

**Mortuary practices, genetics and other
factors relevant to the transmission of
kuru in Papua New Guinea**

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‘I, Mr Jerome T Whitfield, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.’

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Abstract

The large-scale epidemic of bovine spongiform encephalopathy (BSE) in the United Kingdom (UK) created significant fears of a possible threat to public health. This threat was realized in 1996 when variant Creutzfeldt-Jakob disease (vCJD) was first recognized in the UK and was attributed to the oral transmission of BSE to humans. Although the incidence of vCJD is declining the extremely long incubation periods for which genetic effects are clearly important and the unknown prevalence of pre- or sub-clinically infected individuals remain matters of ongoing concern. Such healthy carriers pose a threat of iatrogenic transmission to others during medical and surgical procedures and there have been four cases of transmission of vCJD via blood transfusion.

Before vCJD appeared, kuru and iatrogenic CJD provided our experience of acquired prion diseases caused by human-to-human

transmission. Kuru reached epidemic proportions amongst the Fore and surrounding linguistic groups in Papua New Guinea, and was transmitted during endocannibalism (transumption) of dead family members at mortuary feasts, a practice that ended in the late 1950s. Study of kuru therefore became of renewed interest with the arrival of vCJD as it comprises not only the largest example of an epidemic human prion disease, but one that is nearly complete, offering a number of insights into key parameters of potential relevance to public health in the UK and elsewhere.

The aim of this study is to explain the historical spread and the changing epidemiological patterns of kuru by analyzing factors that affect the transmission of kuru. Although other possible factors are considered, the analysis principally involves the dominant factors of mortuary practices and human genetics. The main thrust of the thesis is on the ethnographic study of mortuary practices, firstly for its primary data, and secondly for its relevance to the transmission of kuru.

Though the genetic results of these studies have proven to be of exceptional interest in understanding genetic susceptibility to and

selection pressure imposed by the kuru epidemic and have provided new insights into human history and evolution, they do not explain the spatiotemporal epidemiological changes. The mortuary rites and related behaviours constitute the principal outcomes of this thesis and can now satisfactorily explain the spread and changing epidemiological patterns of kuru.

Introduction

The large-scale epidemic of bovine spongiform encephalopathy (BSE) in the United Kingdom (UK) created significant fears of a possible threat to public health (Collinge, 1999). This threat was realized in 1996 when variant Creutzfeldt-Jakob disease (vCJD) was first recognized in the UK (Will et al., 1996) and strain typing confirmed that it was caused by the same strain as that causing BSE (Collinge et al., 1996; Bruce et al., 1997; Hill et al., 1997b). Although the incidence of vCJD remains low, concerns remain regarding the genetic effects on incubation period, and of human-to-human transmission through iatrogenic procedures (Llewelyn et al., 2004; Collinge et al., 2006; Wroe et al., 2006). The prevalence of those infected with the vCJD prion in the population is unknown and normal sterilization techniques of surgical instruments do not effectively remove infectious prions (Spencer et al., 2002). To date

there have been four cases of vCJD transmission via blood transfusion (Wroe et al., 2006).

Prior to vCJD there have been two forms of human-to-human transmission of a prion disease. The first is kuru (Gajdusek and Zigas, 1957; Zigas and Gajdusek, 1957), and the second is iatrogenic CJD (Brown et al., 1992; Brown, 2000). Kuru is a prion disease which reached epidemic proportions amongst the Fore and surrounding linguistic groups in Papua New Guinea, and was transmitted during the endocannibalism (transumption) of dead family members at mortuary feasts amongst the Fore and surrounding peoples in the late 1950s (Alpers, 1992; Collinge et al., 2006).

The aim of this study is to explain the historical spread and the changing epidemiological patterns of kuru by analyzing factors that affect the transmission of kuru (Alpers, 1968; Alpers and Kuru Surveillance Team, 2005). Although other possible factors are considered, the analysis principally involves the dominant factors of mortuary practices and human genetics. The main thrust of the thesis is on the ethnographic study of mortuary practices, firstly for

its primary data, and secondly for its relevance to the transmission of kuru.

Early kuru researchers looked at the link between endocannibalism and the epidemiology of kuru (Alpers, 1968; Mathews et al., 1968; Alpers, 1992). However, there has not yet been an in-depth study of clan structure, marriage patterns and inter-clan adoption, and their relationships to mortuary rites and genetics. This study will provide data that explain how these relationships affected many aspects of the mortuary feasts and will also provide ethnographic data to support genetic studies. Furthermore, there has not yet been a detailed study of mortuary rites in the Fore and the contiguous communities of 9 linguistic groups. This study will provide data about the rules surrounding the participation of the mourners, the disposal of the body, and the transfer of the souls of the deceased into the afterlife – the main purpose of the rites. The rich data set will show the complexity of Fore eschatology and the variations and contradictions of human behaviours in relation to mortuary rites that are relevant to the transmission of kuru, and will provide data with the power to explain spatial and temporal epidemiological differences.

The exclusion of alternative routes of transmission has assumed major importance because of the dietary exposure of the UK and other populations to bovine spongiform encephalopathy prions. The primary oral means of transmission of kuru at mortuary feasts has been questioned by some investigators who have emphasized parenteral inoculation over oral ingestion (Gajdusek, 1971). The care with which the body parts and tissues were handled and the wide range of incubation periods of kuru supports oral inoculation through transumption, which has also been shown experimentally (Prusiner et al., 1985), though it is possible that parenteral inoculation may have occurred in some instances. Both the titre of inoculum and the route of inoculation affect the incubation period of prion diseases. The titre of inoculum will vary and will be unknown in each individual case. Ethnographic studies on the mortuary feasts of the kuru-affected region provide important data on the route of transmission and other aspects for the understanding of kuru, which are relevant to the understanding of other prion diseases.

Combining these ethnographic and epidemiological studies with parallel molecular genetic studies of the same populations

(performed by others on samples collected and documented as part of the combined fieldwork) allows detailed assessment of genetic susceptibility and resistance to an acquired human prion disease. This is important both for understanding prion pathobiology and for public health risk assessment.

The genetic results of these studies have proven to be of exceptional interest and provide new insights into human history and evolution. However, the principal outcomes of this thesis show how the mortuary rites and related behaviours explain the spread and changing epidemiological patterns of kuru.

Chapter 1:

Prion diseases of humans and animals

Introduction

The prion diseases of humans and animals are closely related neurodegenerative disorders, previously described as subacute spongiform encephalopathies, or slow virus diseases, and known now as transmissible spongiform encephalopathies (TSEs) and transmissible dementias. The first prion disease to be recognized was scrapie, which occurs in sheep and goats and has been known in Europe for 200 years. Other prion diseases in animals include transmissible mink encephalopathy (TME) (Marsh and Hadlow, 1992) , chronic wasting disease of cervids (Williams and Young, 1980) and bovine spongiform encephalopathy (BSE) (Wells et al., 1987). There have also been cases of feline spongiform

encephalopathy in domestic cats and spongiform encephalopathies in a number of zoo animals (Collinge, 2001).

The human prion diseases have been classified into Creutzfeldt-Jakob disease (CJD), Gerstmann-Sträussler-Scheinker (GSS) disease and kuru. Although CJD and GSS are rare, with an incidence of one person per million per annum worldwide, they have received much attention because of the transmissible prion agent and because of fears of a prion disease epidemic in humans through oral exposure to BSE-infected tissues.

Scrapie was first shown to be transmissible to sheep and goats by inoculation in 1936, following long incubation periods (Cuillé and Chelle, 1936). The infection was believed to have been caused by a virus and in 1954 the term 'slow virus infection' was used by Sigurdsson. In the late 1950s the neurodegenerative disease kuru was investigated in the Eastern Highlands of Papua New Guinea (Gajdusek and Zigas, 1957; Zigas and Gajdusek, 1957). Hadlow noticed the similarity of the pathology, epidemiology and clinical signs of kuru to scrapie and suggested that kuru might be transmissible (Hadlow, 1959). Kuru was successfully transmitted to

chimpanzees by intracerebral inoculation (Gajdusek et al., 1966) and this was followed by the successful transmission of CJD (Gibbs et al., 1968), and GSS (Masters et al., 1981). The success of these experiments gave rise to the concept of “transmissible dementias”.

The nature of the causative agent was the subject of much debate throughout the 20th century (Schneider et al., 2008). The initial assumption that the agent was a virus was challenged by the failure to demonstrate it by electron microscopy; and by the evidence of its remarkable resistance to inactivation of nucleic acid. As early as 1966 it was suggested that the agent might be devoid of nucleic acid (Alper et al., 1966; Alper et al., 1967). Griffith (1967) proposed that the transmissible agent might be a protein. A protease-resistant sialoglycoprotein, designated prion protein (PrP), was isolated from infected brain homogenates that were progressively enriched (Bolton et al., 1982). The term prion was introduced by Prusiner to distinguish the agent from viruses or viroids (Prusiner, 1982). The protease-resistant PrP from the brains became known as PrP²⁷⁻³⁰, and in 1985 it was shown to be encoded by a single-copy chromosomal gene (Oesch et al., 1985). PrP²⁷⁻³⁰ is derived from PrP^{Sc} (denoting the scrapie isoform). The normal form

of the protein is designated PrP^C (denoting the cellular isoform of the protein). There is no difference in the amino acid sequence between PrP^{Sc} and PrP^C, and PrP^{Sc} is formed from PrP^C by a post-translational process that involves conformational change and aggregation (Collinge, 2001). According to the ‘protein only’ hypothesis an abnormal PrP isoform is the principal or sole constituent of the transmissible prion (Prusiner, 1982; Collinge and Clarke, 2007).

Tikvar Alper in 1966 showed that it was not possible to inactivate the scrapie agent with radiation. This led Alper to suggest that the pathogen did not possess nucleic acid, which at that time was thought essential for infection. As there was no nucleic acid it was to be expected that disinfectants that affected nucleic acid would not work against prions. More recently PrP^{Sc} treated with proteinase K remained resistant to treatment over several hours and even days (Prusiner and Hsiao, 1990). Prions are very stable against common bactericide and virucide disinfectants and inactivating methods. Of particular importance to the transmissibility of kuru is the heat stability of prions. Brown and colleagues (Brown et al., 1990) found residual infectivity after

heating infected hamster brain and fibrils in evacuated glass tubes to a temperature of 360 degrees Celsius for 60 minutes.

Prion diseases of animals

The first prion disease recognized in animals was scrapie, a naturally occurring disease of sheep and goats, which is endemic in many countries. Transmissible mink encephalopathy and chronic wasting disease of cervids were initially described in captive animals. It is believed that TME is the result of food-borne prion exposure (Marsh et al., 1991). Chronic wasting disease was initially found in certain areas of Colorado in the USA (Spraker et al., 1987).

BSE first appeared in United Kingdom cattle in 1986 and soon developed into a major epidemic (Wilesmith et al., 1988). Novel spongiform encephalopathies also appeared at the same time in kudu, nyala, Arabian oryx, scimitar-horned oryx, eland, gemsbok, bison, ankole, tiger, cheetah, ocelot, puma and domestic cats following the establishment of BSE. It is likely that they are all caused by the BSE prion strain (Collinge et al., 1996; Collinge, 2001). Over 180,000 cases of BSE have been confirmed in cattle and

it is estimated that 1-3 million cattle were infected. Sizable epidemics have also been reported in many other countries including France, Switzerland, Ireland and Portugal (Collinge, 2001).

Scrapie

Scrapie might have existed in Roman times. The first documented case of scrapie in the United Kingdom was in 1732 and further reports followed between 1750 and the start of the 19th century. Originally the disease had many names, both between and within countries. In the United Kingdom it was known as murrain, goggles, rickets, shewcroft, shakers, scratchie, rubbers, cuddie trot and scrapie. It is believed that the export of Spanish Merino sheep to northern European countries led to severe epidemics in some parts of Germany and France. Other parts of Germany, Britain and Scandinavia were affected to a lesser extent (Hörnlimann et al., 2007c).

Between 1920 and 1958 scrapie was a major problem amongst the Suffolk breed in the United Kingdom and its export was responsible for the introduction of scrapie into Australia and New

Zealand (where it was eradicated during quarantine), the USA and Norway. Scrapie is more common in some sheep breeds than in others. Since the Second World War there has been a significant increase in sheep movements worldwide and these have been responsible for an increase in the number of breeds affected, and an increase in the incidence of scrapie. In 2004, 2663 cases of scrapie were reported in the European Union (European Commission, 2004). However, without an effective test these figures might well be underestimated.

The disease is normally found in sheep between 2 and 5 years of age with most animals becoming infected shortly after birth (Sigurdarson, 1991). The clinical phase lasts from 2 weeks to 6 months: the initial signs are very mild and are often only recognized by the shepherd who cares for the sheep (Radostits et al., 1994). Later the signs become more obvious with the affected sheep becoming nervous or aggressive. Pruritus is common, but absent in the traditional form of Icelandic scrapie. The sheep rub themselves, removing their wool and sometimes damaging their flesh. Others bite themselves and remove the wool over the affected part of the body. Animals may also be hypersensitive and irritable and

tremble. An undisturbed animal might appear normal, but if suddenly startled might develop an uncontrollable tremor. Gait abnormalities occur early in the disease and severe ataxia develops later and progresses to recumbency. The signs of scrapie may vary but the disease is always fatal. Although scrapie is an infectious disease it is known to have a major genetic element which influences the incubation period (Hörnlmann et al., 2007c).

Once scrapie is introduced into a flock it takes on average 3.5 years until signs of the disease become apparent. During this time the disease is likely to have spread to other animals. With time the level of the infectious agent and the pressure of infection increase due to contamination of the environment (Hörnlmann et al., 2007c).

Transmissible mink encephalopathy

Transmissible mink encephalopathy (TME) is a rare disease caused by a feed-borne pathogen similar to scrapie fed to ranch-raised mink (Marsh and Hadlow, 1992). It was first identified in 1947 in Wisconsin, United States of America, and reappeared on 5 farms in 1961. The noxious agent was believed to have been in the animal feed (Hartsough and Burger, 1965). It was in 1963, when it

occurred on a farm in Idaho, that a neurohistological resemblance to scrapie was first realized (Hadlow, 1965). TME has also occurred in Finland in 1966 (Marsh and Hadlow, 1992), Germany and Russia (Hadlow, 2007) .

TME is not vertically or horizontally transmissible (Hanson and Marsh, 1973); however, a few cases have occurred in kits that cannibalized a dead or dying mother (Burger and Hartsough, 1965). So far the disease has not been able to maintain itself in an affected population. Intradermal inoculation of kits may have taken place during feeding times when the kits bit each other (Marsh and Hanson, 1979). The incubation period is around 7-12 months, which means that the disease is only seen in adult mink (Hartsough and Burger, 1965).

The disease has a distinct clinical picture, and onset is insidious with behavioural changes. Increased aggressiveness is common, there are exaggerated responses to sound and touch, and the animal defecates at random sites. A few days after onset there is unsteadiness of the hindquarters followed by drowsiness. Unsteadiness increases and in the late stages of the disease the

animal bites itself and objects around it. In the end it becomes stuporous and finally dies (Hartsough and Burger, 1965; Marsh and Hadlow, 1992; Hadlow, 2007).

Chronic wasting disease in North American cervids

Chronic wasting disease (CWD) is a disease of North American cervid species first recognized in captive mule deer. In 1978 the disease was recognized as a transmissible spongiform encephalopathy (Williams and Young, 1980). Surveillance programs implemented in the late 1990s and early 2000s in Canada and the USA have led to the detection of CWD in farmed cervids in nine states and two provinces. During the 1990s CWD was also recognized in non-captive animals (Williams and Miller, 2007); it is the only known prion disease found in the wild.

It is estimated that the minimum incubation period is 1.5 years. The means of transmission of CWD in wild animals is not known. However, it is believed that some form of horizontal transmission sustains the disease (Miller and Williams, 2003). Live infected animals are probably the primary source of new infections

and geographical spread. Areas may come infected by excreta and decomposed carcasses (Miller et al., 2004).

CWD has been confirmed in four species in three genera, which are all North American members of the family Cervidae. Mule deer and white-tailed deer are the most commonly affected, but wapiti and moose have also been affected. The disease has not been reported in other large ruminants or in farmed animals in the same areas where CWD is found (Williams and Miller, 2007).

The clinical signs of CWD vary and consistent clinical signs occur late in the disease, including a loss of body condition and behavioural changes (Williams and Young, 1980). Those animals that reach the end stage of the disease have chronic wasting, ataxia, head tremor, hyperexcitability, odontoporosis and difficulties swallowing (Williams and Miller, 2007).

The clinical course of the disease varies from a few weeks to over a year, with very short courses, lasting days, observed in some white-tailed deer. New data suggest that the length and course of

the disease are affected by the amino acid sequence of the native prion protein gene (*PRNP*) (Williams and Miller, 2007).

Efforts have been made to determine the incidence and prevalence of CWD in free-ranging and captive cervids in North America and elsewhere. In free-ranging cervids the distribution is patchy, and the prevalence of subclinical CWD cases is high in some populations. In Wyoming and north-east Colorado the prevalence was 5% in mule deer and 0.5% in sympatric wapiti (Miller et al., 2000), and in south-central Wisconsin the overall prevalence was 3% in free-ranging white-tailed deer (Joly et al., 2003). Although there has been a large increase in the number of cases of CWD since 2000 this is likely to have been caused by the increased surveillance rather than an increase in the incidence of the disease. Amongst captive cervids the incidence can reach very high levels with entire cohorts succumbing to the disease (Williams and Young, 1980; Miller and Williams, 2003).

It is possible that CWD is a reemerging disease of cervids, which is supported by its limited geographical distribution, or it may be the result of scrapie infection in cervids. However, cervids

were also exposed to BSE-contaminated feed in the UK in zoos but none there have been diagnosed with prion disease, in contrast to other ruminant species (Williams and Miller, 2007).

Prion diseases of humans

These have been traditionally divided into Creutzfeldt-Jakob disease (CJD), Gerstmann-Sträussler-Scheinker disease (GSS) and kuru, which have been divided into three aetiological categories: sporadic, acquired and inherited. To these have been added fatal insomnia, which maybe either inherited (familial) or sporadic. Acquired prion diseases include iatrogenic CJD and kuru arising from accidental exposure to prions during medical procedures or from participation in endocannibalistic feasts. The sporadic form of CJD occurs worldwide with an annual incidence of one in a million. Around 15% of CJD cases are inherited prion diseases associated with coding mutations in the prion protein gene (*PRNP*). There are no pathogenic *PRNP* mutations associated with iatrogenic CJD or kuru. However, a common polymorphism at *PRNP* codon 129 is a key determinant of genetic susceptibility to acquired (Collinge et al., 1991; Collinge et al., 2006; Collinge et al., 2008; Mead et al., 2009)

and sporadic prion diseases (Collinge et al., 1991; Palmer et al., 1991), and also affects age at onset in some inherited forms of the disease (Collinge et al., 1991; Palmer et al., 1991).

Variant Creutzfeldt-Jakob Disease (vCJD) first appeared in the United Kingdom in 1995 (Will et al., 1996), and once identified as being caused by the same prion strain as BSE (Bruce et al., 1997; Collinge et al., 1996; Hill et al., 1997b) led to concerns of a possible major epidemic of vCJD from dietary exposure to BSE prions (Collinge, 1999). There have also been concerns about iatrogenic transmission of vCJD, in particular from blood transfusions (Collinge, 2001).

Gerstmann-Sträussler-Scheinker disease

Gerstmann-Sträussler-Scheinker disease was first described by Josef Gerstmann, Ernst Sträussler and Issac Scheinker in 1936 in Vienna. They described a rare hereditary familial disease of the central nervous system in a young woman. In the early 20th century neurologists had become aware of this disease and in 1928 Gerstmann had described the clinical aspects of the disease. In 1962 Seitelberger noted the clinical and pathological similarities between

GSS and kuru. In the 1980s another case of GSS was diagnosed in the family and the family's pedigree was updated to include 221 family members from the late 18th century whose members spanned 9 generations (Hainfellner et al., 1995). GSS was successfully transmitted, which confirmed that it belonged to the group of TSEs (Masters et al., 1981). There are two variants of the disease with the classical clinical picture being dominated by ataxia, and the other a mainly dementing form (Hsiao and Prusiner, 1990). The disease is cited to have an incidence of 2 to 5 per 100 million and at least 56 families have been reported to be affected worldwide (Ghetti et al., 2003).

The clinical course of the disease starts slowly with spinal ataxia and pyramidal signs. Later the patient suffers from forgetfulness, reduced intellectual ability and sometimes severe dementia; 82% of GSS patients develop dementia and 15% myoclonus (Kovács, 2002). The median duration of the disease is 39 months (Pocchiari et al., 2004) but it can be longer than 5 years in 31% of cases (Kovács, 2002). A positive family history has been found in 70% of cases and the mean age of onset is 45 years (Budka, 2007b).

Fatal insomnia and sporadic fatal insomnia

Fatal familial insomnia (FFI) was first described in 1986 in Italy. It has an autosomal dominant mode of inheritance and is characterized by its progressive uncontrollable alterations of the sleep-wake cycle, dysautonomy, motor signs and prominent thalamic pathology (Gambetti et al., 2003). It has a specific *PRNP* mutation at codon 178 and the mutated allele encodes for methionine at codon 129 (Goldfarb et al., 1992; Medori et al., 1992). Evidence suggests that FFI has originated independently around the world from multiple recurrent mutation events. The disease showed PrP^{Sc} on western blotting of brain homogenates and a *PRNP* coding mutation, and was included amongst the familial TSEs in 1995 (Tateishi et al., 1995). Later it was proven that FFI was transmissible (Collinge et al., 1995). A recent worldwide review of FFI cases found three in France, seven in Germany (Kretzschmar et al., 1998), two in the United Kingdom, four in Italy, three in the USA, two in Australia and one affected family in Japan. A recent review cites 26 kindreds with 55 FFI cases (Gambetti et al., 2003). A very rare sporadic form, sporadic fatal insomnia (SFI), is now

recognized as phenotypically the same as FFI, but without a *PRNP* mutation. SFI appears rarer than FFI (Gambetti et al., 2003).

The course of the disease and the clinical signs are the same in FFI and SFI. There is a characteristic disturbance of the wake-sleep pattern with other neurological deficiencies. In a review of 14 FFI patients the disease progression was either rapid at a mean of 8.1 months or slow at a mean of 30.8 months (Budka, 1998) and depended on whether the patient was heterozygous at codon 129, which is related to slow progression (Montagna et al., 1998). At the beginning of the disease those who were homozygous at codon 129 experienced dream-like episodes (oneiroid episodes), insomnia and dysautonomy. Those who were heterozygous at codon 129 suffered from ataxia, dysarthria, early-onset sphincter dysfunction, grand-mal attacks and cortical damage (Budka and Gelpi, 2007), with some exceptions (McLean et al., 1997).

Creutzfeldt-Jakob disease

The disease first described by Hans Gerhard Creutzfeldt and Alfons Maria Jakob does not correspond with the Creutzfeldt-Jakob disease of today. Walter Spielmeier suggested that the disease be

named after his two students, Creutzfeldt and Jakob, who first observed the disease, and in the order of their publications (Budka, 2007a).

Over the rest of the century CJD cases have been reported in many countries suggesting a worldwide prevalence of the disease. There was no evidence of transmission or any environmental source and most cases appeared sporadic (Budka et al., 2003). It was only after the transmission of kuru (Gajdusek et al., 1966) that CJD was successfully transmitted (Gibbs et al., 1968). As well as sporadic and inherited CJD there have been over 400 cases of iatrogenic CJD (Brown et al., 1992; Brown, 2000; Will, 2003).

Sporadic CJD may be endogenously caused by a spontaneous conformational change of PrP which then leads to a chain reaction converting PrP^C to abnormal PrP^{Sc}. Where sporadic CJD is inherited there is a coding variation in *PRNP*, this has an autosomal dominant inheritance, but it is recognized that 47% of all genetic TSEs lack a family history. Iatrogenic CJD has been transmitted by contaminated surgical instruments, tissue

transplants and implants, and injected hormone treatments derived from human brain tissue extracts.

In iatrogenic CJD caused by neurosurgical intracerebral inoculation the mean incubation period is 17 months with a range of 12-28 months; for people who received dura mater implants the mean is 9 years with a range of 1.5-23 years; and with peripheral inoculation of cadaveric hormones the mean is 13 years with a range of 4-27 years (Budka, 2007a).

CJD is a rapidly progressive dementia with associated myoclonus, pyramidal or extrapyramidal signs and ataxia, visual signs and terminal akinetic mutism. Iatrogenic CJD mainly occurs in patients under 39 years, often young people who were hormone recipients, inherited CJD in patients aged 50-69 years and sporadic CJD mainly in those aged between 60 and 79 (Ladogana et al., 2005). All forms of CJD transmitted by dura mater grafts have short clinical courses of less than 6 months (Pocchiari et al., 2004). CJD caused by contaminated growth hormone has a clinical course of about one year. Only 15% of patients who develop sporadic CJD are alive after one year (Pocchiari et al., 2004).

The EuroCJD database has 4441 cases of human TSEs of which 84% are cases of sporadic CJD. Between 1999 and 2002 the annual sporadic CJD incidence was 1.39 cases per million. The rate for individual countries varies with Slovakia having an incidence of 0.48 and Switzerland 2.23 with other countries being within the range (Ladogana et al., 2005). Worldwide the incidence of sporadic CJD has consistent rates (Budka et al., 2003).

There are more than 30 *PRNP* aberrations that have been linked to the development of inherited CJD. Local clusters of inherited CJD have been found in Slovakia and in Libyan migrants to Israel due to the E200K mutation (Lee et al., 1999). Ten percent of cases recorded on the EuroCJD database are caused by inherited TSEs including GSS, FFI and CJD (Ladogana et al., 2005).

There have been over 400 cases of iatrogenic CJD worldwide (Will, 2003) and the cases make up 3% of those reported on the EuroCJD database (Ladogana et al., 2005).

The pathology of CJD shows a generalized or sometimes focal atrophy in the cerebrum or cerebellum. Spongiform change with

loss of nerve cells and gliosis form a classical triad which identifies CJD, along with PrP^{Sc} deposition in central nervous tissue (Budka et al., 2003).

The probability of developing CJD is affected by genetic factors (Collinge et al., 1991; Palmer et al., 1991). Nearly 72% of sporadic CJD cases are homozygous for methionine (MM) at *PRNP* codon 129, whereas only 37% of the unaffected population is MM homozygous (Palmer et al., 1991). Only 11% of sporadic CJD cases are heterozygous at *PRNP* codon 129, whereas 51% of the normal population is heterozygous. The rest of the population is VV homozygous, making up 12% of the normal population and 17% of the sporadic CJD patients. It is now well established that *PRNP* codon 129 is an important indicator of CJD susceptibility.

Iatrogenic CJD has mainly been the result of hormone treatments derived from contaminated pituitary glands (Will, 2003). Other cases have been caused by dura mater grafts with Japan being the most affected country. There have also been cases of people becoming infected via cornea grafts and through the use of contaminated instruments (Brown, 2000)

Kuru

A detailed description of the epidemiology of kuru is given in Chapter 2. The genetics of kuru are covered in Chapter 9. To avoid duplication, this section is largely limited to the clinical aspects of the disease.

Kuru is found amongst the Fore-speaking people and 9 contiguous linguistic groups in the Eastern Highlands Province of Papua New Guinea. The linguistic groups affected by kuru were the Fore, Gimi, Keiagana, Kanite, Usurufa, Kamano, Yagaria, Yate, Awa and Auyana.

The local linguistic groups have a number of names for the disease; kuru was the Fore name and means shivering or shaking. The disease was believed to have been caused by a powerful form of sorcery. The first account of the disease was by Dr Vincent Zigas in 1956 (Anderson, 2008) and since surveillance began in 1957 there have been more than 2700 cases (Hörnlimann and Alpers, 2007).

The disease has an incubation period ranging from 4 years to more than 50 years (Klitzman et al., 1984; Collinge et al., 2006;

Collinge et al., 2008). These variations in incubation periods are consistent with transmission occurring as a consequence of eating various amounts of infected tissue, the effects of which may have been cumulative. This occurred during endocannibalism when the bodies, including infective brain tissue, of deceased relatives were consumed. Parenteral transmission could also have occurred during the handling of the body when infective brain tissue came into contact with sores or cuts on the mourners. Parenteral inoculation is a more efficient route of transmission and can be associated with shorter incubation periods.

Genetics also plays an important part and patients who are heterozygous at *PRNP* codon 129 have longer incubation times (Mead et al., 2003; Mead et al., 2008b; Mead et al., 2009). There is no natural horizontal infection and kuru is not contagious; nor is there evidence of vertical transmission or transmission during breastfeeding (Alpers, 1968; Alpers, 1979).

The mean clinical duration for adults is 12 months from onset to death, and this is slightly shorter for children (Alpers, 1987). This can range between 3 months and 2 years and in exceptional cases

even longer (Alpers, 1964). The most prominent clinical feature of kuru is progressive cerebellar ataxia. In CJD the prominent feature is dementia, which is reported to be less common in kuru and seen predominantly in the terminal stages. However, significant cognitive deficits have been reported earlier in the clinical course in recent cases (Collinge et al., 2008). Kuru has not changed in its features during the different stages of the epidemic. It has a clear clinical progression consisting of prodromal symptoms and three clinical stages. The prodromal symptoms are headache, aching of the limbs and joint pains that can last for several months. The ambulatory stage, or first stage, was often self-diagnosed by the patient. The first symptoms are unsteadiness when standing or walking, or dysarthria or diplopia, with or without objective signs of kuru. As gait ataxia worsens the patient develops a broad-based gait, truncal instability and titubation. A postural tremor is often present and worsens with movement; to control this patients often hold their hands together in their midline. When patients stand with their feet together, clawing of the toes is observed as the patient maintains posture. During this stage of the disease patients often develop a severe reactive depression, and the prodromal

symptoms disappear. Astasia and gait ataxia worsen and the patient requires a stick to walk. Intention tremor, dysmetria, hypotonia and dysdiadochokinesis develop. Eye movements are ataxic and jerky but nystagmus is rarely seen. Strabismus may occur; it is usually convergent and is more common in children. It is not concomitant or paralytic and fluctuates in extent and type, sometimes disappearing later in the course of the disease.

Photophobia is common, and patients can be hypersensitive to cold causing shivering and piloerection even when the patient is in the warm sun. Dysarthria is common. Tendon reflexes are reduced or normal, and plantar responses are flexor. The mean clinical duration of the first stage is eight months (Alpers, 1964). Gradually the ataxia worsens and the patient is unable to walk without support and this marks the transition from stage 1 to stage 2, the sedentary stage of the disease, which typically lasts from two to three months. With assisted walking the patient experiences high-steppage, wide-based gait, reeling instability and flinging arm movements in attempts to maintain balance. Hyperreflexia is present, but plantar responses remain flexor with intact abdominal reflexes. There is a short period of marked clonus. Athetoid and

choreiform movements and parkinsonian tremors may occur. There is reduced muscle power, but paralysis does not occur. Obesity is common at this stage and may occur earlier in the course of the disease associated with bulimia. Emotional lability and euphoria with inappropriate laughter can occur, and these features gave rise to the inappropriate name 'laughing death' coined by the media. There is no sensory impairment. When the patient is no longer able to sit unsupported the 3rd stage, or recumbent stage, is reached. Hypotonia and hyporeflexia develop and the terminal stage is marked by flaccid muscle weakness. Plantar responses remain flexor and abdominal reflexes intact. Dysphagia occurs, the patient becomes incontinent of urine and faeces, and inanition and emaciation might occur. Often patients develop primitive reflexes. Transient conjugate eye signs and bulbar and pseudobulbar signs may also occur. Death is normally due to respiratory failure, bronchopneumonia or septicaemia. This final stage normally lasts one to two months but it is not uncommon for it to be longer (Alpers, 1964; Collinge et al., 2006; Collinge et al., 2008).

New prion diseases

Bovine spongiform encephalopathy

In 1986 a new cattle disease was recognized in the United Kingdom, and because it resembled a TSE it was named bovine spongiform encephalopathy (BSE) (Wells et al., 1987). It soon became apparent that they were not isolated cases and that an epidemic was in progress. By mid-1987 the clinical and pathological definition of the disease was established and by the end of that year a hypothesis was established that BSE was a feed-borne disease, with contaminated meat-and-bone meal causing transmission of the disease. In July 1988 a ban was imposed on feeding ruminant protein to ruminants. Similarities between BSE and scrapie were recognized, and it was believed that ruminant-derived high-protein feed for calves contained a scrapie-like agent.

Later studies examined recent changes in rendering processes. Rendering is a process of cooking abattoir animal waste using heat to separate water and fat from protein. The protein was then turned into animal feed or fertilizer after grinding. Investigators concluded that the onset of exposure was related to the cessation in nearly all

rendering plants of the use of hydrocarbon solvent in the separation of fat from the meat-and-bone meal. The geographical variation in the reprocessing of the protein into animal feed supported the variation in incidence of BSE. The origin of BSE is not known. At the time when BSE arose scrapie was the only animal prion disease recognized in the UK and BSE may have arisen from a cattle-adapted scrapie-like agent. However, subsequent strain typing has not been able to relate BSE with any known strain of scrapie. BSE appears to have been caused by a single strain (Bruce et al., 2002) according to studies made on isolates from the UK, Switzerland and France (Bruce et al., 1994). There is no evidence of genetic differences in susceptibility of cattle to BSE. BSE may have originated as a sporadic case of endogenous bovine prion disease.

New spongiform encephalopathies appeared in ruminant species in zoos and wildlife parks and amongst a variety of domestic and wild cats. These have also been attributed to infected feed in the case of ruminants, and to infected meat given to cats. Similar feeding histories and the distribution of cases in zoos also supports the hypothesis that these encephalopathies were caused by the same agent that caused BSE (Hörnlimann et al., 2007b).

BSE is transmitted to cattle via contaminated feed and there is no evidence to support it being a contagious disease. There is no proven evidence of transmission via milk from infected animals, or other evidence of vertical transmission (Hörnlmann et al., 2007b).

The mean incubation period of BSE in cattle is 5 years with the maximum reported age being 22 years and 7 months, and the youngest 20 months. Diagnosis is made in cattle exhibiting abnormal behaviour or locomotor disorders. BSE presents with a number of unspecific general signs such as emaciation, reduced activity, lowered heart rate and neurological signs. Nearly all animals present with behavioural abnormalities including anxiety, restlessness or nervousness. Animals are hyperresponsive to external stimuli and display abnormalities in locomotion such as hind limb ataxia. Recumbency is seen in the final stages of the disease (Schicker et al., 2007).

To the end of 2005, 184,296 cases of BSE were confirmed in the UK which was approximately 97% of the total number of cases worldwide. 5387 cases were reported in other countries by the beginning of 2006. In 1992 when the epidemic peaked the incidence

was just under 1% of the at-risk population, and by 2005 the annual incidence had dropped to 4 cases per 100,000, indicating a waning epidemic. At the start of 2006 3-4 new cases were being reported per week compared to over 1000 per week in 1993, with only 16% of the reported cases in 2006 being confirmed as BSE compared to an 80% confirmation in 1993 (Hörnlimann et al., 2007a).

Surveillance has now recognized 2 variants of the disease known as L-type and H-type, both of which differ from classical BSE. They have both been found in older animals worldwide and their low prevalence is consistent with the possibility of sporadic forms of prion disease in cattle (Casalone et al., 2004; Béringue et al., 2008). Atypical scrapie, of which Nor98 makes up the largest sub-group, is possibly a sporadic form of scrapie (Alvseike et al., 2007).

Variant Creutzfeldt-Jakob disease

A novel human prion disease variant CJD (vCJD), was first recognized in the United Kingdom in 1996 (Will et al., 1996). It is thought that vCJD was caused by exposure to infected bovine tissue in the human food chain in the 1980s and early 1990s. Mechanically

recovered meat contaminated with infective bovine spinal cord exposed a large proportion of the population to the BSE agent. Exposure was significantly reduced by the specified offal ban in 1989 and the risk further reduced by excluding older animals, according to the 'Over 30 month Rule' in 1996.

The incubation period of vCJD is likely to be at least 12 years as the youngest case was aged 12, so this could conceivably be the shortest incubation period. In most cases it will be longer, based on the minimum incubation period of iatrogenic CJD with peripheral inoculation, and taking into account the bovine-human interspecies transmission barrier. The mean incubation period of vCJD is not known.

vCJD has a long prodromal phase with psychiatric symptoms, and only a terminal phase similar to classical CJD (Zeidler et al., 1997a; Zeidler et al., 1997b). Less than half of the cases have associated painful sensory symptoms. Involuntary movements are often found, including chorea, dystonia and myoclonus. All patients develop ataxia which is followed by a progressive dementing process. The mean duration of the disease is 14 months.

Until June 2010 there were 173 confirmed cases of vCJD in the United Kingdom. 47 cases were identified in other countries, with 25 in France, 4 in Ireland, 2 in the USA, 2 in Italy, 3 in the Netherlands, 5 in Spain, 3 in Portugal and single cases in, Canada, Japan, and Saudi Arabia. It is thought likely that the Canadian, one US, the Irish and possibly the Japanese cases were caused by exposure while resident in the UK in the 1980s and 1990s. The number of deaths from CJD peaked in 2000 and there has since been a decline in the annual number of new cases. The mean age of death in vCJD is 29 years compared to a mean age of 66 years for classical CJD. The youngest patient with vCJD was 12 and the oldest 74. vCJD cases are remarkably similar and their clinical features are distinct from sporadic CJD. BSE has been confirmed experimentally as the cause of vCJD (Collinge et al., 1996; Bruce et al., 1997; Hill et al., 1997b).

Until recently all the tested cases of vCJD had been methionine homozygous at codon 129 of *PRNP*, which is a known risk factor and is expanded on in the genetics chapter (Collinge et al., 2006; Collinge et al., 2008). However, in 2008 the first *PRNP* codon 129

heterozygous case was reported but tissue diagnosis was not available (Kaski et al., 2009).

Conclusion

Research into kuru combined anthropological, epidemiological and clinical studies which led to the recognition of its neuropathology and its causal parallel to scrapie. Its subsequent transmission to primates led to the concept of transmissible spongiform encephalopathies and to the unifying concept of mammalian prion diseases. As well as its historical importance, kuru has provided the opportunity to study the full course of a human prion epidemic. Kuru has allowed investigators to establish minimum and possible maximum incubation periods from case histories rather than mathematical models, and has provided insight into the possible incubation periods of vCJD. The permanent cessation of the means of transmission of the disease, endocannibalism, has allowed for investigation into the enormous range of possible incubation periods.

Recently collected oral histories have reaffirmed the cessation of endocannibalism when Australian administrative control was established over the kuru-affected region (Alpers, 1968; Lindenbaum, 1979). Though isolated incidents occurred afterwards these only involved elderly women and there was no significant exposure to kuru after 1960. There were no cases of kuru in people born after 1959, and only 9 in those born after 1956. The 11 cases of kuru recorded between 1996 and 2004 were all born before 1950. If there was still any form of exposure from surreptitious endocannibalism or from ground contamination of prions where feasts were conducted we would have seen cases in people born after 1960, especially in children who have shorter incubation periods; however, no such cases have been recorded (Collinge et al., 2006; Collinge et al., 2008).

Mortuary feast practices involved eating the entire body and the burning of utensils, bamboo tubes and leaf plates at the end of the ritual. This makes it unlikely that there was any ground contamination, and this is supported by the fact that there have been no clusters of kuru cases for many years (Klitzman et al., 1984).

Maternal transmission did not occur in kuru: no evidence has been found for it from the kuru database and archives, from local oral history or from clinical researchers who participated in the early investigation of the disease. The fact that there have been no cases at all in the cohort of children born since 1960, despite many cases in their mothers, argues strongly against vertical transmission.

The kuru epidemic arose from intraspecies recycling of infectious prions. However, transmission of prions between different mammalian species is associated with a transmission barrier which is dependent on the prion strain type and the species-specific differences in its determination. The effects of this transmission barrier are extended mean incubation periods and reduced attack rate. Incubation periods reaching the natural life span of the inoculated species are seen in primary cross-species transmission of prions. Secondary passage within the new species is marked by shortening of the mean incubation period, reduction in the spread of incubation period and high or total lethality to high-titre inocula. This means that the incubation periods of human BSE infection

need to be considered with regards to the effects of the transmission barrier.

The mean incubation period of kuru is estimated to be 12 years (Collinge, 1999; Alpers, 2008) and a similar estimate has been made for iatrogenic CJD caused by peripheral inoculation with pituitary-derived growth hormone (Brown, 2000). In kuru the maximum incubation periods may extend beyond 50 years (Collinge et al., 2006). The BSE cattle-to-human incubation period cannot be directly determined and therefore remains unknown. However, the cattle-to-mouse transmission barrier results in a three-to four-fold increase in mean incubation periods (Collinge, 1999). Therefore the mean incubation period for human BSE infection could well be 30 years or more, with longer incubation periods possibly exceeding the natural life span.

In addition to the *PRNP* gene a few additional genetic loci with major effects on incubation periods have been mapped and these could be important in human susceptibility to prion diseases. All those with short incubation periods have been methionine homozygous at *PRNP* codon 129 (Collinge et al., 1991; Palmer et al.,

1991; Mead et al., 2003; Collinge et al., 2006). It is likely that vCJD patients to date have the shortest incubation periods for BSE due to these genetic factors. It is known that these patients have no other unusual history of dietary or work exposure. As a result the vCJD epidemic may be multiphasic and this makes it difficult to predict numbers (Collinge et al., 2006).

CJD has been transmitted in western societies by accidental inoculation with human prions via medical and surgical procedures. These include inadequately sterilized surgical instruments, dura mater and corneal grafts and intramuscular injections with infected hormones derived from cadaveric pituitary glands. Recently there have been 4 cases of patients being infected with vCJD prions via blood transfusion (Wroe et al., 2006). Iatrogenic inoculation via intracerebral and optic inoculation manifests as classical CJD with a rapidly progressive dementia. However, iatrogenic inoculation via peripheral inoculation manifests as a progressive cerebellar syndrome somewhat similar to kuru. It is therefore possible that the route of infection is important in determining kuru phenotype, though other factors such as genetics may also be important. This is supported by some rodent scrapie models where peripheral

exposure is followed by prion replication to high levels in lymphoreticular tissues (Fraser et al., 1992) with later entry into the central nervous system (Beekes et al., 1996). It is of interest, and public health importance, that vCJD is associated with high levels of prion colonization of lymphoreticular tissue (Hill et al., 1997a; Hill, 1999). This might be due to the supposed oral route of infection or due to the strain type. A tonsil biopsy performed on a kuru patient lacked any detectable PrP^{Sc}. A full autopsy was performed on a kuru patient by Dr Ken Boone and me to confirm if there was prion infectivity outside of the central nervous system (Boone, 2008; Poki 2008). Pathology studies on these samples found no evidence of lymphoreticular involvement in kuru (Brandner et al., 2008).

This argues against uniform lymphoreticular involvement after oral transmission and is consistent with the prion strain properties of vCJD determining the peripheral pathogenesis of vCJD rather than the route of exposure (Brandner et al., 2008; Collinge et al., 2008).

Recent investigations into kuru have allowed researchers to investigate some new aspects of the disease, as described above, and also to investigate epidemiological questions that only became apparent during the later stages of the epidemic. These questions are explained in detail in later chapters.

Chapter 2:

A history of the kuru-affected region and of kuru research

This background chapter is limited to a history of the kuru-affected region and of kuru research. Background information on the geography, historical linguistics, archaeology and social anthropology of Papua New Guinea and of the kuru-affected region can be found in Appendix A.

The island of New Guinea was divided amongst three colonial powers: the Dutch claimed the west of the island, the British established the Protectorate of Papua (or British New Guinea) and annexed the territory in 1884, and the Germans controlled the north-east part of the island and the islands of New Britain, New

Ireland, Bougainville and Manus. In 1906 Australia took over control of the Territory of Papua from the British. At the outbreak of the First World War Australia seized the German-controlled area and in 1921 it became a League of Nations Mandated Territory under Australian administration.

Initially settlements were on the coast, but both the Germans and the Australians conducted exploration. The German expedition of 1914 reached the headwaters of the Sepik River in the Telefomin area. Although patrols were conducted inland in Papua the areas explored remained uncontrolled as the government did not have the resources necessary to administer them. Lutheran missionaries first reached the highlands in 1919, a mission was established in the Gadsup in 1922, and by 1930 the German missionaries reached the junction of the Bena and Asaro Rivers.

Helmuth Baum, a gold prospector, reached the Upper Ramu between 1918 and 1919 and Edward Ubank, another gold prospector, in 1928. Baum was killed in the Upper Watut in 1931 by the Kukukukus. The first successful gold prospector was Edward Waldren (Ned) Rowlands who reached the Upper Ramu in

September 1928, and later teamed up with Cecil Levien. Other prospectors entered the region, and in April 1930 Michael Leahy and Michael Dwyer made their way into the Upper Ramu, went on to the Goroka Valley and then down the Purari River to the Gulf of Papua. Lapumpa airstrip near Kainantu was built in 1932 and the Upper Ramu Patrol Post established there (Radford, 1987). In 1933 Michael Leahy and James Taylor walked from the Bena patrol post to Mt Hagen and explored the Chimbu area and the Western Highlands.

Long before the arrival of foreigners in the highlands their influence was being established through the introduction of new plant species and goods (cloth, knives, axes, matches, salt and beads) that were traded into the highlands. In the 1500s sweet potato and tobacco were introduced from South America into the Moluccas by the Portuguese and from there reached New Guinea through traditional trade routes (Allen, 1992).

In the 1930s the Fore and their neighbours heard and saw aeroplanes fly over their territory. It is likely that Ted Ubank and

the Ashton brothers passed through the Fore, but if they did not the Fore certainly heard about them (Nelson, 1996).

The Japanese invaded Papua New Guinea in 1942 and quickly occupied the north coast and the islands. During the war a group of Australians escaped through the Fore and down the Lamari River to the Purari River. A Japanese bomber crashed near the village of Ilesa and the survivors remained there for six months as one of the crew had a broken leg. Afterwards the crew walked back to their own lines in the Markham Valley by being passed from community to community. An American hospital plane crashed in the North Fore near Awande with no survivors. A retrieval party came and collected the bodies of the dead. In 1943 there was a dysentery epidemic that seriously affected the Fore and their neighbours and there were many deaths.

After the defeat of the Japanese in 1945 the Australian Administration reestablished government control in those areas close to its administrative centres and began exerting its influence further afield. The first government patrol to the edge of the Fore in 1947 went to recover a rifle that had been stolen from an army

patrol in 1943 by Joyo, a resident of Osen. Joyo later obtained ammunition from people living near Kainantu and then used the rifle in local disputes. A 'great man' from Moife met Patrol Officer Don Grove and told him that his enemies had hired Joyo and his rifle to attack them. The government responded by sending Patrol Officer Ian Skinner to retrieve the rifle. He headed south from Kainantu in October 1947 and was met with showers of arrows. The rifle was eventually handed over to Skinner through an intermediary who was rewarded. One policeman was wounded, and one or two Fore or their neighbours shot. After Skinner left Ibusa enemies took the opportunity to attack the village, and Skinner quickly returned and frightened the attackers off with warning shots. In general, Skinner found the people friendly but nervous. Over the next few years the Government gradually exerted its control. The early patrols took small groups of men back to Kainantu where they could see the Administration and learn some Tok Pisin (the national language of Papua New Guinea which has evolved over the last 100 years, and is the universal language in a country with over 800 different languages). The patrol officers appointed village officials called 'luluais' and 'tultuls' and set up

police posts manned by Papua New Guinean police. The first police post in the Okapa District was built in Moke, in January 1951, and manned by Corporal Nalakor and Constables Merakami and Pakau. However, Corporal Nalakor shot a man from Purosa during a raid and was sent back to Kainantu. Patrols continued into the adjacent territories of the Gimi, Yate, Yagaria and Keiagana. Roads were built and the people told to stop fighting and to stop eating their dead. In 1950 Patrol Officer Carey held a ceremony near Tarabo to bring about peace between warring factions and to show the superiority of the government 303 rifle over the bow and arrow. To the north the Lutheran Missionaries encouraged people to destroy their sacred flutes. Patrols were also passing through the Awa, Auyana and other groups to the east of the Fore. As the people built roads as part of their compliance to the kiaps they soon recognized the sound of their Land Rovers and motorbikes which heralded their arrival.

The Fore travelled north to meet the kiaps and invited them to their hamlets and presented them with pigs and garden produce. As early as 1952 North Fore men had left to find work with goldminers and at government agricultural stations in Aiyura and Kainantu.

Those who left home cut their long plaited hair and changed their dress. These fashions were quickly followed by those at home. New crops were planted in some villages and others received seeds via trade. These included potatoes, corn, beans, peanuts and tomatoes. Chickens also spread quickly and in 1954 a Berkshire boar introduced its genes into the local Fore pigs. Coffee was first planted in the region in 1954. Papua New Guinean Lutheran and Seventh Day Adventists followed and by 1952 some were living in the South Fore. In 1950 a white missionary was living in Tarabo and the first government school was opened in Okapa in 1957.

Medical orderlies accompanied the patrols into the region and in 1952 a Native Medical Orderly was based in Moife and a year later one was posted to Moke. Early patrol reports mentioned many signs of ill health and in particular yaws.

Government officers were quick to notice the sorcery beliefs of the Fore and their neighbours. Accusations of sorcery were the main reason for fights and they recognized similar beliefs from elsewhere in PNG. Patrol Officer McArthur persuaded people to hand over their sorcery materials which were then burnt and the people told

that if they practised sorcery or divinations they would be punished. This had no effect on the beliefs of the Fore or their neighbours. However, some changes such as cessation of fighting were adopted very rapidly in the Fore and surprised the kiaps, especially considering the previous level of warfare.

The anthropologists Ronald and Catherine Berndt conducted field work in the Fore in 1951 and 1953. By 1951 the North Fore was controlled by the Australian Administration. In 1953 the South Fore was made a separate census division and nearly 3000 South Fore had their names in the census book. In 1954 the government built a station at Moke which officially became known as Okapa (the station was officially gazetted as Okapa since the earlier decision had been made to locate it near the Okapa (Okasa) pine forest). There was already a jeep track from Kainantu to Okapa and an airstrip in Kainantu for people to travel to Lae.

By 1957 the lives and world view of the Fore and their neighbours had changed dramatically. Some things changed quickly such as the suppression of warfare, eating of the dead and the making of roads. They still had their language, land and customs,

and adopted what suited them into their own belief systems, and accepted the authority of the Australian Administration. In 1958 the South Fore and Gimi areas were declared as controlled by the Administration.

What did differ between the Fore and their neighbours and other highlanders was the occurrence of kuru, a very powerful form of sorcery. In 1950 Patrol Officer Arthur Carey reported sorcery-related deaths in the Inibi-Kimigomo area and a year later he referred to the sorcery as kuru. The Berndts also mentioned it in their first publication. McArthur mentioned it in 1953 and Brown in 1954 with a more detailed description about how it was made by men and affected women. Coleman was the first patrol officer who sent a kuru-affected person to the Kainantu Hospital where the patient was examined by Dr Vincent Zigas and diagnosed as 'acute hysteria in an otherwise perfectly healthy woman' (Nelson, 1996).

By 1955 the generally accepted explanation was that kuru was a hysterical condition resulting from beliefs in sorcery; this was later made explicit by Berndt (1958). In 1956 Charles Julius, the Government Anthropologist, visited the South Fore and wrote a

perceptive report on kuru and kuru sorcery (Julius, 1957). However, the 'bar talk' in Goroka and Kainantu attributed it to the cannibalistic practices of the Fore (Alpers, 1992). It was Frank Earl, an Australian medical assistant, who, having accompanied Coleman on patrol and seen many cases of kuru, of all ages, first suggested that it was caused by some kind of encephalitis (Anderson, 2008). In 1956 Dr Vincent Zigas spent 20 days in the Fore between October and November and made a provisional diagnosis of a type of encephalitis; he sent samples of brain to the Walter and Eliza Hall Institute of Medical Research in Melbourne for investigation.

In March 1957 Dr Carleton Gajdusek, on a visit to Papua New Guinea, arrived in Kainantu and, having been shown several patients with kuru, started to work on the disease with Vincent Zigas. Gajdusek and Zigas hit it off, and were soon investigating the disease in Okapa. The work was conducted under difficult conditions in remote areas. Gajdusek and Jack Baker, the kiap, lived in the area. Other scientists came and visited for variable periods of time to help in the research. Later, Robert Glasse and Shirley Glasse (Lindenbaum) conducted anthropological fieldwork from the village of Wanitabe (Lindenbaum, 2008b), and Michael

Alpers began his medical and epidemiological studies from the village of Waisa (Alpers and Hörnlimann, 2007a).

The patients were visited at their homes and a clinical picture of the disease established. A hospital was built at Okapa, where patients were cared for and investigated and autopsies performed. To help with the work Gajdusek employed a number of local men as interpreters, porters and guides. Pathology specimens were sent by car to Kainantu airstrip and then on to laboratories in Port Moresby, Australia and the United States of America. Initially funding came from the hospital run by Vincent Zigas in Kainantu and then from the National Institutes of Health in Bethesda, Maryland. Patients with kuru were transported on wooden boards over long distances to the hospital at Okapa Station. In the first 7 months 154 kuru patients were studied (Zigas and Gajdusek, 1957).

Information gathered from the Fore people allowed early investigators to establish that kuru was first recognized around 1910, and from then it had grown into a major epidemic. The first case of kuru occurred in the village of Uwami in the Keiagana linguistic group, and then the disease spread to Awande in the

North Fore, and along the valley to Kasokana, from where it spread north and south into the North Fore and South Fore (Glasse, 1962b; Mathews, 1965). The spread of kuru is shown in Figure 2.1. Of the more than 2700 cases of kuru 80% have occurred in the Fore, with most of those occurring in the South Fore. There was a higher incidence of kuru amongst the South Fore, who also had a larger population than the North Fore. The epidemic reached its peak in 1958-1959 and began to decline from 1960 onwards (Figure 2.2). There were no data for the period before 1957 but nothing in the oral history of the Fore indicated that the epidemic had peaked earlier (Alpers and Hörnlimann, 2007b).

In 1957 Gajdusek and Zigas published their first findings describing kuru as an organic neurological disease (Gajdusek and Zigas, 1957; Zigas and Gajdusek, 1957). It soon became apparent that kuru was a syndrome with unique characteristics. The symptoms included general clumsiness of movement, unsteadiness of gait, trunkal instability and progressive difficulty with walking and, later, sitting up. The disease was in due course recognized as a progressive cerebellar ataxia (Simpson et al., 1959; Alpers, 1964; Hornabrook, 1968). The disease also had an unusual age and sex

distribution with over 70% of cases occurring in adult women, and nearly 30% in children and adolescents (with about equal numbers of males and females). The age of kuru victims ranged from as young as 5 years to over 70 years of age (Alpers, 2007).

In 1965 the changing epidemiological patterns of kuru were described showing the decline in incidence (Alpers, 1965; Alpers and Gajdusek, 1965). As the epidemic evolved, the decline proved to have a long tail, with the last 3 cases occurring in 2003, 2005 and 2009; the shape of the epidemic of kuru is seen in Figure 2.3. The pattern of decline varied by age group. The most striking early finding was the disappearance of the disease in those aged under 10 years, and then in those between 10 and 14 years of age; this disappearance gradually progressed through the age groups (Figure 2.4). It eventually became clear that those born since 1960 were growing up free of kuru (Alpers, 2007).

Gajdusek's primary goal was to discover the actual cause of the disorder so he could stop the disease. There were no signs of infectious disease as there was no fever or inflammation. Antibiotics were ineffective, which made bacterial infection unlikely.

Transmission studies with rats and mice yielded negative results. These early results pointed to a non-infectious degenerative brain disease (Alpers, 2007; Alpers and Hörnlimann, 2007a).

From the autopsies performed brains were sent for laboratory analysis. Gajdusek performed autopsies at the kuru hospital in Okapa and this was tolerated by the families; however, the Fore and their neighbours preferred their loved ones to die at home and the reasons for this are explained in the ethnographic descriptions in later chapters. Alpers followed the local wishes and performed all his autopsies in hamlets. Initially brain samples were sent to Australian laboratories, but in August 1957 some were sent to Bethesda in the United States of America. These were examined by Igor Klatzo, who confirmed that there were no inflammatory signs and no evidence of infection. He speculated that a toxic metabolite resulting from the diet of the affected-people might be the cause of kuru. Klatzo also detected vacuolar degeneration, with microscopically small holes, in neurones and characteristic plaques. He noted the neuropathological similarity of kuru to Creutzfeldt-Jakob disease (Klatzo et al., 1959).

Investigations were conducted into the Fore diet to see if there was any possibility of infection, toxicity or deficiency. Garden foods, insects, reptiles, wild animals, domestic animals and birds were all investigated but no evidence was found of an infection that was transmitted from these species to humans. Over 500 food samples were analyzed and compared to samples taken amongst the Anga population who were kuru-free. Cooking utensils, dyes, salt, smoke and ash were all examined but the results were still negative. Blood samples and parasite samples were analyzed but nothing provided any answers. Samples were reanalyzed and possible nutritional and toxic hypotheses evaluated and reassessed (Reid and Gajdusek, 1969; Sorenson and Gajdusek, 1969).

The effect of kuru on Fore society was profound, especially in relation to women and women's roles (Glasse, 1964; Lindenbaum, 1979). At the height of the epidemic over half of all women died from the disease and this had a disproportionate affect on the male-female ratio in affected villages. Men had to take on female chores such as gardening and childcare which were normally women's duties. Women were married at increasingly early ages, to ensure a clan's survival, to men who were increasingly older. Women started

having children shortly after puberty. Children were normally breastfed for up to 3 years and young infants sometimes died of malnutrition if their mothers had died of kuru. Those dying of kuru were cared for by their relatives, and orphaned children adopted by their relatives (Alpers and Hörnlimann, 2007a).

During the analysis of the data collected by the early researchers Gajdusek thought that kuru might have been a genetically linked disease. There was suggestive evidence to support this hypothesis. All the families affected by kuru were related to the Fore by marriage. The Anga and Pawaia who did not intermarry with the Fore were unaffected by kuru. Emigrants from the kuru-affected region maintained their former risk of disease in their new environment. Immigrants were never affected except in the few cases of women marrying in from a neighbouring group just outside the known affected region. Nevertheless, it was hard to explain how such a deleterious gene had become so common in the population and why the age at onset of disease ranged across the whole lifespan.

Bennett and colleagues collected genealogical data from the Fore and developed their hypothesis of a genetic cause for kuru that explained the epidemiological pattern (Bennett et al., 1958, 1959). Gajdusek, however, kept an open mind on the matter and continued to explore a range of aetiological possibilities (Gajdusek, 1963).

Bennett engaged the anthropologists Robert Glasse and Shirley Glasse (Lindenbaum) to investigate the genetic hypothesis in more detail. Their work on Fore kinship and social structure and on the relatively recent origin of kuru did not support the genetic hypothesis (Lindenbaum, 2008a). As they learned more about Fore society, they turned towards endocannibalism as a more likely cause.

In 1959 an exhibition on kuru was held at the Wellcome Medical Museum in London and photographs of tissue sections of kuru brains taken by Igor Klatzo were included. One of the visitors, William J. Hadlow, recognized a similarity in the neuropathology of kuru to that of scrapie, a prion disease of sheep and goats with long incubation periods. Hadlow wrote a letter to the *Lancet* pointing this out and suggested transmission studies using apes (Hadlow,

1959). In 1962 transmission studies using chimpanzees were planned and began at the National Institutes of Health in 1963; in 1965 the first chimpanzees showed signs of kuru. The results of this study were published by Gajdusek, Gibbs and Alpers and showed for the first time the transmissibility of a human neurodegenerative disease (Gajdusek et al., 1966). In 1976 Gajdusek was awarded a Nobel Prize for Medicine for his pioneering work on kuru.

It was well known at this time that the Fore and their neighbours practiced endocannibalism, a practice that was witnessed by Gajdusek and Kiaps who first entered the region (Skinner, 1948; Klitzman et al., 1984). Accounts were collected from local people by anthropologists and other investigators (Glasse, 1967; Lindenbaum, 1975a,b; Alpers, 1992). The practice of endocannibalism involved the eating of the body of the deceased by family members and the incorporation of part of the spirit of the dead person into the bodies of living relatives, which helped to protect the village community. The Fore spoke openly of their practice and were proud of it (Alpers and Hörnlimann, 2007a).

In 1954 the Australian Administration had prohibited endocannibalism in the Okapa District and enforced the prohibition. The Christian Missions at Tarabo, Okasa and Purosa also helped in bringing about this change in people's behaviour. As endocannibalism was one of several ways of disposing of bodies of loved ones it was not vital to Fore cosmology to consume the bodies and this would have eased their compliance to the wishes of the Administration and the Missions. Nevertheless, the Fore were upset by the prohibition and surreptitious endocannibalism continued until the practice ceased by the early 1960s.

Gajdusek and other researchers had considered a possible link between endocannibalism and kuru since the start of investigations; however, no link could be initially found. Human tissue was examined for infectious and pathogenic agents, and transmission studies using cell cultures and animals were unsuccessful. There was no evidence of an autoimmune reaction. The link between endocannibalism and kuru was only convincingly made after the successful transmission of kuru to chimpanzees in 1965 (Gajdusek et al., 1966); the first scientific paper to propose the link and to develop it was presented in 1967, exactly 10 years after research on

kuru began (Alpers., 1968). A similar solution to the kuru puzzle was published by Mathews, Glasse and Lindenbaum (Mathews et al., 1968).

After these achievements the pace of research on kuru slowed down. In the 1970s and 1980s the principal research activity was to maintain epidemiological surveillance, conducted by field staff of the Papua New Guinea Institute of Medical Research and by Michael Alpers, initially from a base at the University of Western Australia and later at the Institute in Goroka. The committed team of trained Fore field assistants continued rigorous surveillance until 1995 (Alpers and Kuru Surveillance Team, 2005). In 1996 kuru research was enhanced by a new collaboration between the Papua New Guinea Institute of Medical Research and the Prion Unit in London under the direction of John Collinge (now the MRC Prion Unit). Epidemiological surveillance and clinical studies documented the final outcome of the epidemic, in patients with an incubation period of 50 years or more (Collinge et al., 2006; Alpers, 2008; Collinge et al., 2008). Molecular studies had shown that the infectious agents of scrapie, Creutzfeldt-Jakob disease and kuru were prions, devoid of nucleic acid and consisting only of protein,

and the properties of kuru prions were investigated by the MRC Prion Unit (Wadsworth et al., 2008). Genetic studies showed that heterozygosity of methionine and valine at codon 129 of the prion protein gene, where there was a critical genetic polymorphism, was associated with longer incubation periods in kuru (Lee et al., 2001; Mead et al., 2003; Collinge et al., 2006; Collinge et al., 2008). Thus in the end, genetics did prove to play a significant role in the pathogenesis of kuru. New studies on genetics and the mortuary practices of the Fore people and neighbouring groups were initiated, which form the subject of this thesis.

The Fore were not passive observers in all these events and contributed in many ways to the success of the research on kuru. Moreover, they had their own discourse about kuru. For the Fore, kuru was a malicious sorcery that had to be countered. As the kuru epidemic grew so did the reputation of the South Fore as powerful sorcerers. As far away as Kainantu and Henganofi, 40 miles from the South Fore, people feared Fore sorcerers. The immediate neighbours of the Fore greatly feared the sorcerer's powers and techniques. Those who travelled into the Fore region took great care not to leave any scraps or materials that could be used by sorcerers.

The Fore went to great lengths to find cures for their loved ones. In the early 1960s the Fore held public meetings and denounced sorcery. These meetings were followed by intensive social interaction involving exchanges as the Fore attempted to redefine their relationships to one another (Lindenbaum, 1979). Only now, in communities where kuru has been absent for two decades or more, has the fear of kuru and kuru sorcery finally disappeared. However, other forms of sorcery remain, and the fearful reputation of the Fore as powerful sorcerers has not abated.

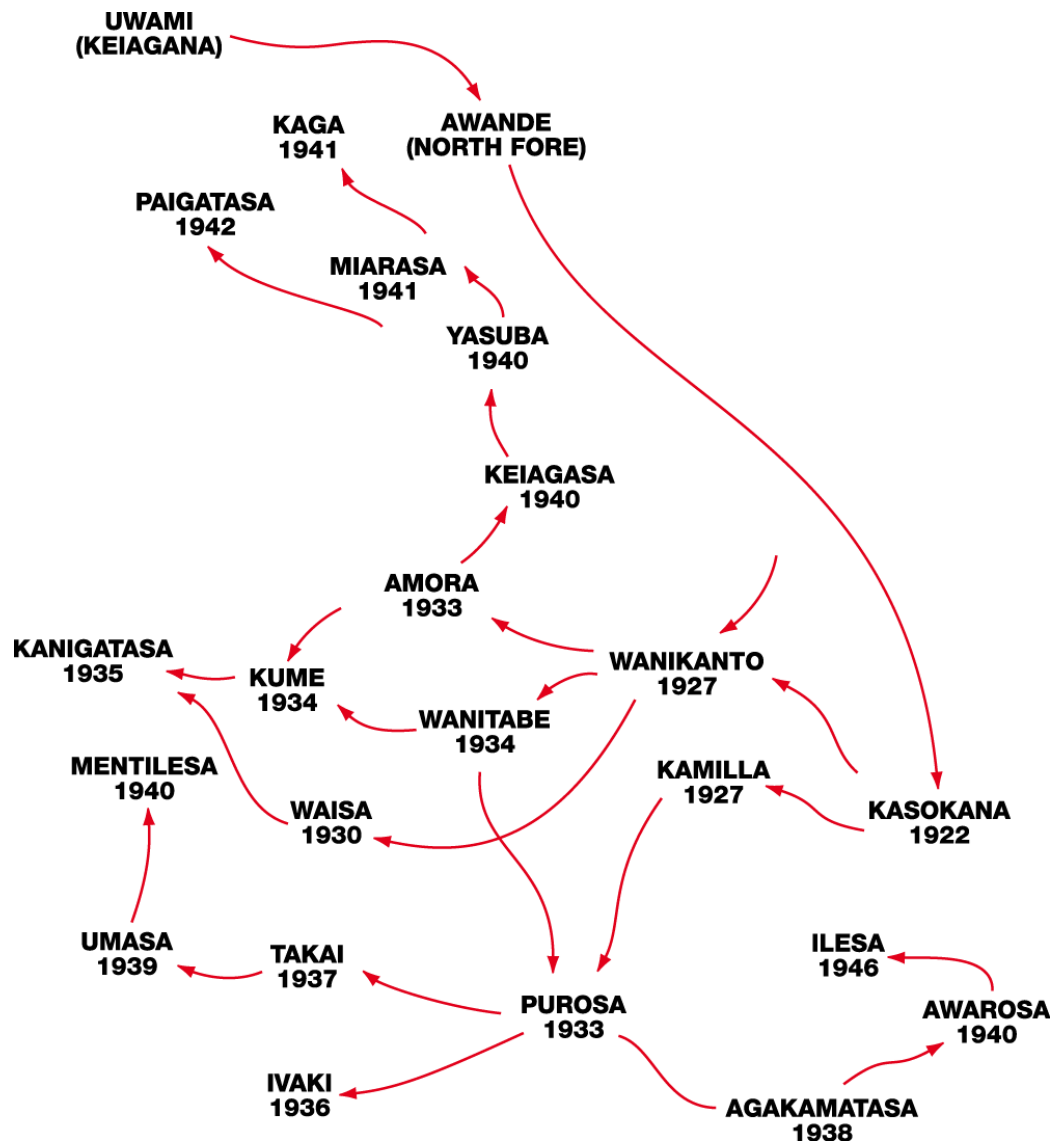


Figure 2.1. Map showing the spread of kuru from its source at Uwami in the Keiagana linguistic group. Taken from Glasse (1962b).

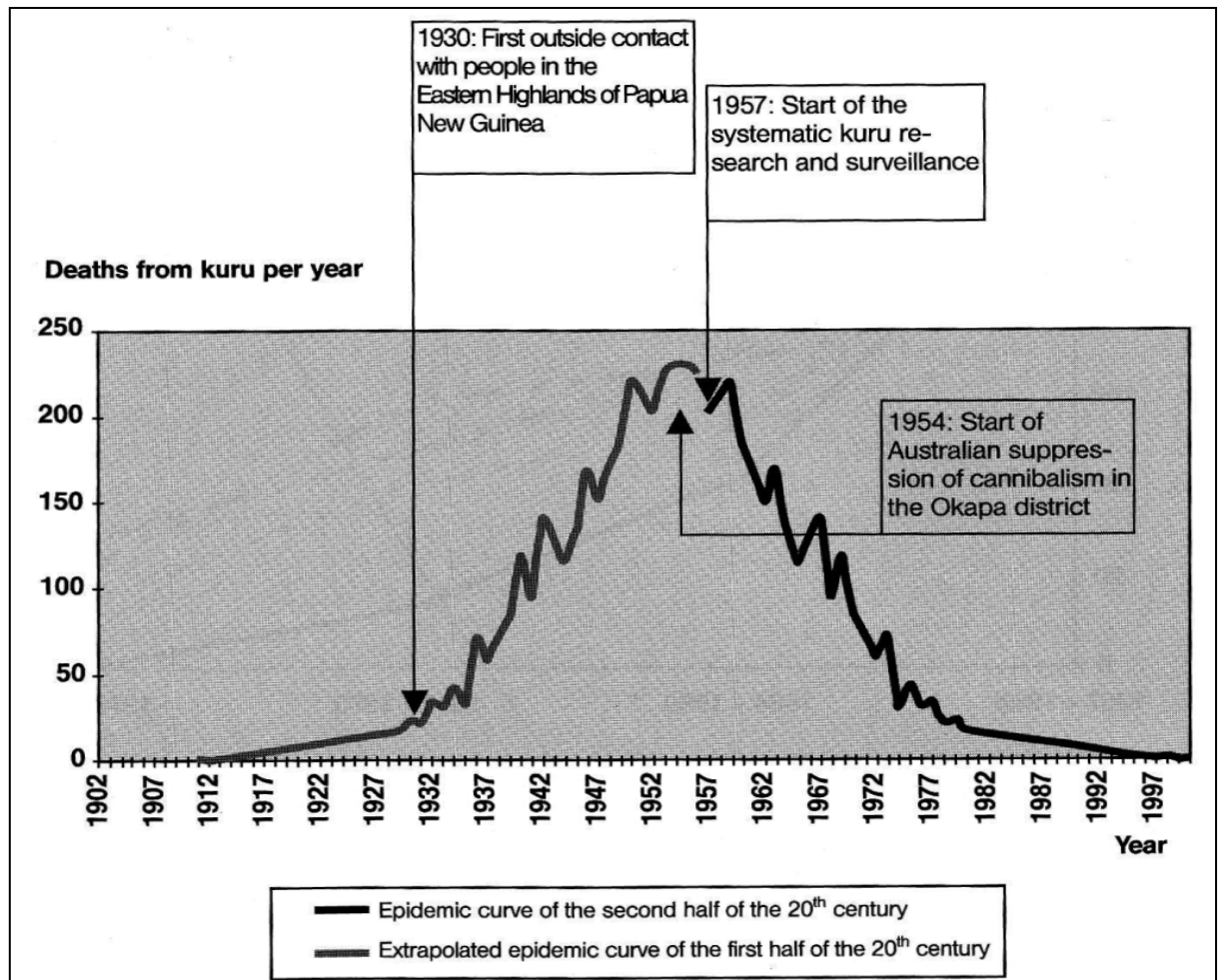


Figure 2.2. Development of the kuru epidemic during the 20th century. The course observed until 1956 is not based on actual data but on a reconstruction of the course since 1957 by mirroring the curve, though its shape is generally consistent with the oral history given by the local people. It can be said with certainty that the peak of the curve was in the 1950s. Taken from Alpers and Hörnlimann (2007b) with permission.

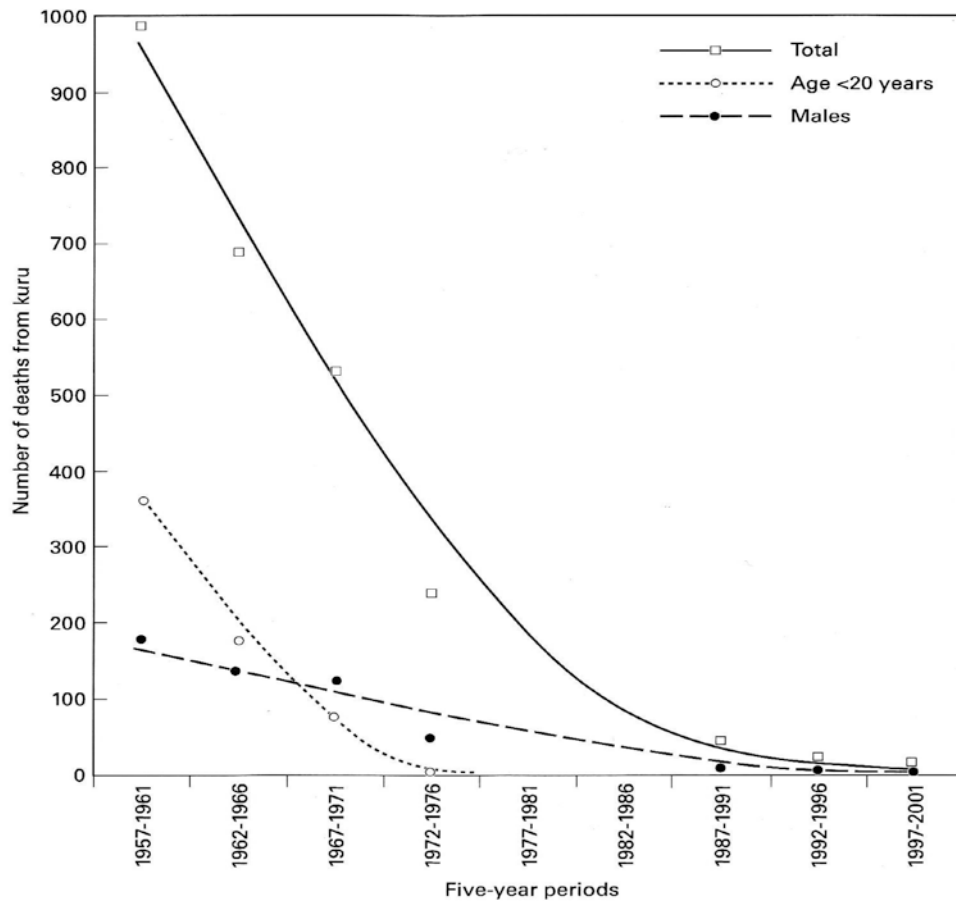


Figure 2.3. The number of deaths from kuru in five-year periods, 1957-2001, for all patients, those aged under 20 years and male patients. The curves represent the best estimates of the shape of the declining epidemic of kuru. Figure taken from Alpers and Hörnlimann (2007b).

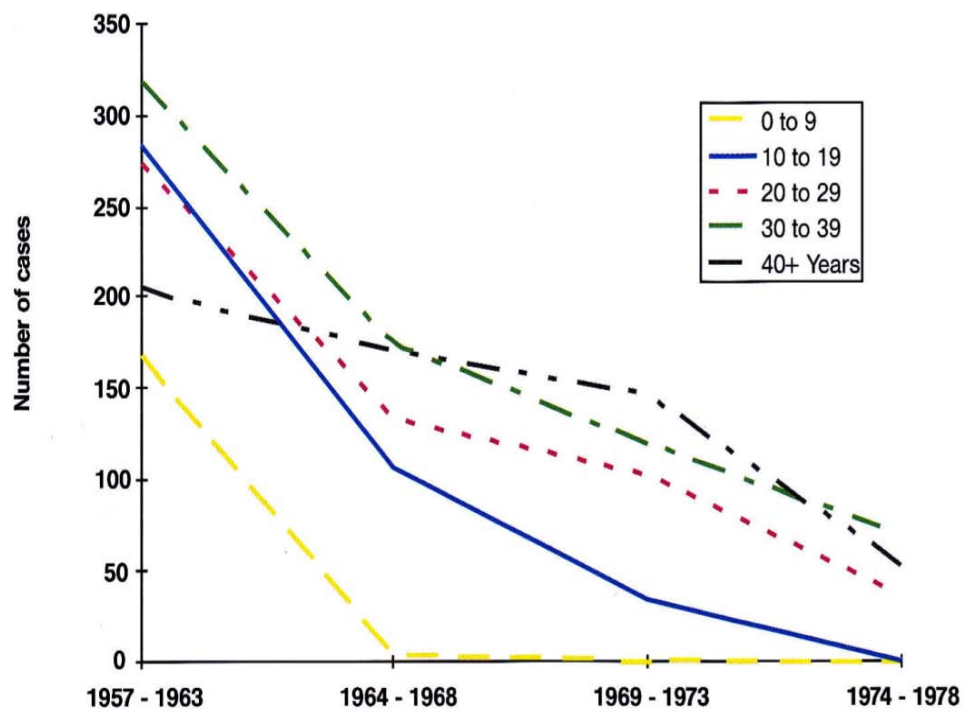


Figure 2.4. Progressive decrease of kuru mortality from 1957 onwards according to age groups. Taken from Alpers and Hörnlimann (2007b) with permission.

Chapter 3:

Review of the literature establishing the research questions

Introduction

The aim of this chapter is to give an overview of the literature from which the research questions are drawn. The first section summarizes the key epidemiological features of kuru. The second section identifies key residual unanswered questions regarding spatial and temporal differences in the epidemiology of kuru, the means of transmission of kuru, and the principal cultural factors that determined mortuary practices in a given community.

In Appendix B there is a historical account of cannibalism worldwide. This section shows that these are not unique practices of the kuru-affected region, or indeed of Papua New Guinea; in fact these practices have occurred worldwide at various times in history on all continents of the world. This is followed by a review of the literature on endo- and exocannibalism in Papua New Guinea generally, and finally a review of the literature about endocannibalism in the kuru-affected region. The literature provided a number of different reasons for the practice of transumption, and variations in the mortuary practices that highlighted the need for further investigations.

The term ‘transumption’ for these mortuary practices was first used by Michael Alpers in 1999. It is defined (Alpers, 2007) as ‘the mortuary practice of consumption of the dead and incorporation of the body of the dead person into the bodies of living relatives, thus helping to free the spirit of the dead’. This practice had deep religious significance for the people of the kuru-affected region and surrounding groups. It is therefore not appropriate to use the term ‘cannibalism’ or even ‘endocannibalism’ for these practices, to which

contemporary members of these societies give such good witness, because of the strong negative and derogatory

Summary of the key epidemiological features of kuru

Kuru is a uniformly fatal neurodegenerative disease with an average duration of 12 months. Annual incidence, annual mortality and prevalence therefore have similar values.

Kuru is found only in a remote area in the southern part of the Eastern Highlands of Papua New Guinea.

Kuru is confined to the Fore linguistic group of people and their neighbours from 9 contiguous linguistic groups with whom they intermarried.

The kuru epidemic began with a single case approximately 100 years ago and built up in numbers and geographic extension over the following 50 years.

The epidemic began in a Keiagana village on the edge of the kuru region and spread from there into the North Fore and,

subsequently, the South Fore, with minimal spread within the Keiagana and other linguistic groups.

Over 80% of cases have occurred in the Fore: over 60% in the South Fore and a further 20% in the North Fore.

The peak incidence of kuru (about 1% of the population annually) was in the South Fore, adjacent to the Anga group of people across the Lamari River, where there was no kuru; in the north and west of the kuru region the incidence gradually faded out with distance from the Fore.

Medical and epidemiological investigations of a still expanding kuru epidemic started in 1957 after a few years of contact of the Fore people with the Australian Administration.

Adult females (over 70% of cases) and adolescents and children (about equal numbers of males and females) were those principally affected by kuru, with, on first investigation, only 2% of cases in adult males.

The age of kuru patients at onset ranged from 4 years to over 70 years.

In the first few years of investigation the deaths from kuru in females showed a bimodal age distribution.

Kuru was familial, but was as common among wives as among sisters and daughters.

The first kuru victims in a community were often women who had come as wives from a previously affected village, and kuru could spread to a previously unaffected village if an emigrant wife from there developed kuru elsewhere.

The epidemic began to decline in the 1960s, and the epidemiological patterns of kuru showed changes from the early 1960s, with progressive disappearance of the disease in the younger age groups and a contraction in the area of high incidence.

It has since been established that none of more than 2700 recorded cases of kuru were born after 1959: this birth cohort has grown up completely free of kuru.

Cases have continued to occur, with decreasing incidence and increasing mean age at onset, since 1960.

The mortality from kuru has declined from over 1000 in the first five years of investigation (1957-1961) to 2 in the last five years (2005-2010).

By 1974 there were no deaths from kuru aged under 20 years; all those dying of kuru since 1994 have been aged over 45, and since 1999 over 50 years.

Since 1986 all cases of kuru have been in the southern area of residual high incidence (mostly in the South Fore, with adjacent communities in the Gimi, Keiagana and North Fore linguistic groups).

The last case of kuru in the Keiagana was in 1987, in the Gimi in 1993 and in the North Fore in 1995; there have been 14 cases in the South Fore since 1996, 8 males and 6 females, aged 48-64 years.

The origin of kuru is postulated to be a sporadic case of Creutzfeldt-Jakob disease (Alpers and Rail, 1971). The spread of

kuru from the Keiagana 100 years ago is well documented (Glasse, 1962b). The epidemiological features and changing epidemiological patterns have been described from the beginning of kuru investigations and regularly reviewed (Zigas and Gajdusek, 1957; Zigas and Gajdusek, 1959; Gajdusek et al., 1961; Alpers, 1965; Alpers and Gajdusek, 1965; Alpers, 1979; Alpers, 1987; Alpers, 1992; Alpers and Kuru Surveillance Team, 2005; Collinge et al., 2006; Alpers and Hörnlimann, 2007b; Alpers, 2008)

Once kuru was proven to be transmissible (Gajdusek et al., 1966) the changing epidemiological patterns were explained by the cessation of transumption as the means of transmission (Alpers, 1968; Mathews et al., 1968). The restriction of kuru to a remote area of the Eastern Highlands depended on the chance combination of a sporadic case of infectious human prion disease in a community practising transumption as the preferred means of disposal of the dead. Women and children were the main participants in transumption, and this explained the unusually high incidence of the disease amongst these groups. The initial spread of kuru to communities through affected wives depended on the key role played by affines in the practice of transumption. Where there was

no intermarriage with the Fore, as in the Anga groups, there was no kuru. The age bimodality initially seen in female cases could be explained by an age bimodality in transumption behaviour in females, and an early age at betrothal in the past (Alpers and Hörnlimann, 2007b). The decline in kuru incidence was explained by the cessation of the mortuary practice of transumption, summarily banned in the 1950s by the administrative authorities. Though the cohort born since 1960 were growing up free of kuru their mothers continued to come down with kuru and die of it; vertical transmission was thus disproved (Alpers, 1968). Though most of the epidemiological features of kuru were readily explained there were remaining questions. In order to try and answer these, the new genetic and mortuary practice studies that are the subject of this thesis were undertaken.

Spatial and temporal epidemiological questions

The first question of interest is why kuru spread the way that it did from the village of Uwami in the Keiagana, which is on the edge of the kuru region. It spread from there to the south and east into the Fore region. Kuru became common in the North Fore, and

reached a high level of incidence in the South Fore, and yet faded out in the Keiagana and other linguistic groups to the north and west (Alpers, 1965). The spread of kuru has been documented from its source in Uwami to Awande, and Kasokana, and then throughout the South Fore and back up into the North Fore (Glasse, 1962b). It was also noted that the North Fore were less enthusiastic about eating those who died of kuru than the South Fore (Mathews et al., 1968). Those communities to the north-west, where kuru faded out, intermarried with the Fore, and Fore women and their children who migrated into this region developed kuru. Women who migrated into the Fore remained free of the disease, but their children developed kuru (Alpers, 1968). The reason for the historical spread of kuru was raised by early investigators, who considered the possibilities of genetics, chance or mortuary practices as the explanation. The present study aims to answer this unexplained question.

There has been an axis of social and cultural change within the kuru-affected region since the late 1940s and a line in the centre of the region perpendicular to this axis demarcates the area of residual high incidence of kuru (Figure 3.1) (Alpers and Kuru

Surveillance Team, 2005). All deaths from kuru from 1986 onwards have been in the area south of this line (unpublished data from the kuru database), and have occurred mainly in the South Fore, with a few cases in the North Fore (in villages south of the line) and in the Gimi and a single case in the Keiagana. The Gimi linguistic group was the last part of the kuru-affected area to come under Australian administrative control and thus the last area to cease practising transumption. The last death from kuru in the Gimi occurred in 1993 and the last two in the South Fore in 2005 and 2009; this 16-year difference requires further investigation, as pointed out by Alpers (Alpers and Kuru Surveillance Team, 2005) – it was a 12-year difference in 2005. The second question raised by Alpers was why those villages to the north of the perpendicular line have had no deaths from kuru since 1985, now 24 years before the last recorded death in the South Fore. Although the southern part of the North Fore came under government control 5 years before the South Fore and thus ceased transumption 5 years earlier, the gap of more than 20 years remains unexplained.

The areas of zero and residual high incidence also presented another problem to investigators. There were North Fore villages in

the areas of zero and residual high incidence. This raised the question as to what was the principal factor that determined cultural practices, in particular the mortuary practices, in a village. Was it membership of the linguistic group, dialect group, ancestral group, the village, the clan, the hamlet or the household that determined cultural behaviour at mortuary feasts? The village is an important social unit, but consists of a changeable association of individual hamlets. The attitude of the head of each household had a large influence on the behaviour of its members. The ancestral group – called a ‘tribal’ group in Alpers (1965) – is a traditionally named group of historical and social significance that is not much invoked, however, in daily life. The dialect often, but not always, had a traditional name but there was no organization or structure that defined the people who spoke it. Language is an important component of culture, but in this part of the highlands there was no political structure or traditional name that united people who spoke a common language; nor would this have had much meaning where language boundaries merged through a dialect chain. Though all these groups have deep cultural significance – either implicitly or explicitly – their influence on the details of any particular cultural

practice or behaviour may vary considerably. With respect to mortuary practices this question is therefore an open one, whose answer may help to explain the epidemiological patterns of kuru.

Another reason for investigating the mortuary practices is to establish the route of transmission of kuru. Some scientists emphasized parenteral inoculation over oral consumption by participants in transumption (Gajdusek, 1971). Both the titre of inoculum and the route of inoculation affect the transmissibility and the incubation period of prion diseases, so data on mortuary feasts would increase our understanding of kuru transmission, which would also be relevant to the transmission of vCJD.

Conclusions

The first question that the present study aims to answer is why the epidemic spread the way it did from its origin in Uwami. The second question regarding the spatial and temporal differences in the epidemiology of kuru was why there had been no cases of kuru north of the axis of high incidence since 1985, when the last case to the south of the line was in 2009. The next question was why there

had been no cases in the Gimi since 1993, as they were the last people to practise transumption in the kuru-affected region. There was also the question as to which cultural group or association principally determined a family's practices during transumption.

Although the initial reports on transumption, analysed in Appendix B, were very brief they indicated that there were differences in attitudes about transumption and exocannibalism in the kuru-affected region. There were also rules about who was allowed to participate in transumption and how the body was distributed. Lindenbaum (1979) pointed out the importance of fertilization and regeneration through transumption, a theme that was first raised by Berndt (1962). Sorenson and Gajdusek (1969) emphasized that traces of the consumed remained in the living. Robert Glasse proposed that the dead were eaten for gastronomic reasons (1963). Berndt (1962) suggested that enemies were eaten in the North Fore for revenge.

Berndt (1962) stated that those who died of kuru were not consumed. Sorenson and Gajdusek (1969) emphasized self-inoculation from the handling of corpses of those who died of kuru.

Glasse (1963) pointed out that there were differences in the distribution of the brain between linguistic groups. Lindenbaum (1979) pointed out that the body was primarily divided up between the matrilineal kin of the deceased.

From the published literature, it was clear that there were spatial and temporal differences in the distribution of kuru. There were also differences in the practices and ideas about transumption in the kuru-affected region. Further investigation was required to establish the specific details of these differences and to determine whether they were responsible for the changing spatiotemporal epidemiological patterns.

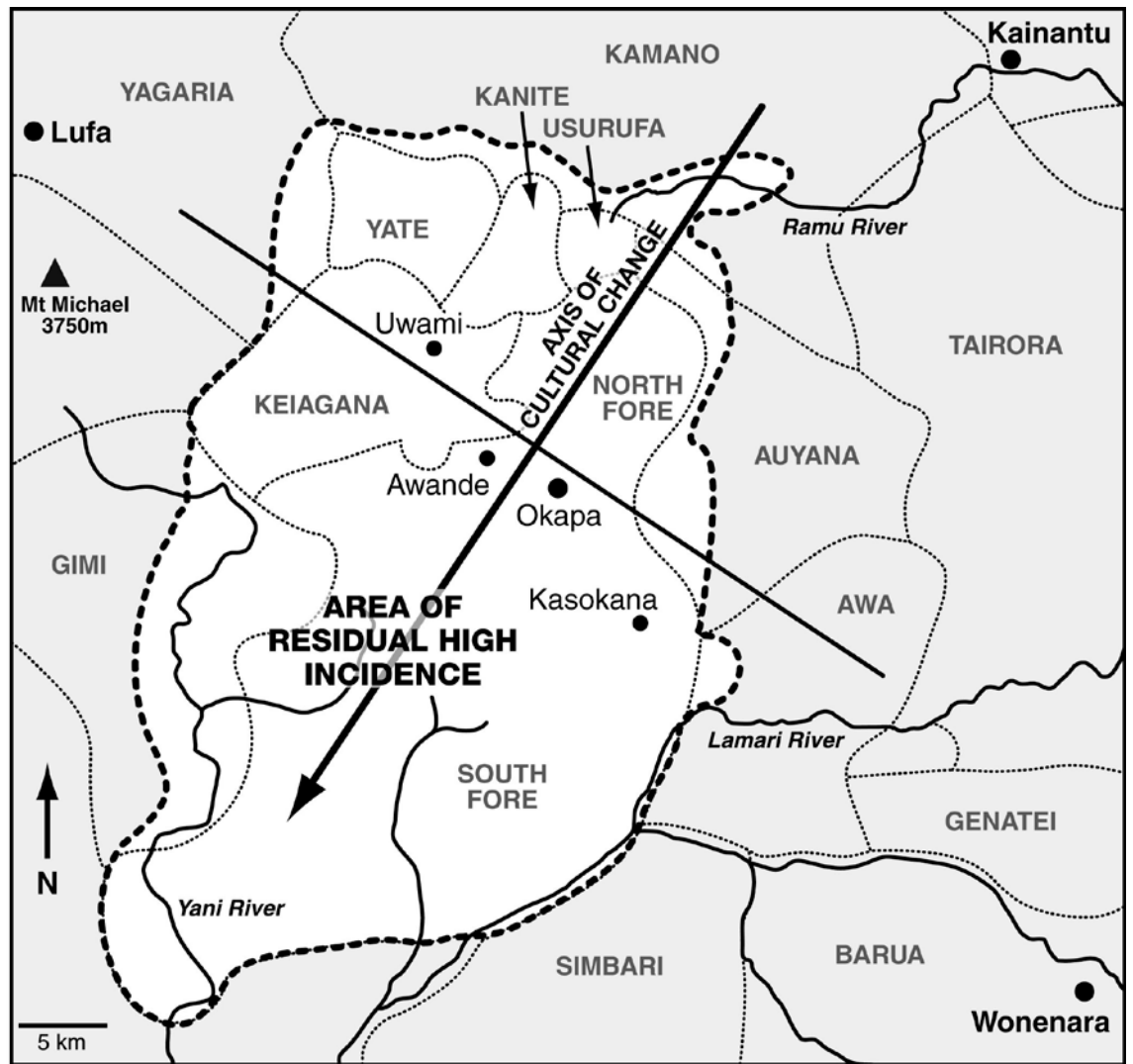


Figure 3.1. Area of residual high incidence of kuru in the kuru-affected region in relation to the axis of cultural change. The thin dotted lines are the boundaries of the linguistic groups. Thicker lines show the course of the major rivers in the region. The thick dashed black line outlines the boundary of the kuru-affected region.

The location of the towns Okapa, Lufa, Kainantu and Wonenara and the villages Uwami, Awande and Kasokana are shown.

Chapter 4:

Research design

In the previous chapter research questions were identified. These questions related to the spread of kuru, to the temporal and spatial differences in the incidence of kuru in the kuru-affected region, to the means of inoculation during transumption, and to what determined a social group's cultural practices.

The aim of this chapter is to explain the choice and implementation of the chosen research design for the study on mortuary rites conducted in the 11 linguistic groups affected by kuru – the number is 11 if the North and South Fore are counted separately.

For the purpose of the thesis the term 'research design' is used for this chapter as it covers more than just the choice and

implementation of method. 'Methodology' refers to the philosophy of method and covers the stance taken by the researcher in the approach to the research study. 'Method' is the term that describes the type of research design used to gather data (Evans and Gruba, 2005) although others have used the term 'paradigm' (Le Compte and Schensul, 1999) for this.

The first section of the chapter clarifies the research questions related to the inquiry into the epidemiology of kuru and confirms the main thrust of the fieldwork, which was to collect primary data about mortuary practices. There then follows a brief historical background to the fieldwork, and a description of the ethical approach to the study and the project's position towards reciprocity for the participants.

Due to the limit on the length of the thesis the sections providing details of the methodology and methods chosen for the study, population selection, resource logistics, data collection instruments, assessment of data and data analysis are placed in Appendix C.

Research questions

The first purpose of the research was to collect data about mortuary practices in the kuru-affected region, and the second was to establish their relevance to the transmission of kuru. The review of literature in the previous chapter revealed that the mortuary practices warranted further investigation. The specific questions related to the transmission of kuru are listed below.

To explain the spread of kuru from the village of Uwami on the edge of the kuru-affected region.

To explain why there had been a cessation of kuru cases 24 years earlier in the northern area of the demarcation line between the low and high incidence areas.

To explain why kuru had ceased 16 years earlier in the Gimi than in the South Fore.

To determine if the main route of inoculation of kuru was oral or parenteral.

To discover the main social determinates of cultural behaviour during mortuary rites.

Historical background to kuru investigation

Kuru investigation was first started by Dr Vincent Zigas, and when he was joined by Dr Carleton Gajdusek in 1957 the investigations became scientific and were carried out in earnest. Many other investigators assisted in the early period of kuru research. Kuru surveillance continued from 1957 until 1976 with the involvement of many field workers, who were assisted by the establishment of the kuru epidemiological database at the National Institutes of Health in Bethesda, USA by Michael Alpers and colleagues. From 1977 the epidemiological field surveillance was supervised by Dr Michael Alpers, who was then Director of the Papua New Guinea Institute of Medical Research (PNGIMR). In 1996, this surveillance was reinforced by a new collaboration with the Prion Disease Group at St Mary's Hospital in London (later to become the UK Medical Research Council (MRC) Prion Unit in 1998) led by Professor John Collinge. This work was initially funded by a Wellcome Trust award to Professor Collinge and later

incorporated into the MRC Unit's core programmes (Collinge, 2008).

By then the people of the kuru-affected region had collaborated with kuru researchers over a period of nearly 40 years. A few of those researchers had also established close relationships with their field-site colleagues and their families, which were maintained over those years.

In 1996 I was recruited by Professor Collinge to travel to PNG and undertake full-time field studies on kuru in collaboration with the PNGIMR under the supervision of Michael Alpers, then its Director (Collinge, 2008; Whitfield, 2008). To help strengthen relationships with communities in the kuru-affected region medical clinics were run in many of the communities, particularly those furthest from any medical facilities. A strengthened surveillance team funded by MRC was established and the PNGIMR field house in the village of Waisa refurbished and extended to include basic laboratory facilities. The team carried out surveillance patrols throughout the kuru-affected region and followed up all suspected kuru cases. The team initially collected blood samples in the Fore region and later throughout the kuru-affected region and many surrounding linguistic groups. The team also collected interviews in

the linguistic groups unaffected by kuru to confirm if they had practised transumption in the period before colonial contact. In 1998, seven short interviews in the South Fore were conducted focusing on the distribution and handling of the brain and spinal cord during transumption.

The field team consisted of 12 local men from various communities in the kuru-affected region, myself (a research nurse, later trained in medical anthropology at the School of Oriental and African Studies (SOAS) in London during the project) and occasional paramedics, medical staff and students who visited from the UK to assist with the project for various lengths of time. Michael Alpers continued to visit the field site and supervise the field operations and Professor Collinge maintained overall supervision of MRC studies with regular telephone contact and visited from London on an annual basis. The ethnographic study started in 2002 and the project was well established by that time allowing the team to make informed choices regarding the research design.

Requirements of the field team to ensure successful fieldwork

The ethnographic study required long periods of fieldwork over many years. Central to the success of the data collection had been the relationship of the team to the communities where it has worked.

The study required the team to interact with large numbers of people and to participate in mutual relationships. As well as interacting with the populations it was also very important to listen to their concerns. It was recognized that the populations where the research was conducted had more immediate health concerns.

I was faced with numerous requests for individual and community assistance during the project and failure to respond to those requests could easily damage the team's relationship with a community. It was also important to remain non-judgemental when faced with unusual behaviour and to accept that community and individual priorities would often cause delays to work. The team leader had to stay neutral in all community disputes including those involving project staff if the matter of contention did not

involve the project. It was also my duty to find good fieldworkers and to give them appropriate training where necessary. It was important to match the individuals' skills to their work description and to assemble and maintain a team with minimal internal conflict.

Relationships with participants and ethical considerations

The ethnographic studies were approved by the Medical Research Advisory Committee of the Government of Papua New Guinea and by the Local Research Ethics Committee of the Institute of Neurology and National Hospital for Neurology and Neurosurgery in London. Most important from both the ethical and operational aspects was the full cooperation of the communities involved in the project. This was established and maintained through dialogue with village representatives, communities, families and individuals. The studies followed the established principals and practices of the PNG Institute of Medical Research.

All research on humans is governed by codes of ethics to ensure there is no physical, mental, emotional or financial harm to the

participants. In the United States the Belmont Report states three primary ethical principals, beneficence, respect for human dignity and justice. Beneficence is related to nonmaleficence which is the researchers' duty to ensure that no harm comes to the participants. In this study the collection of narratives from the participants posed no danger to their wellbeing and they were protected from exploitation. Respect for human dignity included the right to self-determination and no pressure was put on people to participate. In fact, nearly all the participants enjoyed the opportunity to discuss the old days. Full disclosure was provided to the participants in their own language. Justice includes a right to fair treatment and the right to privacy. The most important concerns for an ethnographic study are whether the participants have consented to the study and did they understand what the study entailed before they gave consent. Another important point is the confidentiality of the data given by the informants.

There has been concern about the recruitment of frail older people into studies (Harris and Dyson, 2001). The team approached the leaders of the communities first and then the families of the participants as well as the prospective informants to ask their

consent to participate in the study. The fieldwork was overseen by experienced supervisors to ensure the ethical requirements were fulfilled.

Remuneration for participation in research is now acknowledged and the purism of volunteered information is now accepted as unrealistic. In this study the participants received a stipend of 10 kina a day if the interviews were conducted in their own communities. Lunch and dinner was also provided by the research team as the sharing of food was meaningful in the communities where the research was conducted as a way of reinforcing friendship. Those interviewed in Goroka town were given 20 kina stipend a day and accommodation and meals.

To ensure that the ethnographic research was not seen as exploitive by local communities efforts have been made to engage the communities in the research. The role of local field staff has been acknowledged in publications and grant applications. They have participated in conferences both in PNG and in the UK, where several have given oral presentations, and some have visited the MRC Prion Unit and NHS National Prion Clinic in London.

Individual presentations by field staff and other members of the Fore communities at a major meeting on kuru in London were published in a learned journal (Pako, 2008; Poki, 2008; Puwa, 2008). Some of the publications have been made available to individuals in the kuru-affected region. It is also intended that a summary of the final work will be translated into the national language, Tok Pisin, and made available to the local communities.

The project has assisted the local communities with medical care and sourced external funds to install water tanks into communities and to establish and fund the integration of 5 primary schools with over 500 students into the government education system.

The project acknowledged that research had been ongoing since 1957 and designed a withdrawal plan from the field site to gradually reduce dependence on the research as a source of employment and assistance.

The relationships between some of the researchers and the communities has been ongoing, with one researcher establishing an

education trust to assist local children with school fees to which other researchers have also contributed.

Methodology

The research design consisted of an ethnographic method incorporating narrative as the primary instrument for data collection. A novel approach was taken to collecting the primary data with educated young Fore interviewing their own family members who fitted the study criteria to reduce ethnocentric bias. I accept that they would also have their own presuppositions but the narratives were all recorded and form the primary data set, as well as archives for the study. The results show that this approach was effective. The data collected fulfilled the requirements for detailed assessment and after editorial analysis enabled conclusions to be drawn and provided key segments for further ethnographic enquiry.

The methodology was an innovative approach within a long tradition of ethnographic enquiry. It has been written up for publication (Jerome Whitfield Wandagi H. Pako, Sena Anua, John Collinge and Michael P. Alpers. Traditional Fore mortuary practices

in the kuru-affected region: methodological issues and the practice of transumption. Submitted for publication).

The follow-up used focus group interviews, which revealed rich data sets, and after further assessment and analysis the ethnographic description of events surrounding mortuary rituals in the South Fore reached saturation. The data were then used to construct a template, which was used to successfully conduct focus group interviews in other linguistic groups affected by kuru.

Structured interviews were also tried, but found to be an unsuitable instrument for data collection. The requirements of the field team, ethics and reciprocity were also considered.

For genetic studies the demographic knowledge of the structure of the communities in the region, by language, clan, village and hamlet location, familial and historical relationships, gender and age enabled meaningful sampling to be undertaken and valid genetic conclusions drawn from the large body of laboratory data generated.

Conclusion

The success of the data collection made apparent in the following chapters was due to a number of important factors. One was the long term relationship between the researchers and the researched, which accepted the value of ongoing reciprocity in Melanesian culture to maintain kinship. The Fore community valued the assistance of the researchers for healthcare and for resourcing outside assistance. The communities and individuals who participated, did so, on an informed basis and were treated with the respect and dignity that they were entitled to under the codes of ethics. This allowed a close relationship to grow between the researchers and the team. The team largely consisted of people from the kuru-affected region, and all decisions were made by the team leaders after consultation with relevant staff. This process enabled the project to collect a large amount of unique data contained within the narratives elicited by the questions of the young, culturally attuned research assistants. The full list of interviews obtained is given in Appendix H.

Chapter 5:

Ethnographic descriptions of mortuary rites and related practices in the kuru-affected region: South Fore

Introduction

This chapter and the two that follow it summarize the ethnographic results of the research design described in the previous chapter. The data here will be used to analyze epidemiological records to test the hypothesis that temporal and spatial differences in the epidemiology of kuru were due to variations in human behaviour during traditional mortuary feasts in the kuru-affected region.

The ethnographic description starts with a brief overview of Hertz's work (1960) and explains how his analytical structure has been used to organize the ethnographic data in a chronological order of mortuary rituals. Where possible the description of each linguistic group starts with a summary of the cosmology and an ethnographic definition of the souls that constitute a person. The data presentation starts with the South Fore, where the most in-depth analysis of mortuary rites has been conducted, followed by the other linguistic groups of the kuru-affected region, and finally those of the surrounding linguistic groups. In some cases ethnographic information that might be relevant to the genetics of kuru is also presented, such as rules for adoption and marriage. There are also descriptions of marriage and birth rites where such data had been collected as these had an important bearing on the distribution of the body during transumption; however, because of the limit on the size of the thesis these data can be found in Appendix E. Finally, there is a brief summary of the findings and the conclusions that can be drawn from them.

A summary of Hertz's analysis of mortuary rites

The ethnographic descriptions of traditional mortuary rites in the kuru-affected region are not unusual when compared to mortuary rites historically, and in other non-western countries (Metcalf and Huntington, 1991; Pearson, 2000). It is important to see the described obsequies as culturally specific ways of dealing with the problems of death that affect all societies. In western society the deceased's soul departs when the person dies, and as soon as the family and friends can gather the funeral is held, and then mourning continues as a private affair. This view of western obsequies is challenged by Metcalf and Huntington, (1991) who show that there is much ritual in western obsequies that is often missed.

Robert Hertz's 'A contribution to the study of the collective representation of death' (1960) published in 'Death and the Right Hand' is still the most important work on the anthropology of death today, even though it was first published in 1907. Other important contributions to the field include Van Gennep (1960), who interpreted mortuary rituals as a rite of passage, Metcalf and

Huntington (1991) on mortuary rituals, Bloch and Parry (1982) on regeneration and Robben (2004a), who has recently overviewed the field.

Hertz (1960) states that death is not confined to biology, or to the mourning of family members, but instigates moral and social obligations which are expressed in culturally determined obsequies. His analysis was restricted to South Asian tribal societies from which he isolated the stages of secondary burial amongst the Dyak of Kalimantan. He divided the obsequies into three parts, consisting of the body, the souls and the mourners, all of which undergo changes during the intermediary period and the final ceremony. In the intermediary period the body was temporarily stored, the souls of the deceased remained near the corpse, and the grief-stricken family members were separated from society. During the final ceremony the remains of the deceased were buried, the souls entered the land of the dead and the living were freed from the rituals of mourning. At this time the deceased joined the ancestors and the living bade their loved one farewell (Robben, 2004b). Although Hertz (1960) stretches his interpretation to include all obsequies as containing secondary burial rites, which is not the

case, his ethnographic examples provide a solid case for secondary burial in many societies. His theoretical divisions of mortuary rites provided a useful approach to the collection and analysis of ethnographic descriptions from the kuru-affected area. When these are compared to the ethnographic descriptions by Hertz (1960) or other ethnographers (Clastres, 2004; Conklin, 2004; Dole, 2004) it is clear that the core values behind transumption are shared with all societies but expressed in different cultural practices. Transumption in the kuru-affected region can be interpreted as a secondary burial rite, which is strongly supported by the data that has been collected for other traditional secondary burial practices in the kuru-affected region.

Traditional mortuary rites amongst the South Fore

There were several ways to dispose of a body in the South Fore so the following structure has been used to clarify the ethnographic descriptions. The data have been organized so that the common mortuary rites from death to the placement of the body at the sepulture are described first. This is the same for all forms of disposal of the body. There then follows a detailed description of

transumption and all the related mortuary rituals till the final departure of the souls, and the rebirth of the deceased as an ancestor. Descriptions of the alternative sepultures and rituals can be found in Appendix D, and if there are rituals common to those written about in the section on transumption the reader is referred to that section. Finally, rituals common to all forms of disposal during the final departure of the souls and afterwards are described.

In 1958 the population of the South Fore was 6962 (Alpers, 1965). The Fore are a linguistic and cultural group whose members inhabit the region between the Krakte Mountains to the north, and the Yani and Lamari Rivers to the west, south and east. For administrative purposes they were included in the Okapa District and were divided into the North and South Fore. South of the region extends a vast rainforest that stretches to the coast and is inhabited by a small population of Pawaians of the Yar or Iare subgroup. Across the Lamari River to the south-east the *moraei kina* (the Moraei people of the Anga cultural group) inhabited the rainforest and there was limited interaction between them and the Fore.

The Ashtons, gold prospectors, first entered the North Fore in 1934 followed by Ted Ubank in 1936. In the Second World War, Japanese airmen who crashed near Ilesa walked back to their own lines in the Markham Valley, an allied aircrew made it to Kainantu and a party of civilians fled down the Lamari River to Papua. The first government patrols entered the region in 1947 and the Okapa Patrol Post was established in 1954. The North Fore was derestricted in 1951 and the South Fore in 1958. The 10 surrounding linguistic groups speak different languages though villages on the borders where there is social interaction are bilingual (Gajdusek and Alpers, 1972). There are three dialects in the Fore (Scott, 1963), *ibusakamana*, *atikamana* and *pamusakamana*. Of the 2700 cases of kuru since 1957 80% occurred in the Fore, with three-quarters of these in the South Fore (Alpers, 2007; Alpers and Kuru Surveillance Team, 2005). The South Fore comprise the *atigina* (the *atikamana*-speaking people) and the *pamusagina* (the *pamusakamana*-speaking people).

South Fore (pamusakamana dialect) / English glossary

South Fore

English

<i>auma</i>	The deceased's soul similar to the western concept
<i>aona</i>	The deceased's inheritable qualities
<i>ama</i>	Simulacrum of the <i>auma</i> but more powerful
<i>kwela</i>	Harmful ghost of the deceased consisting of pollution
<i>yesegi</i>	A person's aggression
<i>amani</i> (ancestor)	Founding sacred ancestor of a clan
<i>amani</i> (ground)	Sacred ground of a clan <i>amani</i>
<i>bagina</i>	The land and creator
<i>kwelanamandi</i>	The land of the ancestors
<i>anagra</i>	Female affines

anaso A married woman's godmother

agona Final mortuary payment to the affines

In the account that follows, all Fore terms are given in the *pamusakamana* dialect unless otherwise specified.

South Fore cosmology

This section explains the connection between the land (*bagina*), which is the creator, and the creation of the ancestors (*amani*) whose descendants make up the clans found in the Okapa region today. It links the world of the living with the parallel spirit worlds of the ancestors, the clan guardians and the guardians of the *bagina*, and provides a background to understanding the rich eschatological beliefs of the Fore which provided much of the impetus behind their traditional mortuary rites.

The South Fore have their own traditional explanations for the origin of the universe as they experienced it prior to their colonial encounter. These explanations took the form of myths that have been orally transmitted between generations. The myths are located

in time through genealogies which connect the living to the founding ancestors of the clans and finally to the *bagina*. This theme is discussed by Kahn (1990), who focuses on the importance of stones found in the landscape that record history and myth in terms of space, amongst the inhabitants of Wamira in Milne Bay Province. Monoliths are also found amongst the Tairora in the Eastern Highlands Province (Watson, 1983).

The myths bring the landscape to life and the past is preserved in it through sacred geographical features that anchor the past in the present. Significant events in Fore history have been recorded in a durable format in the landscape bringing truth to their myths. Each ancestral group uses similar myths told throughout the Eastern Highlands, and claims them as their own by anchoring them to their own landscape (Watson, 1983). The land is alive, the creator of life, as well as a medium of transformation, and finally the home of the ancestors. Everything is linked throughout the landscape: the place of creation, the spread of the sacred ancestors and the history of human populations. The world of the spirits and the land of the dead all occupy geographical space in the landscape. The history of humans is also found in the landscape, recorded in

cleared gardens that are now grassland, abandoned villages and footpaths, and bamboo and yellow sugar cane groves that mark the sepultures of the dead. Human history is linked through the landscape to the *amani* and the *bagina*, which have a profound impact on the daily lives of the humans who share their landscape.

The creation of the land, ancestors and humans

How the *bagina* (the land) created the *amani* (clan ancestors)

The rivers are the blood, the stones the bones, the ground the skin and the plants the hair of the *bagina*. The *bagina* is the land and it created the *amani*, the sacred ancestors of each clan, from whom men are descended, and once the *amani* were created the *bagina* changed back to its original form – the land. Everything that came from the *bagina* was eaten by the *bagina* when it died. According to the South Fore, their creation myth and that of all the other linguistic groups affected by kuru is as follows:

“Our folklore tells of our origin in the story called *kalukalu*, which is also the name of a place in Ivaki, and there is a stone there which is in this story. An

old man and woman lived in Ivaki and they had about 10 to 15 daughters. Since there were no men to marry their daughters the old man went and built a separate hut. After a month he completed it and moved in alone. It was a large round house several kilometres away from the women's house. He wanted to find a way to make men so they could marry his daughters. While he was thinking about this he saw a bone nearby and brought it back to the house. He went out again and collected firewood and some young, half-matured bamboo tubes to cook the bones in. He crushed the bone with a rock and mixed it with herbs and wild green vegetables and placed it in bamboo tubes on several fires in the house. The bamboo tubes were turned slowly to ensure the contents were not burnt during the cooking.

As soon as there was enough heat in the bamboo tubes they made gurgling sounds (*kalukalu* in the *pamusakamana* dialect of the South Fore). Then the contents of the tubes shot out and there stood in the

centre of the house some handsome young men. The old man continued to make more.

Curiosity got the better of the daughters so they sent their ugliest sister to check on their father in his new house. She sneaked up to the house and saw her father cooking something in bamboo tubes. She was curious, so she peaked behind the door and saw the young men in the house. She quietly crept away, and once she reached home told all her sisters what she had seen. When her sisters heard the story they immediately rushed to their father's house to catch the men. The ugly girl could not run as fast as her sisters so she lagged behind. When the girls arrived at their father's house they tried to capture a man each, but their father warned them that the men were not ready yet, and they required more magic before they would be complete. Then the men turned into red and green parrots and flew into a nearby tree. The women turned into crows and chased after them. When you see a flock of crows fly by the one at the

back is the ugly daughter in the story. The old man turned into a stone at the spot where he had built his house.” (Male: interview 62).

Thus were created the original *amani* from whom humans are descended. This creation story leads to speculation that there might be a link between creation and transumption. The bone is male substance from the agnates and the green vegetables are female substance from the affines, and symbolically they represent the flesh and bones of a body (Lindenbaum, 1979). Transumption involves the placing of flesh and bones with green vegetables in bamboo tubes and then cooking and consuming them. The creation of *amani* and the creation of ancestors, who also have personhood, is the same. As the *bagina* created the founding *amani* so it is the duty of humans to ensure that the dead are also transformed into living ancestors. Cooking is a common form of transformation in myths and this interpretation is consistent with mythological beliefs worldwide.

How the *amani* dispersed across the land and created humans

The next myth tells the story of a male and female *amani* who travelled from Andai (the place of creation in Ivaki in the previous myth) up the Lamari River Valley to Manyavindi. The *amani* settled in Manyavindi (which is near the village of Okasa) and the population grew until eventually the offspring of the founding *amani* spread out into their own lands and their descendants became the clans of the region today. The South Fore believe that the descendants of the *amani* in Manyavindi now inhabit the land as far as Goroka in the north-west and eastwards as far as the Markham Valley. Some go even further, and believe that the *amani* populated the whole planet, and for this reason Dr Carleton Gadjusek and Dr Michael Alpers found it easy to understand the Fore when they first arrived in the Okapa District, because their ancestors had originally come from Andai.

“There was a man and a woman who came through Kwalakwalizi, Oleloti, Ugumakagaya and Imakizi. When they travelled the woman did not have a vagina. Her body was whole while the man had a

very long penis which he rolled up and carried. At Imakizi the man wanted to have sex, but they continued on with their journey. They travelled all the way to Avazi and then to Aligindi with the man hoping to have sex with his wife, but his wife did not have a vagina. They went all the way to Okasa, and it was there that the man became so frustrated that he picked up a sharp piece of limestone and did an incision on the woman, and that is where the vagina was first formed. If you go to Okasa the people will show you exactly where this happened. When he made the incision blood gushed out of the vagina and that is why we have red sugar cane, red 'pitpit', and anything red that we taboo our young initiates from eating. At Okasa they had their first sexual encounter which led to plenty of children who spread towards Kainantu. That is where our population started, so you will see more people from Okasa to Kainantu and beyond.

Before this, the man saw a woman at Kasokana digging a garden, so he unwrapped his penis and sent it from Okasa to Kasokana. When the woman from Kasokana bent down to see what was scratching her buttocks she saw the penis and she picked it up and inserted it into her vagina. After sex she took a stick and started beating the penis and broke it into pieces all the way to Okasa shortening the penis to the size that men have now. The woman returned to Kasokana, and the couple who travelled from our area remained in Manyavindi and had plenty of children. The woman from Kasokana bore a male child who had a difficult time finding a wife, so when he was old enough he had a sexual relationship with his mother and had several concubines. Later his descendants moved towards the South Fore and that is why we do not have a large population, since only one male *amani* moved into the South Fore region.

You can still see the track that the man and woman used while travelling this way up to Okasa.

When we burn the bush during the dry season the track that they travelled on is still visible, and the track was seen by our fathers and our forefathers. Your children and your children's children will still see it." (Male: interview 47)

All the linguistic groups affected by kuru and some of those beyond share the same story, according to the Fore. These linguistic groups have stories of their founding *amani* who came from Manyavindi and were the descendants of the original *amani* created in the *kalukalu* myth.

According to the clans of the Keiagana, Kanite, Gimi, Auyana, North Fore and the South Fore their *amani* were descended from the *amani* who settled in Manyavindi. This is a name used by the Fore and Keiagana; the Kanite call it Agile. The story of the *amani* who settled in Manyavindi is as follows. The *amani* built a cordyline fence and then a house after arriving in Manyavindi. He then built five fire pits inside the house and placed an upright piece of bamboo in each one. He then told the bamboo tubes to talk and they made sounds like many insects, and finally a male and female *amani*

came out of each tube. Each couple were the founding ancestors of the clans of the following linguistic groups: Kanite, Fore, Gimi, Auyana and Keiagana (some believe they populated the land even further afield). The *amani* couples travelled to different regions where they became guardians of their own lands for the *bagina*, and the inhabitants of each of these regions have a myth about their founding *amani*. The *atigina* have a story about Yegiyema who was born in Kasokana, and then travelled to Ivingoi where he married an *amani* from Andai and their descendants now make up the original clans of the *atigina*. They had two sons Nomagiya and Tusu, and one of Nomagiya's sons married his sister and their descendants are the light-skinned people who make up the Kasoru clan (although it is called the Kasoru clan the members are really from the Okasa clan who have changed names to distinguish themselves from the original Okasa clan). All the clans have their own stories about their founding *amani*. After the birth of men Yegiyema moved to his *amani* called Okangato, which is between Kamata village and Wanevinti Mountain.

Although Andai is the place of creation according to the South Fore it was from Manyavindi that the population of *amani* spread.

Once the *amani* occupied their lands they had children who were also still *amani*, and then their descendants changed into humans. One elderly man in Ketabi was able to name his patrilineal line back through seven generations to his clan's founding *amani*. Each clan has a male and female founding *amani* who live together, and their children also married and inhabited their own *amani* in turn. This means that the clans of each dialect group as defined by the Fore have a founding clan which has the first claim to ownership of the land. Traditionally this was of no practical importance but it has emerged as a very serious issue during oil exploration in the Kaza and Lamari River valleys. The *amani* children were allocated land by their parents, and eventually they occupied their own *amani* and left the rest of the land to be occupied by their human descendants.

The Fore have a rich cosmology which is anchored in the landscape linking the past with the present. Human history is linked spatially and temporally to the cosmology. The sacred geographical sites confirm the reality of the myths, and as long as the Fore continue to pass on their myths and believe in them, their cosmology will remain their reality.

The continual role of the *amani*

The importance to the Fore of their land, and indeed of specific pieces of ground, is emphasized by their use of the same name for the founding ancestors of the clans and for the sacred grounds where the *amani* live. Once the *amani* had spread over the land and humans came into existence, they continued to play an important part in the lives of humans as the intermediary between humans and the *bagina*. The *amani* were the guardians of the *bagina* and were the portal for humans to interact with the hidden powers in the landscape. These powers were found at sacred geographical sites, in hallucinogenic plants, at sepulchres and other places with a close connection to the dead.

The *amani*, the sacred grounds of each *amani*, consists of a cave that leads to *kwelanamandi* (the land of the ancestors), a lake, a mountain, a pine grove and palm trees. Each clan has its own entrance to *kwelanamandi*: for the Takai it is Agili, Ai is Agivesi, Baivasa is Amundi, and so on for each clan in the South Fore. The *amani* created by the *bagina* were half men and half wild men (which refers to the superhuman qualities of the *amani*).

Eventually, the descendants of the *amani* evolved into humans who form the clans of the Okapa region today. In the *pamusakamana*-speaking region of the South Fore the Takai clan originally had three *amani* (two women and one man) and the Ai clan had one *amani* (a man). All the clans in the *pamusakamana*-speaking area are descended from these *amani*, who came from Kasokana or Andai. After the birth of humans and the formation of the clans the *amani* disappeared into their own lands (*amani*) and the time of humans began.

This is the myth of the founding *amani* of the *pamusagina*:

“There was an *amani* from the Takai clan who had two wives and lived in Hantaii in the Takai-Ivaki border area. Another *amani* called Ikawa lived on his own in Avazii, just beyond the Ivaki-Umasa area, and he was from the Ai clan. They accidentally met at the top of Ivaki when the *amani* from Hantaii was out setting rat traps. Ikawa came upon him and asked him what he was doing, and the *amani* from Hantaii asked the same question. Ikawa replied that he was

the only *amani* in those parts and he came from *aoao* (stone). The Ai *amani* invited the Takai *amani* to his home in Avazii and he stayed there for the night. The next day his friend from the Takai clan took the Ai *amani* back to his home in Hantaii.

When they reached Hantaii the Takai *amani* instructed his two wives to make a mumu while he took his friend up to Doziemati and onwards to Ivingoi looking for any other *amani*. When they saw that there were no other *amani* beyond Ivingoi they returned, ate the mumu and slept. The next day he told his two wives to make another mumu while the two *amani* travelled down to the Kaza River, up Iviwanavi mountain, to Kaguzanavito mountain, and then to Imeriva mountain searching for other *amani*. The *amani* from the Takai clan was named Wana and the *amani* from the Ai clan, who is my forefather, is called Ikawa. While resting up at Kaguzanavito, Wana sent Ikawa to climb a tree to see if there were any other *amani* living on the other side of the

mountain. When they confirmed that there was no other *amani* living in that area they started distributing the land between them. They returned home in the evening, ate and then slept. Early in the morning Wana gave one of his wives to Ikawa and told his friend to have sex with her while cutting bamboo. When Ikawa had cut the bamboo and was pulling the bamboo back towards him his wife held on strongly to the other end. Eventually he dropped the bamboo and returned to Wana's house. When Wana saw him he asked if he had had sex with his wife. Ikawa replied that he had not, and Wana was furious and called his friend over and demonstrated to him how to have sex.

The next day Wana slaughtered pigs and having cooked them gave some to Ikawa and his new wife. He then told him that their offspring would populate the region. Wana told Ikawa that his sons should marry Ikawa's daughters and vice versa, so the area would be populated. Wana explained to Ikawa that

the land in the Kaguzanavito area would become filled with people and land issues would greatly affect them. Ikawa replied that he had always looked after the land on his own and saw no reason to give it up. Wana told Ikawa that since he had given him one of his wives he would have many children, and their children would have plenty of children, and generation after generation would fill the valley and beyond. That was why they had to start distributing the land. They agreed and the first son of Ikawa was called Wave, the second Dalekwali, the third was Amava, and then came Aikwani, Petoto and Kwae. Aikwani is the grandfather of your father Ikabala.”

(Male: interview 62)

This myth tells the founding story of the clans of the *pamusagina*, and implicitly states the importance of the agnate-affine relationship in Fore culture, and the importance of land that was originally divided amongst the ancestors. The narrative makes a temporal link between the *amani* and the living through genealogies, and a spatial link with the landscape by naming

geographical locations, and combined they create temporal and spatial reality for the Fore.

When the first human descendants of the *amani* were allocated their clan grounds they saw the rocks and rivers of the *bagina* that formed their land. Their duty was to protect their *amani's* sacred grounds and if this law is broken the living have to perform the *diana* (*atikamana* dialect) ritual to undo their punishment from the *amani's* guardians. The *amani* assist the living on many occasions and they are a link to the *bagina* who created everything. When the *bagina* is asked to help it is said that the land answers, and this means the *bagina* will assist humans through their clans' *amani*. The *amani* is the home of the clan ancestor as described above, and each *amani* has a close connection to other mysterious places in the landscape which they are guardians for (these places are also called *amani*). These include caves, ponds, unusual rocks or patches of rainforest, which are guarded by *kolekolepa* (invisible dwarves with magical powers in the *atikamana* dialect) who act as guardians for the *amani*. These locations might also be inhabited by *kavugi*, which are wild ghosts, in the *atikamana* dialect, that frighten humans. If a human has seen a *kavugi*, an *amakalo gina ne* (a

person who communicates with the souls of the dead) is asked to chase the *kavugi* away from their village by performing a ritual. The *kavugi* are omens of death sent by the *amani*, and if the *kavugi* is chased away the death of a family or clan member is prevented.

It is believed that a human dwarf is a link between the worlds of humans and the *bagina* through the *amani* and when a community's dwarf dies another is born to maintain the link. The role of a dwarf is to restore peace between the humans and the *amani's* guardians, whenever necessary. It is believed that the mother of a dwarf hung her bilum containing her baby near the *amani*, and her child was switched for the baby of a *kolekolepa*. The *kolekolepa* live in the *amani* and normally have the appearance of dwarves with long hair and beards, and live a similar life to humans, such as making houses and gardens. They live in an invisible parallel world to humans, so although they cannot be seen they are affected by what humans do. For instance, if a man cuts down a tree in the *amani* it might damage the garden or a house of a *kolekolepa*, or cause other damage in the parallel world. Sometimes they take on a different form such as a snake or dog for their own purposes, but normally they are invisible. They have the

power to paralyze, kill and deform unborn children for violations of the *amani*. If plants in the middle of the land of a *kolekolepa* have been damaged he will definitely punish the offender, or one of his close kin. The offender may see the punishment in a dream: he might see that he never marries, that his children die, or another kind of curse that the *kolekolepa* can bestow on humans. Some *kolekolepa* paralyze the whole body and others only certain parts. The *kolekolepa* are not asked to assist during fighting, but are asked to assist with food presentations as they live a similar social life to humans and understand the importance of food presentations. The owner of the *amani* shouts to the *kolekolepa* and tells them to start heating their own stones and the *kolekolepa* would respond by magically enlarging the food presentations of the humans. An offering of food would be left later at the *amani* to thank the *kolekolepa* for their help.

The patrilineal line of the clan had a connection with the *amani* through initiation, but their women and children could be harmed by the guardians of the *amani* as they had different or mixed blood and were not recognized as being connected to the *amani* that protected the clan's land. Problems start when people cut plants or

gather bush foods in the areas where the *kolekolepa* live and in retaliation the *kolekolepa* curse the humans who infringe on their land. When family members go back and check if the damaged plant belonged to the *kolekolepa* a bloody or oily wound indicates that this is the case.

The human owner of the *amani* ground, or a dwarf if there is one in the village, has a connection with the *kolekolepa*, and will be called upon to mediate between the *kolekolepa* and the victim. Firstly he will rub blood or fat on the damaged plant; nowadays, fat from a chicken or pieces of 'lamb flaps' (mutton ribs imported from Australia and New Zealand) are used, but in the old days he would often use pig fat, which was normally stored in bamboo containers in the houses. The owner takes leaves from each of the damaged branches or trees, some soil, and a cup of water from each creek where the offended *kolekolepa* lives. The water from these areas is believed to be the urine and other wastes of the *kolekolepa*. He also collects silver leaves known as *asai* from his own land. Next he walks to a nearby hill leaving a trail of *asai* leaves behind him; these have a shiny surface and will reflect the moonlight allowing the *kolekolepa* to follow him to the hill and hear what he has to say.

The *kolekolepa* move around at night time so the ritual is performed in the early evening.

At the top of a hill the arbitrator builds a platform, covers it with *asai* leaves and puts the collected items from the ground of the *kolekolepa* on the bed of leaves. As dusk approaches he lights a fire and places a piece of bamboo with three sections decorated with *asai* leaves at each end into the fire and explains the problem to the *kolekolepa*, and asks him to forgive the transgressor by removing the curse. When the bamboo explodes both the *kolekolepa* and patient will hear it, and if the patient is startled by the noise then the curse of the *kolekolepa* is confirmed as the cause of the ailment; otherwise the family will seek a cause and cure elsewhere.

The water from the creeks is taken to the patient, and the healer spits it onto the damaged or ill part of the body. He then takes a piece of 'pitpit' with a *ni* leaf fastened to it and returns to the *amani* and places the stick in the ground. Next he shouts out to the *kolekolepa* telling him that his guilt is known, and asks the *kolekolepa* to come and hold the stick or to bite it. This is performed near dusk and after an hour the healer retrieves the stick and

returns to the village. Back in the village the stick is checked for teeth marks to confirm that the *kolekolepa* has admitted his guilt and removed the curse. Meat and greens are cooked in bamboo, mixed with *ni* leaf and given to the patient to eat, and the next day he is cured. Once he is cured the family of the victim make a mumu for the healer in gratitude and as payment for his services.

All those who have physical disabilities as a result of disease or injury are said to have been harmed by a *kolekolepa*, who are also held responsible for deformed, albino and twin children. Albino babies were revered in some communities as children of the *kolekolepa* and in other villages they might be left to die. Sometimes, the mother left twins to die because she had suffered greatly during delivery, or the first born was kept and the second left to die as the child was made from the leftovers of the conception. Traditionally, the Fore understood that a mother could only successfully breastfeed one child so one was left to die. Deformed children were left to die as the men would have been angry with the women for allowing such a child to be born.

The *amani* is the guardian of a clan's land and the caretaker for the *bagina*. During initiation rituals the initiates received abilities called *aona* and aggression called *yesegi* from their clan's *amani* which helped them throughout their lives. Their connection was confirmed at this time as the *aona* was received in the form of a spirit familiar that connected the initiate to the *amani* and the land until death. Women might receive *aona* from their father's *amani* on the night before their marriage. There are many duties of the *amani*, of which the following are further examples: it will assist in battle, locate enemy sorcerers, heal those affected by sorcery, avenge the dead, and guide the souls of the dead to the land of the ancestors, *kwelanamandi*.

Kwelanamandi

This is the land of the dead which is also described as the land of the ancestors. All the founding clans of the South Fore have a tunnel from their *amani* ground that leads into *kwelanamandi*, through which the souls of their dead clansmen and clanswomen travel after death. For example, the Ai clan entrance is in Agivesi, the Takai clan in Agili, the Baivasa in Amundi, and the Wanda is in

Palali. When someone is about to die a sign occurs at these locations warning of an imminent death amongst the clan. In Agivesi a loud noise is heard, in Amundi a sound like bamboo breaking, in Agili a falling tree heralds a death. When a death occurs amongst the Ai the clansmen shout to Agivesi to let the *amani* know that the deceased is coming. Each entrance to *kwelanamandi* is guarded by an *amani* who directs a deceased's souls into the next world.

Kwelanamandi was just like the dream world where time did not exist, and when people dreamed of the dead they visited *kwelanamandi*. To enter, the soul had to cross a red river and then it entered a land inhabited by their ancestors. It was very similar to the land of the living, but there were no wars, sorcerers or famines. The dead lived a much pleasanter life than the living. Sometimes the *ama* and *kwela* of an ancestor might carry a sleeping person off to *kwelanamandi* where they would be feasted with wonderful food, but in the morning they would awake to find they were holding bush foods in their hands. Those who are unconscious are believed to have gone to *kwelanamandi* – the regaining of consciousness is explained by the ancestors turning the *auma* of the deceased back, saying it was not yet time for the person to die.

Tuvamali was another word that was used to refer to *kwelanamandi*. *Tuva* means where you belong and where nothing runs out, and *mali* means place. This is a word that is used to describe the superiority of the afterlife to the life experienced by the living.

The five souls of the South Fore

The Fore believe that an adult man or woman can have up to 5 souls contained within the body of the living that disperse after death. Three of the souls are eventually reunited to form an ancestor in *kwelanamandi*, and two (or one in some cases) are inherited by the deceased's favourite children. The following are descriptions of the five souls.

Auma

The following are some descriptions of what *auma* means to the Fore.

“It's your love”.

“It's the inspired thought from your heart”.

“A character who smiles at you from afar when he sees you”.

“Whatever good we have comes from our *auma*”.

“Free-willed speeches that we make”.

“Mutual friendship is inspired by *auma*”.

(Males: interview 152)

The closest comparison is to the western concept of the soul, and consists of only the person's good qualities. Each person's *auma* is unique and is created in the womb of the mother from male substance. There is no recycling of the *auma* as in eastern religious beliefs about reincarnation.

Ama

The *ama* is a simulacrum of the *auma*, but more powerful, and remained with the family until the obsequies were completed. It is believed that the *ama* is sometimes visible after death, so the living could see the deceased for the last time. The *ama* assisted in detecting those responsible for the death, watched over the funeral

preparations and assisted the family in expanding the food available at mortuary feasts. A dying person would tell their loved ones that his *ama* would assist them after his death, as he realized that the funeral was a great burden on the family, and believing that he could help after death eased the pain of separation. The *ama* of the deceased departed to *kwelanamandi* when the *agona* ritual had been performed, and the ashes of the sepulture dispersed, or the bones had fallen to the ground from a platform or been removed from the grave. *Kwela tavalawaye* meant that the *ama* had departed, as the family had begun to forget the appearance and character of the deceased.

The *ama* also gave blessings to family members, or other mourners who consumed the body of the deceased out of love, that would increase the recipient's *aona*. After the departure of the *ama* it could still be called upon to assist the living through the relics of the deceased. The *ama* is found in the bones which are regarded as being made from male substance.

The parts of the body that contained *ama* were certain bones, normally the collar bones and jawbone, and the hair of the

deceased. The family would ask the *anagra* to return these bones after the body had been consumed. If the head had been taken by the *anagra* the family would request the return of the jawbone and hair if they had not already taken some after the death. If the bones were to be returned to the family they were scraped clean and dried first by the *anagra*. The jaw was placed in a purpose-made bilum of *asi*, and worn around the neck of a man so it hung down his chest and requests were made to the deceased's *ama* through the bone. If a woman wore the bone it was hung down her back and worn out of sorrow. The collar bones were worn as a necklace by women, and the men put them in the bilum that contained their hair. They could be worn by any member of the family, including children, and were a sign of sorrow for the women and children and a means of summoning help from the *ama* of the deceased for the men. The hair was put in small bilums and worn around the neck and the bilums were shared amongst the family members. These relics were talismans and were used to call upon magical assistance from the *ama*. When worn they warned of enemy ambushes, sorcerers or other dangers by making the person itch, or made a warning noise. When the itching stopped it was safe to walk ahead; and sometimes,

if a person urinated a lot it meant that the enemy was ahead. When a member of the family was ill the *ama* might be requested through the bones or hair to help heal the patient. These talismans could also reinforce the person's *aona* and make a warrior feel *inauma* (*pamusakamana* word which means unstoppable aggression). Those men who were filled with *inauma* were described as being thirsty for revenge and would not hesitate to kill enemy men, women and children. The relics provided a link to the deceased's *ama* which assisted the family members with whatever they requested. Gradually, the link between the living and the ancestor faded as generations passed away, and the *ama* no longer assisted the living. The ancestor had forgotten the living and their hair and bones were then left by their sepulture.

Kwela

This was the ghost that was felt by the living; it was the dangerous aspect of the dead person that could harm the deceased's family members. The *kwela* and *ama* of the deceased occupied the sepulture, which was a temporary home until they departed after the final mortuary rite called *agona*. The *kwela* came from the flesh

and blood of the deceased and as the body decomposed it became more and more powerful. The smell of decomposition was the *kwela* that travelled on the wind, as a cloud of pollution, in the form of a human and harmed the women and children of the family of the deceased if the obsequies were not performed correctly. A man's or initiate's *aona* was harmed by the pollution of the decomposing body so the men would stay away from the body when it started to decompose.

As the body decomposed the *kwela* became immensely powerful; so exposed sepultures, which were baskets or platforms built in sugar cane or bamboo groves, were built far away from human habitation to ensure that people did not come into contact with the *kwela*. If the body was buried most of the pollution from the decomposition remained in the burial pit so the *kwela* was not as dangerous. Finally, if the body was disposed of by transumption the *kwela* remained in the female affines, called *anagra* in South Fore, for the period of normal decomposition thus rendering the *kwela* even less dangerous. The *kwela* of the deceased would not harm those of the same blood so the affines could safely consume the body. During the *aluana* ritual the *kwela* was removed from

inside the *anagra* to the sepulture (the covered ashes of the fire where the body was cooked), and it remained there until the final mortuary rite called *agona*, when it departed to *kwelanamandi*.

Yesegi (occult power)

Yesegi was the term used to describe a man's aggression, way of thinking, lack of fear and the supernatural power of his *aona*. It was a man's *yesegi* that made him a great warrior and powerful sorcerer. *Yesegi* was the power of a person's *aona* and the two were intimately linked. It came from two sources: firstly it was received from the *amani* with *aona*, and secondly from a deceased family member. *Yesegi* was part of a man's skin when he was alive and it departed from the body with the *kwela* after death. The *yesegi* of the deceased was normally transferred to one of the deceased's sons and this gradually became apparent as he grew older. It was believed that the *yesegi* became part of a man's skin when it was inherited. There was no particular moment when the *yesegi* moved from the dead to the living, and the transfer was commented on in retrospect by the men. *Yesegi* could also be transferred from a woman when she died, as some women helped carry shields or

wielded clubs during fights. Not everybody had *yesegi*, but it was evident in those who possessed it. *Yesegi* was also given to initiates during the *akitona* ritual as described in the next section on *aona* and the source of this *yesegi* was the *bagina* via the *amani*.

When a man's death was being avenged the *ama* and *kwela* helped the warriors. The *yesegi* was the aggression of the *kwela* and it transferred onto the avenging warrior's skin, so he would possess *inauma*, and ferociously attack the enemy and avenge the deceased. The *ama* would enter the avenging warrior and also assist in avenging the death, and the *kwela* would move in front of him putting fear into the enemy. Once the death had been avenged the *yesegi* returned to the *kwela* until it transferred to one of the deceased's children.

Aona (abilities)

The *ama* could only transfer the parent's *aona* to one child, and this was normally the favourite child of the deceased, who was often the oldest child of the same sex. As well as the *aona* of the deceased a child or other young relative could receive *aona* from the *ama* in the form of a blessing during transumption. This was not the same

as the deceased's *aona*; it could be any ability and was commented on in retrospect. *Aona* came from the *amani*, or the *ama* of a deceased adult. *Aona* can be described as a person's abilities and it provides protection to those who use it properly. People were not born with *aona*; it was something they gained during their lives. When people became old their *aona* dissipated, and they would say that it was time for them to die as their *aona* was weak.

A child might receive *aona* from the deceased's *ama* during transumption if he ate part of the fingers of a dead parent or grandparent. As the children grew up the family members would say that they acted or carried out tasks like their parents who must have blessed them with their *aona*. Children received their parent's *aona*, and so inherited their characters and abilities. *Ava auma* means father's ways, *ano auma* means mother's ways and *aga gava* means family ways.

The opportunity for a man to acquire *aona* from his *amani* happened at the following initiation rites: *kokana*, *andamana* and *akitona*, which are names in the *pamusakamana* dialect, performed on young initiates so they might have a vision and receive *aona*

from the *amani* when they did so. It could also occur on the night before a man was married. During *akitona* the interior of the men's house was decorated with red pandanus, and one was dressed like a man and placed next to the central post of the house. The red pandanus was hidden from children and the first time the initiates saw it was during the *akitona* ritual. There was a large fire in the men's house and the initiates were under many restrictions to help them experience visions. During *igavu* (part of *akitona*) sharpened cassowary bones were rammed into the initiates' noses so that they underwent a transforming ordeal. It was during *akitona* that the initiates would have a vision of an animal or plant which became their familiar spirit – the connection between a man and the *bagina*. The familiar spirit was the *aona* that the initiate received from the *amani*. The familiar would appear in dreams or visions and might assist a man by warning him of dangers, or tell him where to find pigs or possums when hunting (these are just some examples). These were the only times that a man could receive *aona* from the *bagina* through the *amani*. A man's character was also affected by his familiar spirit, so if the familiar was an aggressive animal then the initiate would be aggressive. Men never ate their familiar spirit

in the non-dream world as that would destroy their *aona*. The familiar spirit was the *bagina*, and when the familiar appeared or spoke it was regarded as the *bagina*. The process of receiving *aona* was called *kiva*. This is not to be confused with the *kiva* tree leaves used frequently in the men's house to help the initiates grow.

Once the men had received *aona* they received visions from the *bagina* when under the influence of a hallucinogenic drug made from the bark of the *agora* tree and *ileleva* (wild taro). The drugs released the *ama* from the body so it could enter the world of dreams and visions, and the user's *aona* connected with the *bagina* to receive its assistance. A similar technique was used to strengthen a sorcerer's *yesegi*.

Later in life a familiar spirit might tell the man that his gift (abilities) had changed. For instance a man who had received the gift of being a good gardener might later in life become a good hunter. The interpretations were very flexible so a man who had the ability to divide food at a feast without any arguments might also be a successful gardener or hunter. People interpreted events within

the framework of their understanding of *aona* and events were fitted inside this belief model.

Contact with a decomposing body through touch, smell and ingestion would contaminate a warrior or initiate and damage his *aona*. The men avoided those who ate the dead and purified themselves so that their *aona* was not damaged. Food taboos were designed to protect a man's *aona* as were many of the rules of the men's cult houses. There were also rules to protect a young woman, in particular those who were newly married, from the pollution of the corpse. Although this rule was to protect the woman, in reality it was to stop her from becoming a danger to her husband's *aona*. When she was an old woman she was allowed to dismember a corpse as her *aona* was already fading and it no longer posed a danger to her and her husband.

Ivaena was the first ritual that women were exposed to where they might gain *aona* from their patrilineal *amani* or the *ama* of an ancestor. This was performed the night before a woman was sent to live with her husband's family. A large fire was made in a house and the older women told her stories about how she should behave.

The older women purposely hurt her feelings and were very critical of her behaviour. Suddenly she would start to cry and she was left alone till she finished. It was during this time that she would experience a vision as to her future – this vision was the *aona* she received. If a girl was an orphan she might think of her mother and father and their *ama* might come and give her *aona*. *Aona* could also come from the *ama* of the deceased grandparents. Sometimes the woman might have a vision of an animal, and this *aona* was sent by the *bagina* via the *amani*. The *aona* came from her family or the *bagina*. Whatever the woman saw during her vision came true, and sometimes it changed her character. Sometimes, if a woman was having difficulties becoming pregnant the *ama* of one of her parents or grandparents would come and tell her not to worry, and not long afterwards she would become pregnant.

The red pandanus had great power to induce visions in women. The visions could also predict unfortunate events in the future. If a woman had a bad vision she would not eat the red pandanus again and this prevented the vision from becoming reality; however, if the woman continued to eat the red pandanus she would be cursed and the vision would become reality. The women ate this plant during

the season but the men used to eat it in secret. Before, it was believed that the red pandanus grew in the *amani* and originally came from Andai (the place of creation).

The incorporation and departure of the souls

The souls and personhood during rites of passage

The body of a baby was believed to be formed from the sperm of the father and the blood of the mother, and the *auma* and physical body formed in the womb. The bones and *auma* came from the father and the blood and flesh from the mother. As the flesh and blood came from the mother they were returned to the mother's family when a person died, so it was the affines who opened the road to *kwelanamandi* by removing the flesh and blood from the bones through transumption. The *kwela* would not harm those of the same blood, that is, the affines, but it could harm other family members.

A baby was born with *auma*, *ama* and *kwela*, and *aona* and *yesegi* were added to a child during transumption at mortuary feasts when the child might receive the *aona* of a parent or a

blessing from the *ama*. During rites of passage both men and women might receive *aona* and *yesegi* from the *amani*. When they were adults they could still receive blessings from the *ama* of their deceased relatives or from participating in transumption. As the person entered old age their *aona* faded and they became weaker, and eventually they died.

The death of an adult and departure of the souls

The *auma* resides in the middle of the chest of the living and departed from the body with the *aona*, *ama*, *kwela* and *yesegi* on the last breath of the dying man through his mouth. The *auma* went straight to *kwelanamandi* escorted by the *kwela* and *yesegi*, together with the *ama* and *aona*, all of which then returned to the land of the living. The flesh became the *kwela*, which became stronger as the body decomposed, and this strength gradually faded towards the end of the obsequies. Once the flesh had decomposed and only the bones were left, this was a sign that the *kwela* was no longer present or was not very active. The *kwela* cannot be seen; it travels on the wind and can harm members of the deceased's family. The Fore believed that fear and *yesegi* were located in the skin. The

aona and *yesegi* normally passed to the children during the *agona* rite, but sometimes it happened before. The *ama* is the spirit that can be seen and is a simulacrum of the living person but more powerful. The *ama* comes from the bones of the deceased. If the mortuary rituals were performed properly the *ama* assisted, but if they were not, the *kwela* would punish the family. After transumption the *kwela* remained inside the *anagra* until released after *aluana*. It did not reside in any other women who took part in transumption. The *ama* remained in close proximity to the family (the *ama* did not enter inside the family members but it remained close to them). The *kwela* was frustrated and angry and wanted to join the *auma* in *kwelanamandi*. Once *aluana* was completed, the *kwela* and *ama* remained at the sepulture which was where the body had been cooked. After the last mortuary ritual the *auma* was joined by the *kwela* and *ama* in *kwelanamandi*, and once this happened the deceased was reborn in *kwelanamandi* as an ancestor.

Death of a child and the departure of the souls

If a child died the soul's entrance to *kwelanamandi* was dependent upon the mother and father forgiving any transgressions

rather than the affines. At first the *kwela* and *ama* remained with the parents as the child had not been able to fulfil his duties to them. The *kwela* did not enter the wombs of the women who ate the body, but remained in the vicinity of the mourners with the *ama*. They departed to *kwelanamandi* after *agona* had been performed. The *kwela* of a child was not feared as it was not powerful, so there was little threat of pollution to the family members. The *ama* and *kwela* of a boy could move in the men's area and a girl's remained in the *kami* (the women's area of the hamlet). The departure of a child's souls was the same as for an adult, and the ancestors were asked to care for the child's souls when they arrived in *kwelanamandi*.

Death of a baby and the departure of the souls

The baby's *auma* departed to *kwelanamandi* at death and the *kwela* and *ama* remained until *agona* was completed. The mother continued to carry the baby's bilum around and when the mother's breasts were full of milk she squeezed the milk into the bilum to feed the baby's *ama*. This would continue for a week after death and the completion of transumption, and then the mother of the

deceased baby would tell her family it was time to perform *aindu*.

The family members brought garden rats to the mother's house and they were cooked and their soot rubbed all over the bilum. The baby's blanket was then removed, and this removed the *ama* from the bilum. The mother would be crying when this happened as this was a defining moment in the obsequies. The rats were then cooked in bamboo tubes with greens and shared among the women. The bilum was hung in the house and if the mother had another child she would use the bilum again.

By performing the obsequies correctly the family ensured that the souls of the deceased were recycled within the family or became an ancestor, all of which assisted the living. Although there were different methods of disposing of a body the end result was the same in ensuring that the souls went to their respective destinations.

Tuvuana

The gathering of people to pay respect to the deceased was known as *tuvuana* in *pamusakamana*, and *tuvuyena* in *atikamana*. The affines, agemates and anyone else with a social relationship to

the deceased would attend. Also those with a social relationship based on geographical location would attend: this would involve people from surrounding villages.

Although the term *tuvuana* is used to describe a gathering of mourners it is also closely related to the practices undertaken during the care of the dying person, the preparation of the body and the gathering of relatives before the person died. These practices are now described followed by the stages and events as far as the depositing of the body at the sepulture.

Looking after the sick and dying

When a man was ill the family members would initially look after him, but when it looked as though he was seriously ill they would inform the affines, who would come and help care for him. Initially he was cared for in the men's house by the male members of the family, but when it became apparent that the illness was very serious they would move him to his wife's house in the *kami*. It was hard work to care for a dying man so the women took care of him; only his wife helped him to the toilet when he was able to walk as

the younger women and children were not allowed to know that men defecated. When the man was no longer able to walk his wife's male cousins assisted in carrying the dying man to the toilet and with cleaning any faeces from his bed. The responsibility to care for the sick person fell on the patient's family, neighbours and affines. The patient was kept warm, and food and water were given to him when he requested it. When the patient had pain they would move him to ease it and to prevent pressure sores. Stinging nettles were applied to the body to remove pain. The same care was given to a dying woman, except that she was cared for in her own house in the *kami*.

Treatments were provided by healers who charged fees for their services. They would identify the illness and the cause, and then treat it. The family would kill a pig and the fat was cooked with greens and herbs and given to the patient as a cure. The healer was given a piece of pig meat as payment. The Fore would go to any length to find a cure for their sick relatives (Lindenbaum, 1979).

Close to death

When a man was close to dying the mother's brothers and their wives would be by his side with his wife's brothers and their wives. His own brothers would be busy preparing food and firewood for the guests, and his sisters would be in the house assisting his wife. The family told him they were sorry he was leaving, but they knew he would be welcomed by the ancestors when he arrived in *kwelanamandi*. It is believed that those who are about to die appear in the dreams of their loved ones who are far away to say goodbye before they die. If a woman was dying she was surrounded by her female patrilineal and matrilineal relatives.

The dying man would thank all his relatives for looking after him, and then request water from his favourite creek and sweet potatoes just before he died, so that he would not be hungry or thirsty on his journey to *kwelanamandi*. The family knew that the man was about to die when he made this final request so they killed a pig and melted the grease out of the fat. The grease was rubbed on his body to cool his *auma*, and this allowed it to cross the red river at the entrance to *kwelanamandi*. The word 'kul' (cool) is a Tok

Pisin word meaning to calm a person's mind, and is the opposite of angry. To enter the land of the ancestors the *auma* had to be at peace with its relatives and friends; otherwise, it was unable to cross the red river. Pig grease was often rubbed on the bodies of the living, and was associated with beauty and health. It was important that the deceased arrived in *kwelanamandi* in his best attire to be greeted by the ancestors and the oiling of the body was part of the beautification process of the body and *auma*. Once the man's body was oiled he was dressed in new clothing and ornaments. When about to die he would wait for his favourite maternal uncle or other favourite affine to be looking away, or to be preoccupied with something when he expired, so the uncle did not actually witness his death. This was done out of respect for his affine whom he did not want to upset. These rituals and behaviours applied equally to a dying woman.

Death

After death the immediate reaction was grief, but the family and affines watched from the start for any signs from the cadaver that might implicate someone in the death.

When a person died, some of the affines would be sent to bring the rest of their clan to the village; others remained and looked after the body. Once the affines received the news of a death in their village they rubbed earth on their bodies and headed off to the village of the deceased led by the *anagra* (all married women amongst the affines). Behind the *anagra* came the men armed with bows and arrows and axes; they were followed by the young and old members of the clan. The men destroyed the gardens of the deceased and killed his animals whilst the rest of the affines picked up the food and piled it up outside the men's house in the agnates' village. They did not remove any of the deceased's possessions from his house. The family members piled shells, bows, arrows, beads, headdresses, bush rope (*asi*) and tapa cloth by the men's house as compensation for the affines. The women would carry some of the cut sugar cane to the *kami*. The food was then cooked and divided amongst the affines. If the affines killed too many pigs there might be a fight with the men from the agnates, but this never lasted long, and afterwards the two groups of men would mourn together.

If the affines had not been alerted to the impending death they would rub ash from the deceased person's fire on their bodies as a

sign of mourning and destroy the fire pit. They did this because they were angry at not having been told that the person was about to die. Sometimes the deceased person's house was burnt down. This happened if the mourners thought the person was not seriously ill or that he would recover, and then he suddenly died. It was done out of grief and sometimes other villagers less closely related would try and put the fire out. The women might puncture the walls of the deceased's house with sharp sticks in anger at not having been informed of the serious condition of the deceased.

The violence was an expression of the grief of the affines and the destruction was punishment of the family for allowing someone of the same blood to die. The affines held the family responsible for the death and the amount of damage was equated with the person who had died: the more important the person who died the more destruction they committed. Most deaths in the South Fore were from fighting or illnesses accredited to sorcery. It was the agnates' responsibility to ensure that all the members of their family and clan were protected from sorcerers and enemy warriors, and failing to do so resulted in the death of a member of the family. If a child died the affines used thorns and nettles to beat the family members

as they had not heeded their advice and looked after the child properly. The affines sometimes nipped the mother's ears so that they bled as she had not heeded their advice on looking after the child. Sometimes the family members would fight back but the ensuing fight would soon stop as the participants started to mourn together. This was the expected behaviour of the affines. The fights were a means of punishing the agnates and allowed the affines to vent their grief, anger and frustration with the family over the death of the child who had not lived long enough to see the mountains and rivers of the clan's land.

The fighting and arguing stopped as soon as the affines had eaten the meat of the pigs they had shot when entering the village. The meat 'cooled' their anger and made them forget any injuries they had sustained and the transgressions committed by the agnates. Cooked pig meat once eaten always reduced anger, arguments and grievances amongst the Fore. This feast was called *isosoana* in *pamusakamana*, and meant a feast for those who came to mourn. Tensions and outbursts of violence would continue to emerge until the *agona* payment was completed. These outbursts were shows of affection for the deceased and when they came from

the affines the family accepted them for what they were and were not offended as they understood their meaning. In fact, the family would have been offended if the affines did not behave in this way.

“Your ‘kandere’ control the door to the next life”, is a Fore saying. When a person was dying they would try and stay alive until their mother’s brothers arrived because the affines ensured the departure of the dying man’s *auma* into the next life. It was said that “he went back where he came from”. This referred to the affines as a mother: he came from the affines since that is where his flesh and blood came from; and the affines ate him when he died. In other words he went back to his mother, the affines, who held the key to life and death. A man was born from the affines and was returned to them when he died.

The relationship with the affines helped to reduce the grief of the family as they realized that they did not mourn their loved one alone, and this allowed them to let go of their grief. This was very important, because if they did not forget the deceased person then his souls could not depart to *kwelanamandi*. If the affines were happy with the mortuary process then the *kwela* and *ama* would be,

and they would depart after the *agona* payment. If the *kwela* was unhappy with the mortuary rites it would not depart and might harm a member of the family.

The affines who remained in the village, while the rest of the clan were sent for, placed the body on a new tapa cloth, dressed it in a new pulpul and put the deceased person's headdress and ornaments on the body, if this had not already been done before he died. The eyes of the corpse were closed as the person was no longer with the living. If a woman died the body was dressed by male and female agnates, but if a man died the body could only be dressed by male agnates in the men's house. A sugar cane bed was prepared and tied together with bush rope by the affines with materials brought by the family, and the same bed was used to carry the body to the sepulture. A chair supported the body at a forty-five degree angle on the bed so the body was visible to the mourners. Red sugar cane was used to remind a male ghost of the time it was placed in his lap when experiencing visions as an initiate in the men's house. This was done to make each of the souls happy, by experiencing good memories of its life, and helped the *kwela* and *ama* to depart for *kwelanamandi*. The head was held horizontal by a piece of wood

under the jaw supported by a stick at each end placed firmly in the ground. This kept the head up in its natural position and kept the jaw closed. Red cordyline was used to ward flies off the body as the plant symbolized revenge for the death of a loved one, and was also used to incite the *ama* and *kwela* to take revenge against the family's enemies.

It was important to prepare the body before all the guests arrived, so the deceased was seen in his best regalia. This was out of love for the deceased, as a matter of pride and duty of the family, and respect to the affines and other guests. A man's body was adorned with a new headdress of red feathers, toea shells around the forehead and pig tusks in the nose. A new pulpul dressed the body of a woman and her skin was oiled with pig grease to enhance its beauty; shell bands and pig tusks also adorned the body. This was done so that the *auma* of the deceased would arrive in *kwelanamandi* well dressed and ready to meet the ancestral spirits. It was also done so that the relatives and visitors would remember the person as he or she was when living. The body of an important person was not disposed of quickly, out of respect and to give time for all the mourners to gather to see the body for a last time. This

was very important because it would be the last visual memory that the living would have of someone they loved. The strength of a dead man was symbolized by his bow and arrows. The bow was placed in the left hand with the deceased man's hooked arrows (these were the deadliest arrows). An age-mate would shoot one of the dead man's arrows towards the clan's *amani* with the deceased's bow shouting out the name of the clan's *amani*. This informed the *amani* of the death and that its help was required to avenge the death. This ritual was conducted at night. Firstly, the deceased's hair was wrapped around the arrow and the arrow was then placed in the corpse's hand. It was then pushed through the roof as taking it through the door would have cooled the power of the *ama*, as women had walked through the doorway. When lit the arrow was guided by the *ama* of the deceased. *Aoyasa gina* means helper of the dead, and this referred to the *ama*. The *amani* was also asked to look after the *auma* on its journey to *kwelanamandi*.

When the death was to be avenged *kano kama* was performed, which means payback in *pamusakamana*. A shield was hung up at the entrance to the village and the men fired their arrows and shouted for the *ama* and *kwela* to come and assist the warriors. One

of the warriors carried a cooked sweet potato, which symbolized revenge, and left it on the proposed battlefield and shouted to the enemy that they were coming to avenge the death. The enemy were then challenged to battle the following day, and one of their warriors was targeted for payback. Orange and red cordyline were planted on the sepulture after a death was avenged. Green cordyline was more domestic and used to mark boundaries and to bring peace.

Another variant of these rituals involved gathering herbs from the *amani*, and requesting the clan's *amani* to assist in avenging a death. During the ritual the herbs were spat on a war shield with cooked dog meat. This symbolized the character of a dog: the dog bites back, and was symbolic for avenging a death. Once the cooked meat and herbs were spat on the shield the men would eat it and then depart for battle.

Bakana (*divination by spirit possession*)

Traditionally it was believed that only the very old died of natural causes and everyone else either died in battle or from

illnesses that were attributed to sorcery. Before a death was announced publicly the family members gathered in the house of the deceased. The *ama* was asked to assist on the first night after death to find those responsible for the death, and this ritual was called *bakana*. Spirit possession involved the *ama* of the deceased entering the body of a male family member. The man ate hallucinogenics, performed certain rituals, and as he hyperventilated on tobacco he became possessed by the *ama* and was able to see the *kwela*. Once possessed he might place hot coals in his mouth, start eating tobacco or engage in other bizarre behaviour. He would explain the cause of death to the other family members and then lead the men towards the guilty sorcerer's village. Normally, the family members would stop the possessed man from entering the village where the suspected sorcerer was resident because if he was identified the men would have to kill him and this would cause further fighting and deaths. The possessed man followed the *kwela*, and it showed where the man had died and what had been used to kill him. Bark from the *yarabo* tree was spat on the possessed man to help release the *ama*, as it had a strong smell and drove the *ama* from the possessed man. On other

occasions tobacco smoke was blown in his face and the *ama* and *kwela* asked to depart by making requests to the dead man's hair. *Bakana* was always conducted on the first night after death.

Autavana

Autavana in *pamusakamana* (*aitavaena* in *atikamana*) meant to uphold the man who had died, or to remember his name. The deceased man's clothing was hung up inside the clan's *amani* and the *amani* asked to assist in avenging the death. The clothes were also hung up as an offering to the *amani* to assist the *auma* on its journey to *kwelanamandi*. A senior man from the family performed this ritual of offering the clothes and asking the *amani* for assistance.

Mourning over the body

Mourners gathered around the body and cried, slept and sang depending on how they felt. There were three types of songs that were sung at funerals: *usi* songs, which were men's songs about wisdom, power and visions, *azza* songs, which were soothing and could be happy or sad, and finally *aeva* songs, which stirred feelings

of anger and revenge in the singers. The songs were traditionally sung at night. The family, affines and other friends sang these songs to help set the souls free. The *ama* was present in the hut when the singing took place and witnessed the entire funeral process. The purpose of the singing was to say farewell and to allow the souls of the deceased to go in peace. It was said that the *ama* felt the individual grief of each of the mourners. The singing also kept people awake and allowed them to keep insects off the body and so delayed decomposition. Before a man died he would request what songs were to be sung at his funeral and when his *ama* heard the requested songs being sung it was happy.

Aeva songs could be sad, happy or angry, but their purpose was to make the mourners seek revenge for the death of their loved one. They might be about the person who had died or their land, or songs that said goodbye to the deceased. The songs expressed the beauty of the land and told the dead person to depart. The songs about the land were songs about the road to *kwelanamandi*. They made the mourners cry and when they finished they would start to sing another song about the deceased. The women would sing along with the men after the men initiated the songs. After the disposal of the

body singing would continue on an ad hoc basis until *aluana* had been performed.

Male bodies and important women's bodies were placed on stretchers so they could be easily moved in and out of shelter and displayed publicly. If a man died his body was displayed outside during the day on a platform built near the women's area so that the women and the children could see the body that remained in the men's area. At night the body was returned to the men's house. The widow would sit next to the body on the ground with her cape covering her head, but still allowing her to see. The widow was supported by two women, and this was one of the few times women were allowed into the men's house. Before the widow and her close friends entered the men's house all the ritual artifacts were removed so they were not seen by the women. Men and women touched the body until it started to decompose – this was known as *kwelavula*. It was not necessary for the men's house to be purified afterwards, as the body was removed before it started to decompose.

Women's bodies were displayed in the *kami* during the day and returned to the deceased woman's house during the night. The men

and initiates entered the dead woman's house to pay respects, but they would not touch her body and remained within the *aloti* (the men's area of a woman's house). Important women's bodies were placed on stretchers and the others were supported in the lap of female relatives and placed on tapa cloth on top of banana leaves. Children's bodies remained in their mother's house in the *kami* and were not displayed outside. When the body was displayed outside tree branches approximately three metres high were planted in the ground to provide shade for the mourners and the body. It was believed that the sun dried the corpse and helped preserve it a little longer, giving relatives in distant places a chance to see the corpse before it started to decompose.

The male guests were accommodated in the *pasa wae*, the men's house, with the male clan members. The visiting initiates assisted the resident initiates with cutting firewood, collecting leaves for cooking, filling water containers and preparing spatulas for moving hot stones. If the *pasa wae* was full the visiting initiates went home each night and returned in the morning.

The *pasa wae* was constructed of pine posts with sheets of pine bark facing inside tied with bush rope called *anda*. Chewed sugar cane covered the floor and this in turn was covered with sewn pandanus leaves, which acted as a bed. The man's body was placed in front of the central post facing the entrance in an area known as *wava*. The older men sat in two areas on either side of the entrance known as *kavela*; the next age group sat in two areas behind the *kavela* known as *auta*; behind these two areas were two more called *aneata*; and finally at the far end of the hut was one area for the unmarried men called *tuluta*, which contained a secret emergency exit. The male visitors sat in the correct section depending on their age and sang and mourned with the clan members of the deceased. During the night groups would swap between being near the fireplace in their age-segregated area and being near the body.

Male members of the family would be vigilant throughout the funeral for signs indicating a guilty party. If a woman's food did not cook properly it was a sign that her husband or another male relative was involved in a sorcery-related death. Other signs came from the body, which might release urine or faeces, open its eyes, or supposedly sit up when a person guilty of the murder or related to

the murderer approached the body. If a sorcery trial was held the body was placed outside and the suspected clan's men would have to touch the deceased's hand: if the corpse moved or made any sign it was an indication of the guilt of the man's clan. The trials were tense and involved a stand-off between armed factions as political tensions were publicly acknowledged and tested.

The journey of the auma to kwelanamandi

When a man was dying his spirit familiar from the *bagina* would come and grieve over him and then die. The family would find a dead snake, lizard or whatever was the dying man's spirit familiar near the village and they knew the man was about to die. The spirit familiar was the connection between the *bagina* and the initiated man and this connection was broken just prior to death.

Just before a man was about to die he would tell his relatives that the ancestors had come to accompany him on his journey to *kwelanamandi*. To reach *kwelanamandi* the deceased had to look aggressive, he had to look like a true man – a warrior. A man's mistakes or wrongs could block the road as well as wild ghosts: by

looking aggressive he could frighten these wild ghosts to open the road to *kwelanamandi*. He carried his bow and arrows as the road was full of dangerous wild spirits called *kavugi* who inhabited the *amani*. The *auma* was escorted by the *ama* and *kwela*, and the *ama* and *kwela* of the ancestors, to ensure that it arrived safely in *kwelanamandi* and then they returned to the land of the living where they remained until the termination of the mortuary rites.

Before a man died his favourite maternal uncle would come and open the door to *kwelanamandi*. If the uncle had died then his first son would fulfil the role. If a man died before this relative arrived his *auma* would wait for the uncle to arrive and forgive the deceased for any offences he had caused the affines during his life. At this point the *auma* would depart for the next life. It was the uncle who removed the deceased's mistakes that would stop him from reaching his ancestors, as only his affines could forgive him. Today, when a man dies slowly and his body is rotting a padlock key is fastened on his wrist and this opens the way to *kwelanamandi* by allowing him to die.

After death the *auma* walked across the land to meet the *amani*. This was its last chance to see the land and to say goodbye to the *bagina*. When the *auma* arrived at the *amani* it would ask why he had died, and after feeding it the *amani* showed it the road to *kwelanamandi*.

The shadows of whatever was put on the body would go to *kwelanamandi* with the *auma*. The shadows of the funeral items were simulacrums of mortuary items that could be used by the deceased. After three days the *auma* crossed the red river at the entrance to *kwelanamandi* and after being welcomed by the ancestors settled on its allocated ground and waited for the *ama* and *kwela* to arrive. When the body started to decompose the mourners knew that the *auma* had crossed the red river at the entrance to *kwelanamandi*.

Sites chosen for the disposal of the body

Normally a dying person would request where and how their body was to be disposed of. It was believed that the person's *auma* made the wish as to where to dispose of the body, and this could be

influenced by the man's *aona*, which might show the place of disposal to the dying person in a dream. If the decision was made by the family it was the male members who decided, although the women were allowed to express an opinion.

The family would express the wishes of the deceased as to how their body should be disposed of and the affines would always follow the wishes of the deceased and the family. The family told the affines the chosen method of disposal of the body: burial, placed in a basket, placed on a platform in a bamboo or yellow sugar cane grove or by transumption.

If the body was to be placed on a raised platform it was taken to a yellow sugar cane or bamboo grove. If it was to be buried it was taken to the chosen site of the deceased or the family, which was normally next to a bamboo or sugar cane grove. If the body was to be consumed it was taken to a distant bamboo grove, sugar cane garden or casuarina grove as they provided shade and were far enough from the village to avoid polluting it. There was no limit to the number of bodies that could be prepared at one site but each had a separate sepulture. The site chosen was always on the clan's

ground but it did not have to be on the deceased man's own allocated ground. In the South Fore it was considered an honour to have a person's sepulture on your land. All the sites chosen were domestic and marked by domestic plants as a human was not a wild animal. The sepultures reinforced land ownership – especially the bamboo groves as they lasted for generations.

Occasionally the affines might take a woman's body back to her village of origin where it would be disposed of by one of the above methods. It was usually the brothers of the deceased woman who decided to do this. Before the body could be taken any outstanding issues such as the payment of bride price would be settled. If the body was returned to her village of origin it was wrapped in tapa cloth and fastened with rope made from the bark of the *asi* tree, which grew near human habitation and was easily available. The family gave one or two pigs to the affines to help feed the guests and for *igoghana*, if they had them available. Some of the family members would also gather food and go and assist with the feast. Sometimes the body was cut up and then taken back to the village to be cooked and eaten. The practice of taking the body back to the deceased's village of origin was not common, but occurred during

the kuru epidemic where bride price was sometimes paid a few years after marriage if the woman survived long enough to bear children. If she died before this from kuru the agnates could claim the marriage annulled and were not liable to pay the full bride price or mortuary payments. Political tensions between the agnates and affines also resulted in such an action.

Movement of the body to the sepulture

After two or three days the affines would take the body of a man, boy or a married woman from the family and carry it to the sepulture. If an unmarried girl died her body was carried by her male relatives as her body belonged to the family. If the affines took the body the family members followed crying for their loved one and remained until the body was disposed of, unless it was to be consumed; in this case the body was placed on wild green vegetables on top of a piece of tapa cloth and then nearly all the male family members departed.

If the body was to be disposed of by transumption the *anagra* who had the rights to it started to claim their share as the body was

carried to the sepulture. Some women held parts that they claimed whilst others marked a piece with clay or tied bush rope around it. Others shouted out their claims to a particular part.

A payment called *wasagasa* was made to the affines who carried the body during the *aluana* and *igoghana* feasts and another called *kagasa* was made to the affines who prepared the sepulture at *aluana* and *igoghana*. If an unmarried girl died payments were not necessary as the body was carried by male members of the family.

Isosoana

This feast took place at the men's house whilst the women participated in transumption. Before the women departed to the sepulture with the corpse, they gathered food for the men so that they could feed their guests; otherwise, the men gathered their own food to feed the male mourners. Any women who did not take part in transumption would assist in the preparation of this feast. If pigs were available the men would kill them and cook them with the vegetables out of respect to the guests who attended the funeral.

Isosoana in *pamusakina* (*isosoena* in *atikamana*) meant a feast for those who came and mourned the deceased.

The mortuary rites described so far were very similar for males and females, and were the same for all forms of disposal of the body. The dead person started to undergo rites of separation from the living, starting with the *bagina*, the family and affines, and then the *amani*. The departure of the *auma* was the first priority for the mourners. At this stage the *kwela* was not a threat to the family but the mourners knew that the *ama* and *kwela* were present and watching them, so it was important to conduct the rituals correctly. Then the relationships between the survivors took priority, in particular the relationship between the agnates and affines. *Tuvuana* was also a time when loyalties, and political ties and strengths might be tested. The body was handled and prepared with respect and love and only after 2-3 days when the first signs of decomposition appeared did the relatives start to fear the corpse.

Transumption: rules for claiming and primary distribution of the corpse

Bodies that were not eaten

A dying man's request to be buried, consumed or placed on a platform was always respected by the family and affines. In the South Fore transumption was the most common method of disposal of the corpse, and many of the bodies that were placed in graves or on raised platforms were later removed and eaten out of love and respect for the deceased. There were a few cases when the body was not consumed.

If the body was found in a decomposed state it would be buried immediately to remove the threat of pollution. This happened when someone died in the forest and it took several days to find the body. The bodies of those who died of dysentery were not eaten in any community in the South Fore as people believed that dysentery was a contagious disease and was not caused by sorcery. There was some ambiguity surrounding the corpses of those who died of yaws or leprosy, and in some communities the bodies were eaten and in others not. Leprosy fell into the contagious disease category and lepers were often ostracized from a community, and when they died,

they were buried and their huts burnt. However, this was not always the case. Whenever, for whatever reason, there were sores on a corpse, these were cut off and dried on a fire and then cooked in bamboo and eaten with the rest of the body. Those who died of kuru or other types of sorcery were always eaten in the South Fore, as sorcery was not contagious so corpses were regarded as safe to eat. In one or two communities very old people were not eaten to show respect for the deceased. They thought that their neighbours would have castigated them for eating a body with no meat on it, and they would have been regarded as greedy. There was also the occasional case where a body that was mutilated during battle was not eaten out of sorrow. Finally, exocannibalism was not practised amongst the South Fore.

Rules for claiming and distributing a male body

The body of a man belonged to his affines and normally the senior uncle on the matrilineal side claimed the corpse, and oversaw its care, transport to the sepulture and disposal. Sometimes the duty fell to another matrilineal uncle that the deceased was particularly close to. If the body was to be disposed of

by transumption he would transfer the duties of division, dismemberment and cooking to the senior female *anagra* who was normally his wife. He would stay and witness the transumption of the corpse to ensure that the *anagra* carried out their duties diligently, and to see if there was any behaviour amongst the guests which might indicate their families' involvement in a sorcery-related death.

There was a rule of seniority in the appointment of a mature woman to oversee the transumption of the corpse. The oldest living matrilineal aunt of the deceased would be responsible for overseeing the dismembering of the body; if she had died the second oldest matrilineal aunt claimed and oversaw the dismembering of the body, and the rule of seniority was followed until a woman from the affines was appointed to oversee the transumption. If all the mother's brothers' wives had died, the wife of the first son of the oldest brother would oversee the dismembering of the body. If he was unmarried or his wife had died the right passed onto the wife of his next oldest brother. If there were no women in this family then the duty fell on the wife of the first son of the second oldest brother of the deceased's mother, and this rule of seniority continued until

someone was found who would take charge of transumption. If the rights went to an *anagra* who was too young to take charge she would request an older female relative to take charge of the dismemberment and distribution of the body.

In the case of a married man there were at least two groups of *anagra*: one from his deceased's mother's family and another from the man's wife's family. Ideally, both families came from the same clan, but in reality they could be from different clans. Though the women might be from different clans or different families in the same clan they were still referred to as *anagra*, which was a term of respect for the female affines.

If a man had one wife the *anagra* on the mother's and wife's side took equal shares of the body. On his wife's side the rights to the body were given to the first cousins' wives as the distribution followed the same rules as the distribution of bride price. This principal also applied to the mother's family, who passed the rights onto the first cousins' wives. If a man married two wives the senior matrilineal aunt would be in charge of dividing the body and each group received an equal amount of the body. There would be three

groups of *anagra* in this case. Both widows sat close to the body and the deceased's mother's family would cut one side of the body and the wives' families the other side of the body. If a man was divorced the rights to the body remained with his mother's family and his wife's family had no rights to the body. If the wife had died the distribution for her family was the same as if she was living. If the first wife had died and the man remarried the distribution was the same as for two wives. If the man was adopted the body was divided between his biological mother's relatives and his wife's family and the adoptive parents received a payment during *agona*. If a man was divorced his son's body would be eaten by the affines and the divorce did not change the rights to the body as the affines had contributed the son's blood. In practice many of the *anagra* would claim part of the body and this was the cause of arguments amongst the mourners. Some would claim they were entitled to part of the body as they had been close to the deceased or they would find some other reason to make their claim.

A married man's or woman's *anaso* (godmother) had an equal right to the body as an *anagra*. The *anaso* was normally an older woman from the same clan as the new bride who was appointed to

look after her when she moved to her husband's village, and the role was similar to that of a godmother. The *anaso* would normally live in the same village but would have married into a different family. She was treated like a sister-in-law by the husband and had an equal claim to that of an *anagra* to the body of the husband and wife when they died. She would share her portion with the other women of her family and friends.

The oldest son's wife of the deceased man would make a request for part of the body on behalf of the family. This request was not a right, and was made on behalf of the daughters-in-law and other women in the family who were called *anatu*. The *anagra* could refuse this request, but this was unusual, and only occurred if there were pre-existing tensions between the two groups. Normally the *anatu* were given the head and the right arm of the deceased. The senior *anatu* would mark the parts of the body that she wanted to claim and the senior *anagra* would support the request or refuse it. The arm was symbolic for food, support and protection and was consumed by the *anatu* out of respect for the deceased person's good actions to their family. The head was requested as it was symbolic of the deceased's individual humanity: the face gave them their

individuality. In most cases the women who made up the *anatu* were originally from the affines' clan and were therefore on good terms.

All the women who had rights to claim part of the body would receive an equal amount. If there were six claimants it was divided into six parts, and if there were twelve claimants it was divided into twelve parts. The women with a claim to the body would hold the part that they claimed, or mark it with red earth or tie vines around the part. Once the body had been claimed, and those claims mediated by the senior *anatu* in charge of the obsequy, dismemberment began.

If a man was unmarried his body was claimed and divided in the same way as for a married man, but there was only one group of affines. If the deceased was very young he was not yet a complete person, had less standing and did not have an extended web of social contacts; therefore, only a small number of women would take part in transumption. As a male became older and more valuable to his community the mortuary rites would become more extensive and more significant. If a young man was believed to have inherited

his parent's *aona* or *yesegi* it was important that these souls were passed on to other young members of the family.

Rules for claiming and distributing a female body

If a married woman died her body was claimed by her eldest brother, but this right was transferred to his male cousins who would transfer the right to their wives for the purpose of transumption. In the distribution of the body the *anagra* and the *anaso* had the rights; the senior *anatu* would request the deceased's arm, head, or both and the *anagra* normally agreed. The deceased woman's daughters who had married out would attend the obsequies with their families and participate in transumption with the *anatu*.

The rights to an unmarried girl belonged to her oldest brother but these rights were transferred to his male cousins who would have received her bride price if she had lived, and they transferred it to their wives if the body was to be disposed of by transumption. This was compensation for not receiving the bride price that would have been received if she had grown old enough to marry, and the corpse was consumed by their wives. The female cousins always

claimed the head as that was regarded as the most important part of the body by the family. For reasons already explained the *anagra* would also attend and help eat the body even though they had no right to a specific part, so in this case they were *ename*. The aunts were responsible for dismembering the body as they were the oldest and most experienced women in performing this ritual.

Suicide and death during childbirth

Amongst the South Fore, people committed suicide by hanging, and it was believed that the *auma* could not depart from the body as the neck was fastened tight by the rope. Suicide was a terrible thing to do, and the person who performed it prevented their soul from leaving to the ancestors in *kwelanamandi*. When the body was found the family would remove the rope to release the *auma* so it could depart to *kwelanamandi*. If a woman died in childbirth the death was always attributed to sorcery and her *auma* departed immediately to *kwelanamandi*. Neither form of death altered the mortuary rites for the deceased woman, ostracized her souls, or increased the threat of pollution.

Rules for claiming and distributing the body of a baby

If a newborn male baby died at the menstrual hut the *anagra* did not have a right to the body, but once the baby had been brought to the *kami* and remained there for two or more days the *anagra* claimed ownership of the body. If a baby girl died the body belonged to the agnates. If the child died at birth the women were ashamed, and depending on the community the child was buried or consumed by the older female agnates and affines who assisted in the birth. Although the child had not become part of the community it was still important that the child's souls reached *kwelanamandi* to be with the ancestors.

When a baby died in the *kami* the *anagra* would come and hold the corpse, mourn and then take it to one of the usual places for transumption. The mother's first brother's wife claimed the body of a male, but it was the cousins who had the rights to consume it.

Grieving

There were two words commonly used to describe this in the *pamusakamana* dialect. The first was *kayalala*, which means the

after-effect of being burnt, and *kaisu kaisu*, which means emotional pain. The level of grief experienced by the individual depended on the relationship between the individual and the deceased. A father was referred to as *tumu waga*, the name for the centre post of a house; the women and children were connected to this post and when it collapsed the whole house collapsed, symbolizing the effect of his death upon his family. When a mother died the roof of the house collapsed inwards but the posts remained, which symbolized the children left on their own without their mother's protection. If a sister died then there was no food and water and a family went hungry. If a brother died there would be no firewood and the family would be cold.

The women believed that by eating the body of the deceased their grief would subside. When the women cried and dismembered the body the men would tell them to eat and that they, the men, would avenge the death. The emotional intensity of the mourning peaked when the body was dismembered and consumed. The widow and daughters were supported by relatives at this time, and the men would overhear the words of comfort given to their women and be filled with rage. The women would often say that if they were

men they would avenge the death. Not only did the women eat out of sorrow; they also ate out of anger and would ask the men why they were eating a loved one when the enemy was not; these kinds of comments were taunts to their own men. Human bodies were not to be eaten, but the women ate them out of love and respect for the deceased, and so that the insects could not. The men were angered by this sight and taunted further by the comments made by their womenfolk, and so enraged, they would seek revenge for the death of their clansman. One explanation for the grief dissipating after transumption was that the women had exacted a promise from the men that they would avenge the death. Other informants emphasized that they believed that the deceased was part of them after transumption and this helped them overcome their grief.

The dismemberment and preparation of the body for transumption

The body was normally taken to a sugar cane garden, or a casuarina or bamboo grove. Often, it was a favourite site of the deceased who rested in these places during the heat of the day when he was alive. These sites provided shade to the participants and

cooled the corpse, so when it was dismembered the *kwela* and *ama* would be happy.

On arrival at the sepulture the body was placed on a bed of green vegetables on a bark cloth resting on banana leaves. The bed was designed like this so that none of the body was lost during transumption. The *anagra* surrounded the top of the body and the female members of the family, if they remained to witness the dismemberment, sat down about a metre away around the lower half of the body. When the body was about to be dismembered the women chased the young children away and told them that if they did not leave the *kwela* would eat them. Babies stayed with their mothers three to four metres away from the body as the *kwela* was dangerous to the small children. If one of the *anagra* had a baby or very young child she would give it to one of her female relatives to look after when she was participating in cutting the body. If an *anagra* had a child under the age of three she would still breastfeed it with the help of another woman who held the child, or the child was tucked under her arm so it could feed without the mother holding it with her hands. The children's noses were wiped with

bark capes and their eyes cleaned with the mother's or other female relative's fingers as required during the obsequies.

The body was not normally dismembered with close family members present as it was unbearable for them to watch. The agnates would move away when the *anagra* dismembered the body. Occasionally a male agnate who witnessed the dismemberment shot an *anagra* who was cutting the body, out of grief and anger. The arrow was aimed at the woman's thigh as this was a site used by some men to punish women, and the arrow used would be non-barbed. The arrow was shot out of frustration, and the attacker did not intend to kill or maim his *anagra*. He was actually expressing his love for the deceased. Later the man would compensate the victim's family who understood the cause of his distress. A close male relative of the deceased could be possessed by the *ama* when watching the dismemberment of the body and in this altered state he might attack anyone who was suspected of being responsible for the death, or anyone related to that person. This kind of possession was called *kiva*.

An appointed family member witnessed the transumption and remembered how the body was distributed and ensured that the body was treated properly. The family recorded the first division of the body then other senior women who received parts of the body recorded each subsequent division so all the women who took part in eating the body would receive correct purification and compensation payments during *aindu*, *aluana* and *igoghana*.

The mother's oldest brother's wife was in charge of dismembering and sharing of the corpse. The *anagra* would sometimes argue over the division of the body and they would compete to hold onto the body to validate their claim. They started to claim their part of the body the moment it was removed from the house by holding onto it as it was carried to the sepulture. Some of the *anagra* would argue about who had looked after the person well when they were alive and therefore deserved part of the body. Those who arrived late had not claimed part of the body, and they would argue their case until they were included in the distribution of the body. The senior *anagra* in charge would start dismemberment of the body with her bamboo knife. It was believed that when the first drop of blood from the body touched the *bagina* it welcomed the

kwela and *ama* and comforted them. The *ama* and *kwela* were always welcomed by the *bagina* when the body was dismembered.

The body was always cut up by the old *anagra*: that is, women with grey hair who could no longer bear children. The *aona* of the older women was already fading so they were not affected by the pollution of the body, and their elderly husbands' *aona* was also fading so there was little fear of their wives polluting them. The younger *anagra* who had rights to part of the body would ask the older ones to cut their part of the body for them. The younger women were not allowed to cut the body as they would be polluted by the blood and this would pose a danger to their husbands' *aona*. These men were the warriors who protected the community, and if the pollution reached them through their wives their *aona* would be damaged, and they would not be able to defend the community to their fullest ability. Women over the age of sixteen assisted by holding the body during de-limbing. They did not assist for the torso of a man or woman as they were forbidden to see a man's intestines full of excrement and the genitals of either sex, and this part of the obsequy was hidden from all except the elderly *anagra*.

There were two groups of *anagra*, one on each side of the body; firstly, they cut off the feet and then filleted the legs. The hands were cut off at the wrist, the arms filleted and the bones removed. The leg bones were cut off and the body sat down on the tapa cloth with the back of the torso downwards. The chest and abdomen were cut open and the intestines removed and given to the widow, who hid them in a bilum full of greens. In the *atigina* the widow was sometimes given the hip bone as it was regarded as something that belonged to her. The intestines and genitals were given to the widow in the *atigina* so she could show her love for her husband and to reduce her sorrow by being able to show her grief publicly; in the *pamusagina* she received nothing, as they believed that if she ate part of her husband his *kwela* would remain with her forever. In the *atigina* the widow had to eat part of the body to help her forget her dead husband and the internal organs were shared amongst the *anagra*. The older *anagra* cut the body so that the intestines and genitals remained hidden from the other mourners, and to ensure that this happened they crouched down and made a wall around the body with their bark capes so that the other participants could not see what was happening. If a female corpse was dismembered the

genitals were hidden from the unmarried adults and children and if a man had been cut up his intestines and genitals were hidden from the children, unmarried adults and newly-weds. The head was then cut off and finally the backbone divided up. As the body was dismembered the person who claimed a particular part took it and put it on a banana leaf plate with a breadfruit leaf on top containing wild ferns. The bones were divided up and placed on top of each pile of meat belonging to the recipients. The daughter-in-law of the *anagra*, or her own daughter would assist her in subdividing the meat, so it could be shoved inside the bamboo tubes and once cooked shared with the *ename*. The meat was put inside bamboo tubes with wild green vegetables and cooked. Wild green vegetables symbolized that the deceased had departed to another world – to a wild place where he would forget the living. The wild was the opposite of the domestic world of humans. The widow's brothers prepared a large fire, bamboo tubes and implements for the cooking of the body. It was the men's duty to complete all the preparations required for the transumption of the body. The meat of an adult (excluding the head) mixed with wild green vegetables filled about 34 bamboo tubes which were 2 feet long and 5 inches wide. The internal organs filled

about five tubes and all the tubes were cooked in the main fire which then became the sepulture.

In the *atigina* the head was normally prepared at the same time as the rest of the body, but sometimes it was consumed the following day with the bones. The meat was removed from the skull by the widow, her daughters-in-law and her daughters. The head was held by the neck and the hair burnt and scraped off; the skin and muscle were removed and placed on a banana leaf with a breadfruit leaf on top that contained wild greens. The head was then placed on a new leaf bed identical to the previous one with wild greens on top, and a stone was used to break open the top of the skull. Ferns were wrapped around the head and used to remove the brain tissue. It was then hand mixed with wild greens by the *anatu* of the widow. The mixed brain and ferns filled two or three bamboo tubes.

The spine was cut into pieces which were sometimes crushed before being cooked in bamboo tubes. The vertebrae were soft bones, but small children were still not meant to eat them as they might choke.

When a man's body was cut up the young women and newly-weds were not allowed to see the torso being cut up as they believed that the male anus was sewn up when boys became initiates and from then on they never defecated. This belief helped enforce male superiority over females and ensured that women protected men by following the beliefs of their society. By the prior cleaning of the intestines by the older women the young and newly married women were fooled into thinking that men were naturally superior and did not defecate. If the older women who knew that men defecated let the secret out to the younger women they would be killed. Newly married women stayed away when the body was dismembered, but they were allowed to eat the cooked meat. The excrement was sometimes mixed with greens and eaten, and later the intestines were stuffed with red and green cordyline leaves to prove to the younger women that men did not defecate.

On other occasions the intestinal contents were emptied into a hole under the fire where the body was cooked, while hidden by the capes of the *anagra*. The gall bladder was also buried under the same fire. The intestines were then cut up, dried on the fire to make them softer, and then stuffed into bamboo tubes with wild green

vegetables and spices. Certain women mixed spices in their mouths and then spat them on the meat so that it tasted better. Ginger, traditional salt, and other herbs and spices were used. The body was always cooked in bamboo tubes as it was imperative that the whole body was eaten and there was no other means of cooking that would not have involved some of the body being lost. Some informants claimed the meat was cooked with wild green vegetables because human meat contained a lot of fat, and vegetables reduced stomach problems related to eating the body. The following wild green vegetables named in *pamusakamana* were cooked with the body:

dagilamu, a wild fern

wesa, a wild fern

igagai, a grass

iyoyo, a weed

kugumaya, a leaf from a tree found in the forest

binana, a vine found in grasslands

ese, a wild fern

ikwaya, which was chewed and spat on top of *igagai*; once chewed it had a sticky consistency and this held the bone dust that was sprinkled on top

tagisalepa, a spice spat on top of the food.

Possible parenteral inoculation of participants and cross-infection during mortuary rites

Many of the women and children had open sores on their bodies caused by yaws, tropical ulcers and other infections or cuts from working in the garden. When traditional mortuary feasts were taking place, people scratched their bodies using their finger nails and rubbed their bodies. Importantly, there was no prohibition on this kind of behaviour during the obsequies. People with a lot of sores tended not to scratch their bodies as the sores were painful. Pig grease was rubbed on the body as a traditional cure for scabies and fungal infections. All the following terms for infections etc are in *pamusakamana*.

Tropical ulcers are called *kavare* and these were very common in pre-colonial times; cuts are called *a'anambo*; infected scratches are *sasa*; scabies is *aguvana*; and fungal infections are *amavata*. Blood from the body of the dead man was rubbed on the skin of his sisters with mud as a sign of mourning in the *atigina* but not in the *pamusagina*. This was done as an expression of love for the deceased. Other possible sources of parenteral inoculation have already been described during the handling and preparation of the corpse.

If a woman dismembered the body or helped cut up the meat she would give her baby to someone else to hold, and cleaned her hands before touching the baby again. Once the body had been dismembered the women who had handled the flesh would squeeze the liquid from young bamboo shoots onto their hands to wash off any blood. The hands were then rubbed with *kwelapa* leaves which had a rough surface and sanded the hands to ensure that no blood remained. Sometimes sugar cane juice was used to wash the hands and the fibres used to clean the fingernails of any possible blood. Finally the women wiped their hands on their bark capes, and sometimes they spat on their hands before cleaning them on their

capas. Cleaning materials depended on what was available: green vegetables, banana skins, sugar cane and bamboo shoots were all used.

Grease that was on the participants' hands was rubbed on their tapa cloths and pulpuls. The grease was from the body of a human and the family would be upset if the women rubbed grease from the body elsewhere. The human brain tissue was never intentionally rubbed on the body as that would be disrespectful to the deceased. The items used to clean the hands were burnt in the fire used for cooking the body. Once the meat had been further divided and placed in the bamboo tubes those women who handled the meat would clean their hands with *igagai*, a wild green vegetable, which was placed in the bamboo tubes with the meat, cooked and eaten.

There was no self-mutilation amongst the *pamusagina* as part of their funeral practices. However, in the *atigina* close relatives of the deceased would cut off the tip of their finger as a sign of love and respect. This was optional and depended on the relationship between the mourner and the deceased.

The traditional wooden plates (*igwale* in *pamusakamana*) were for public use and were not used in obsequies as they would become polluted. However, if older plates were available they could be used during the transumption of a body. Other informants stated that they were only used when an important person died and were not regarded as polluted after transumption. Only old bilums were used for transporting body parts as they would be polluted and could not be used for normal household chores.

Transumption: subdivision and consumption of the corpse

Division of the share of the *anagra*, *anaso* and *anatu* with the *ename*

The bamboo tubes were placed on the fire, and turned frequently by the women, so the meat cooked evenly over a period of about 20 minutes. It was important that the body was cooked properly and not burnt. Breadfruit and banana leaves were heated on the fire to make them soft by the *anagra* and their assistants, and then a large plate of banana leaves was made on the ground. Breadfruit leaves were prepared to act as separate plates for the distribution of the cooked meat. Each *anagra* and the *anaso* would empty half of her tubes' contents onto the communal leaf plate, the

contents of which were given to the other female guests who came to mourn the deceased, who were the *ename*. The *anatu* did the same, and half of the tubes that contained the brain were given to the communal pile (this was one or two tubes) if the head was eaten on the same day. If the head was eaten on the following day it was not shared with the *ename*.

The intestines and genitals were not shared with the *ename* by the widow in the *atigina* or by the *anagra* in the *pamusagina*, as they were not considered decent food for the *ename*. The bones including the spine and the internal organs were also not shared with the *ename*.

Ename

The body was shared with the female visitors from the surrounding villages (*ename*) who had a connection with the deceased. Piles of food were prepared for women from particular villages or clans and the senior woman from each group would control the distribution. All the female participants would receive part of the body as they had come out of sorrow and the family and affines had to ensure that they were treated well. The *ename* were

normally given pieces of muscle or skin as these were the regarded as the most suitable parts to be given to the guests. However, as mentioned, one of the tubes containing the brain was often shared amongst the *ename*.

When the women attended the obsequies they ate to show that they and their families were not involved in the death. If they did not eat they would have been suspected of being involved in the death. If a woman whose husband had been involved in the death ate at the feast the *kwela* would attack her. This attack often took the form of stomach ache which was interpreted as the *kwela* attacking the woman in revenge. Some women also came as they relished the opportunity to eat the cooked meat, and some had a reputation for this in their communities.

The female guests from other villages, *ename*, were fed from the end of a sharpened piece of bamboo, and the women from the same lineage as the deceased received their meat on a banana or breadfruit leaf and ate with their hands. This was done to protect the *ename's* families from the *kwela*. If the meat touched the woman's skin the *kwela* might remain on her skin, and then harm

her family if a member had upset the deceased when he was living. The host women were called *tuva* and they received their share on a plate. The *kwela* would not harm the women from the family who ate the body as they ate out of love, so they could eat with their fingers from a banana or breadfruit leaf. This ritual showed the ideal group loyalties: those from the same community were trusted and ate with their hands and those from other communities ate from a stick.

The *ename* (*namukina* in *atikamana*) would purify themselves on their way home: they would use banana skins to clean their hands and then rinse them in a stream. The women ate small pieces of meat and then stripped leaves off the *wese* tree and chewed them to purify their mouths. There were no restrictions on these women when they arrived home.

Sharing amongst the affines and agnates during the obsequies

The *anagra* and *anaso* (*andaso* in *atikamana*) would share half their meat with the guests and the rest was shared with their daughters-in-law and their children, their ‘poromeri’ who supported them at this time, their daughters and their children, and their

mothers if they were still alive. The *anagra* and her family would eat at the sepulture and the remaining meat was taken back to the widow's house and shared amongst the women who mourned there during the night.

In the *atigina* the widow would share with her sisters-in-law, her sisters, and all of their daughters and daughters-in-law, the deceased's aunts, cousins' wives and their children. The widow consumed her husband's genitals and would help eat the intestines. Married women were meant to have one or two children before they took part in transumption, and they were meant to eat from a stick; when they had finished bearing children they were allowed to dismember the body and hold the meat with their hands. The older women ate the internal organs and they were not meant to share them with the younger women and children; however, in practice these rules were rarely, if at all, followed. There were restrictions on who could eat the brain (*wava*) and spinal cord but they were rarely enforced.

If the *anatu* received an arm, a finger would be given to each of the children of the deceased to eat if they were still small. The

fingers were cooked in bamboo with greens and the flesh eaten, and then the bones crushed, cooked with greens in bamboo and eaten. If there were more than five children the fingers could be subdivided. The fingernails were also eaten as they shrank when they were cooked. A woman or child might receive a blessing to their *aona* by eating a parent's or grandparent's finger; in this situation the blessing was given by the *ama* out of respect for the person's sorrow.

In the *pamusagina* the widow did not receive any of her husband's body; it belonged to the senior *anagra*. The mother-in-law would eat the dead man's penis and the senior mother's brother's wife would eat the testicles; it was believed that if the younger women ate them they would become ill. The older women might receive a blessing from the *ama* of the deceased by eating the sexual organs. The brain, sexual organs, spine and internal organs were meant to be eaten by elderly females, but in practice the rules were not enforced. Newly married women from the agnates and affines who took part in transumption would receive part of the body on a stick, so they did not pollute their husbands. A mother might tell a girl to eat less out of modesty; she would not want the other women saying bad things about her daughter.

The transumption of the remaining meat from the body during the night in the house of the widow or an *anatu*

The mourners ate at the sepulture and when evening approached took their remaining bamboo tubes back to the widow's house in the *atigina*, as they were not allowed to eat the corpse anywhere else apart from where it was cooked and the widow's house. In the *pamusagina* the house of one of the *anatu* was chosen, and not the widow's house. It was believed that the *kwela* would remain with the widow if the body was consumed in her house. The tapa cloth used to carry the corpse was put on the ground and breadfruit leaves were placed on top before the meat was emptied from the remaining bamboo tubes. The *anagra* shared the meat on the tapa cloth with all the women who stayed in the mourning house that night. It was important for the *anagra* to share the meat, and the women used their hands as they were not threatened by the *kwela*. The following ate the meat in the widow's house: the widow, her daughters-in-law, her daughters and their children, and the aunts and cousins; on the affines' side, the *anagra*, their daughters-in-law, their daughters and related children if they were present. Some children stayed with the women during the night in the

mourning house and ate, as the women told the small children they were eating pork. The *ename* returned to their homes as evening approached or stayed in other houses in the *kami*.

There were no restrictions on girls assisting their mothers to eat the body but newly married women were not meant to take part, although some consumed meat from the end of a stick if their mother-in-law agreed.

The tapa cloths used to carry the body were taken to a stream and the blood was washed out by one of the *anagra*. The widow took the top one that had the most blood on and wore it until she was finally freed from her husband's souls. The senior *anagra* would take the others and use them as they had no connection with the *kwela*.

There were slight differences in the transumption of the head in the South Fore. If the head was not eaten at the sepulture it was placed on greens in a bilum and taken back to the mourning house and the bilum hung up on a beam between the *aloti* (men's area) and the women's area of the house. The head was not always eaten

with the body as the family tried to keep it for as long as possible so they could continue to look at the deceased person's face. Once the face changed, that is, when it started to decompose, it was eaten as this signalled that the man was dead and from then on only memories would remain of the deceased. When the head was hung up the women kept flies off it out of respect for the deceased. In the morning the head was taken to the boundary between the *kami* and the men's area and shown to any of the men who wished to see the deceased person's face for the last time.

The head was not cooked in the house of the mother or widow in the *pamusagina* as the *kwela* would harm them. This was the law of the land and had been passed down from the ancestors. The head could not be cooked outside as that would create another grave and this was not possible. Other parts of the body had been consumed in the house of an *anatu* so the head was taken to this house to be cooked and eaten. In the *atigina* the head was cooked and consumed in the widow's house or taken back to the sepulture and prepared with the bones during *ikwaya ana*.

The head was placed on a large flat stone with a concave indentation to hold any fluid. Firstly, the hair was pulled out, and this required little effort. A cut was then made with a bamboo knife from the forehead to the back of the head and the skin peeled off. Next, the jaw and tongue were removed, and then the rest of the skin and meat. A large hole was made in the top of the skull using another stone from a river, fingers wrapped in greens were pushed into the hole and the brain loosened from the skull. The brain hemispheres, cerebellum and brain stem were then pulled out through the hole. The skull and the broken parts from the cranium were browned by the fire. The brain was mixed with wild green vegetables and put in bamboo tubes. The meat from the skull was shared amongst the *anatu* and the other women of the deceased's family. The hair that was not kept to contact the deceased's *ama* was burnt and the ashes mixed with greens and cooked in bamboo tubes and eaten. Fluid left in the tubes when the meat and greens were removed was drunk and grease on the hands wiped on the participant's hair and skin. The brain tissue and meat were cooked separately. The bamboo tubes used to cook the brain were opened and the contents cut (like grated cooked banana or taro in a bamboo

tube) with a bamboo knife into as many pieces as required. The women liked the taste of the brain so it did not last long.

Finally the two stones used to process the skull were taken to the sepulture and placed next to it. The sepulture was the place where the corpse was cooked and the ashes of the fire were covered up with earth to stop them from blowing away and to stop enemy sorcerers tampering with the ash. This became the temporary home of the *kwela* and *ama* after *aluana* until their final departure after *agona*.

After the head was eaten the family members drank red sugar cane, which removed the taste of grease from their mouths. Although the red sugar cane enabled the women to relieve their thirst and sweeten their mouths, it was also there out of respect for the deceased, as the eating of the head signalled the departure from the land of the living to *kwelanamandi* which was associated with the colour red.

Andagosa

Pregnant women who attended a feast would rub fluids from the cooked body on to their abdomens, and later check their newborn children for signs that indicated that their babies had inherited a physical feature, such as looks or a birth mark, from the deceased. Later, when the child was older, the family might comment that his character or skills were like those of the deceased. People would comment on his behaviour and say that he had received the qualities of the deceased when his mother ate the body or rubbed fluids from the body onto her abdomen. The *ama* transformed the baby to have the behavioural mannerisms and general appearance of the deceased. This was a blessing from the *ama* of the deceased and was not the transference of the deceased's *aona*. The ritual was called *andagosa* in *pamusakamana* and *agosa* in *atikamana*.

Rules surrounding participation in transumption

Children's attendance at mortuary feasts in other communities

Children who required frequent breastfeeding were normally taken to the mortuary feasts by their mothers. If a mother left a

child who was still breastfeeding the other women who remained in the hamlet would breastfeed the child until she returned. Girls aged 6-9 would often remain in the hamlet and look after their smaller siblings (aged 3-6) if the mothers did not want to take them to the mortuary feast. There were several reasons for this: firstly, it was hard for a mother to refuse meat to a crying child. The child did not understand that a human was being consumed and might demand to be given meat which would not have been appropriate behaviour at a mortuary feast. Another reason to leave children at home was the danger of travelling in those days. The women might be ambushed by enemies and the children killed. It was also a lot faster and less dangerous for the women to travel independently to a distant village, or through enemy territory. If this was the case, or if it was wartime, the children were left in the hamlet supervised by an older woman. There would also be men who remained in the village to protect the women and children. However, if a child cried a lot the mother would take the child with her to the feast. If an older woman stayed to look after the children then the other women would bring her a piece of meat from the feast to compensate her for her work.

When the girls reached the age of 9 they would assist their mothers at the feasts and were taught how to behave and how to perform the obsequies. The young girls would collect firewood and green vegetables allowing their mothers to enforce claims on the body.

If the feast was elsewhere the boys who were over 6 but uninitiated stayed in the village and were looked after by the older members of the family who could not attend the feast or remained to look after the children and security of the hamlet. The initiates aged 13-15 and older would attend the feast with the older men and stayed in the men's house with their counterparts.

Children's participation in mortuary feasts in their own community

It was normal for children to participate in transumption in their own community. The children were allowed to eat part of the body when they had stopped breastfeeding (0-3 years); until then they were never meant to be fed any part of the corpse. It was believed that the meat would harm the young children as it was not suitable food for humans, and the polluting effect would have stopped them from growing properly.

Boys were allowed to eat part of the corpse from the age of 3 and stopped if they underwent minor initiation at 6-8 years, when they were partially admitted to the men's house. However, there were activities and secrets that were discussed in the men's house that the young boys were not allowed to see or hear about and on these occasions they were sent back to the *kami*. The young male children were not capable of keeping secrets and they were also polluted, and it was not until they were aged 13-15 that they fully entered the men's house as initiates. Between the ages of 6 and 8 fathers began taking the young boys into the men's house to socialize them; however, they did not enter fully till later. Some boys wanted to stay with their fathers, and these boys might remain with their fathers nearly all the time; others were happier to remain some of the time with their mothers in the *kami*. The boys who spent their time with their fathers followed the rules of the men's house and those who remained with their mothers most of the time were largely exempt from these rules. When the boys started to spend time with their fathers they soon realized that the men were forbidden to eat the dead and they followed this rule. Between the ages of 13 and 15 the *andamana* (in *pamusakamana* – *maviyena*

in *atikamana*) ritual was performed and the boys became initiates. At the same time those boys between 6 and 8 who wanted to enter the men's house also underwent a minor initiation called *kokana* in *pamusakamana*, and *ivoyena* in *atikamana*, and entered at the same time. It was the duty of the older initiates to look after the younger ones.

More boys remained in the *kami* up to the ages of 13-15 than stayed in the men's house. Nevertheless, parents liked to get their children into the men's house when they were young because there had to be enough initiates to perform *andamana*; if they were short on numbers the ceremony could be delayed by a year or two and that delayed the boys' development to a full adult, which is what the parents aspired for.

In the *atigina* male children of all age groups were not allowed to eat part of a female corpse; however, this rule was not enforced until they were aged 5-6 years. From the ages of 6 the boys in the *kami* were no longer allowed to participate in the transumption of women's corpses. They were allowed to take part in the transumption of men for ritual purposes. The boys aged 6-8 who

remained in the *kami* were officially meant to eat just muscle and fat from the body of a man and this rule was followed. These boys were not allowed to eat internal organs or the brain tissue. The boys were, however, allowed to eat the backbone between the ages of 6 and 15 and these pieces possibly included the spinal cord. Again it is important to emphasize that muscle was the normal part of the body given to these boys during transumption. By eating the meat the boys gained *aona* and *yesegi* that helped them grow into aggressive warriors.

If one of the boy's unmarried male cousins died the boys in the *kami* would assist in eating the body, but they would only eat the meat from the arms and legs for ritual purposes. If a sister or female cousin died the boys over the age of 6-8 did not take part in eating the body. The boys over the ages of 6-8 were fed directly into their mouths by their mothers using a sharpened piece of bamboo when they participated in transumption. In the *atigina* the boys and girls aged 3–6 were meant to be fed directly into their mouths by their mothers using sharpened pieces of bamboo, because a child could have dropped some of the meat from its hands and then the *kwela* would have cursed the child. It was important that the whole

body was consumed and none of it fell on the ground, as this would have offended the family and the *kwela*.

In the *pamusagina* the boys were allowed to eat men and women up until the age of 6. Males who remained in the *kami* between the ages of 6 and 15 still ate males and females. Up until the age of 10 they were allowed to eat the meat on the backbone; after eating the meat they gave the bone back to the mother so she could dispose of it during *ikwaya ana*. The boys aged between 6 and 15 who did not undergo *kokana* were allowed to eat the brain and spinal cord as they remained in the *kami*. By the age of 15 all the boys had become initiates and no longer participated in transumption.

Once it was cooked the children received a bit of meat wrapped up in green vegetables to eat. The children smelt the meat and wanted to eat and they were too young to understand where the meat had come from. The mothers fed their children to make them happy and to pacify their demanding behaviour. The children did not have to undergo the purification processes like the women as they did not look after gardens and prepare food for the men. The

cooked meat could still damage adult males but was not dangerous to females and children. The children in particular were safe, as they did not have any *aona* to damage. Children were not allowed to eat a pig's uterus and they did not eat the uterus of a woman who died. Some of the children were frightened by the ghost stories told by the women and stayed away from the mortuary feasts altogether. The cooked meat was considerably less dangerous than the uncooked; it was the blood from the uncooked corpse that presented the biggest danger of pollution.

Children under the age of 3 years were not meant to be fed any part of the corpse as their mothers believed that it was unsuitable for children so young. Young children between 3 and 6 were not meant to eat the brain and spinal cord but the rule was not enforced, so the women often fed the children these parts out of love or to appease a demanding child. The women were afraid that the children might choke on bones and the intestines so these were also forbidden for young children to eat. Other internal organs were not fed to children as they contained too much blood which would harm a child's growth, but in practice this was enforced in some communities and not others.

Women's participation in transumption

The internal organs other than the brain were not fed to girls or young women; the women were meant to have at least two children before they were allowed to eat these organs. It was believed that if the younger women ate these organs they would become weak. This practice was called *urolo dame* in *pamusakamana* and *unuroronameiye* in *atikamana*; it was the same as eating your own blood, and it was forbidden: like parents eating their children's bride price. The high blood content of these organs made them particularly dangerous to the younger women. The polluted food would damage the *aona* of the young women and their husbands; the *aona* of the older women and their husbands was already dissipating so they could eat this food. Ideally, the corpse was meant to be eaten by the older affines who were no longer able to bear children. In particular the internal organs and the brain were not meant to be shared with the children. In practice these rules was not followed and nearly all the females participated.

Newly married females were not meant to participate in transumption as it would have endangered their husband's *aona*

but this rule was not rigorously enforced and these women would often eat from the end of a stick. They were not meant to take part in transumption again until they had at least two children and again this was not often enforced.

Women who did not participate in transumption

Not all the men liked their wives and children participating in transumption. There were a handful of men who believed that corpses should not be eaten and they strictly enforced a ban on their wives and children from participating in transumption. A husband did not witness the actual feasts so it was possible for his wife to have taken part in transumption without him knowing. A man might stop his family from attending the funeral if he was in some way connected with the death, because the *kwela* might attack him or his family or expose his involvement. If a woman did not take part in transumption then her children did not. It was estimated in an interview that 5% of men occasionally ate to increase their *aona*, and about 2% of women refrained from transumption.

Male transumption

There were one or two men in each village who habitually took part in transumption, and these were older men whose *aona* was fading, and afterwards they purified themselves with sugar cane. They did not have to undergo any significant purification rituals as the *kwela* did not reside in them. However, there was one ritual called *ilevino* that initiates might take part in that involved transumption, and some men continued to repeat this ritual throughout their lives.

Ilevino was the name given to the ritual eating of part of the cooked vagina of a dead female relative by males so they received *aona* and *yesegi* from the deceased woman's *ama*. The *yesegi* and *aona* were given to a male by the *ama* in the form of a blessing and were not the deceased's inheritable souls. Initiates might take part in *ilevino* when they were young under the older men's supervision in the hope that they received *yesegi*. Male warriors who had powerful *yesegi* might continue to perform the rite throughout their lives. The ritual for the initiates was more sophisticated than for adult warriors.

A small piece of meat was taken from the vagina, mixed with *agivara*, cooked in bamboo and secretly fed to an initiate in the forest. It was important that enemies did not know that the initiate had taken part in *ilevino*, as they would attempt to kill him as they knew he would be a dangerous warrior in the future. After eating he returned to the men's house to sleep, and hopefully to experience a vision that was a sign he had received *yesegi*. The *agivara* caused the initiate to sweat and increased his chances of experiencing a vision. An initiate would normally eat once or twice and if he failed to experience a vision he would not take part in *ilevino* again. Some of the men who experienced visions would repeat the ritual whenever the opportunity arose. The daughter of the deceased would normally request a small piece from the *anagra* who had received the vagina and the *anagra*, if she agreed, would wrap a piece in a banana leaf and give it to her. The woman placed a small piece of the cooked vagina into the man's mouth on the end of a stick, or placed a piece on a banana leaf and the man would eat it off the leaf without touching the meat.

If the relationship between the deceased woman and the man was close then he was more likely to receive *aona* and *yesegi*. If a

man received a blessing his vision could be about anything: children, pigs, garden crops, fighting or sorcery and the vision would be interpreted by the senior men of the clan. However, the reason for eating the vagina was to receive *aona* and *yesegi* in the form of a blessing that would make the participant a fearsome warrior. As *ilevino* was secret, it was interpreted in hindsight that a man must have performed *ilevino* and received a blessing if he was an aggressive warrior.

A woman's sexual organs were regarded as shameful by all members of Fore society. The vagina was a source of pollution, in the form of menstrual blood, that endangered the whole community and for this reason both men and women colluded in trying to hide the truth about the female sex organs from the unmarried and children. Open discussion about birth, menstruation and sex were forbidden subjects, and men never witnessed childbirth or menstruation. Women were ashamed of their bodies. However, childbirth, pregnancy and menstruation were topics that were discussed amongst the women. It was the duty of the *anagra* to eat the vagina of a dead woman and therefore the *ama* did not bestow *yesegi* on them when it was eaten; however, when a man ate a piece

of vagina the *ama* would hopefully give *yesegi* to the man. This was the most powerful blessing a man could receive. When the woman's *ama* saw the man's humility and courage when he ate, it would bless him. When referring to the vagina the Fore used the word for "chin" as it was not referred to directly. The men called the vagina "frog" amongst themselves.

Ikwaya ana

This obsequy was called *ikwaya ana* in *pamusakamana* and *ayambu yaku* in *atikamana*. The flesh from the corpse was consumed on the first day and night, and on the following day any remaining flesh was consumed with the bones. In the morning the men cut firewood and the younger women would carry it to the same fireplace as used on the previous day and start a fire. Then they gathered young breadfruit leaves and green vegetables to use in processing the bones. The women would depart from the widow's house with the bones and any leftover greens and meat in their bilums. The bamboo knives and containers used during transumption were also taken. When the women were involved in normal domestic duties they would collect stones from river beds

and keep them by their houses to be used during *ikwaya ana* when somebody died. The *anagra* would carry these stones to the sepulture with the bones.

The bones were placed by the fire to dry, so they would break into smaller pieces without sharp edges. The women who possessed the bones crushed them with the assistance of their female family members. In the *atigina* the bones were placed on *igagi* on a breadfruit leaf on top of a concave stone and crushed with another stone. When the bones were broken it was important that none of the pieces were lost, so the larger pieces were wrapped in greens before being crushed. In the *pamusagina* the bones were crushed in *nase*, a wild green vegetable, covered in *ikwaya* (another wild green vegetable), which had been chewed, so the bone dust stuck to it; the greens were then wrapped up, placed in the bamboo tube, cooked and eaten. This was important, as they were eating a loved one, and the family members would witness the obsequies. The *ama* and *kwela* would also be present at the obsequies, so the body had to be treated with respect so that the *ama* and *kwela* would be happy. The participants were the affines and agnates; the *ename* did not participate in this ritual. The small children were not allowed to eat

bones as they might choke on them, but children aged over 6 were allowed to participate. This was also out of respect for the deceased as the children under 3 would not understand that they were eating a loved one, so they might throw the bones away and this would upset the *kwela* and the watching family members. The *ama* always remained with the family members after the body was eaten and the *kwela* with the *anagra*.

After the crushing and cooking of the bones the women started to eat them, and as evening approached they returned to the mourning house and remained there till transumption of the body was completed. The process of consuming a body could take up to three weeks. During this period some of the children would come and go from the widow's house. The children who stayed with their mothers were avoided by the other boys who spent most of their time in the men's house as they feared the pollution. Boys aged 6 and older did not sleep in or enter the widow's house, but those under 6 were allowed to. There were no restrictions on the girls, but newly married women were not allowed to enter the mourning house, as they would damage their husband's *aona*. Instead it was their duty to assist the participants with water, food, sugar cane

and firewood; the men assisted with providing the bamboo and the cutting of firewood. The men were also not allowed into the house; but occasionally an old man would enter and participate in transumption with the women. The bones of all those who died were eaten, even those of babies, as they were part of the person. If a child died the parents might wear a collar bone out of sorrow for the loss of a child that they dearly loved.

An appointed family member watched over the eating of the bones during *ikwaya ana* to ensure that the rituals were carried out correctly. All the leaves, bamboo containers, knives and anything else used during the mortuary rituals were burnt on the fire and the ashes mixed with greens and eaten. This was to ensure that the entire body was eaten, so that the deceased would become an ancestor. The ash was prepared in the same manner as the bones.

There was no extra payment for those who ate the bones as they belonged to the *anagra* or family members who received them, so the compensation for eating them was included in *igoghana*. The bones were powerful as they contained *ama* and when they were eaten the *aona* of the deceased might be transferred to the

deceased's favourite child. The deceased's *aona* and *yesegi* had to be transferred before the souls departed for *kwelanamandi*, and it was transferred only once at one of three possible events, during *tuvuana*, *ikwaya ana* or *agona*.

The bones polluted the participants so they had to purify themselves afterwards using banana skins. The reason that the banana skins were used was that they cleaned the hands very well by removing the grease.

At the end of *ikwaya ana* the fireplace was covered up with earth and this became the temporary sepulture for the *ama*. The stones used to break the bones were cleaned with banana skins which were then burnt in the fire and the stones returned to the bamboo grove or sugar cane grove which marked the sepulture. These stones were reused in subsequent mortuary feasts.

After the body had been eaten the *anagra* felt as though the deceased was within them, and this reduced the grief of the participants. Even though the person had died he or she was still with the living, and had not departed yet; they only departed when

the grief had subsided and people had accepted the death.

Transumption reduced the grief of the mourners, and shortened the mourning period. The *ama* stopped with the family members through transumption and remained with the men through the wearing of the bones or hair of the deceased. Even after the departure of the *ama* to *kwelanamandi* these bones still had contact with the ancestor, who could be summoned to help through the relics.

Once the fireplace was covered up the family would light a small fire by the side of the sepulture in the morning and afternoon. Food and water were also placed there as the *ama* was cold, hungry and thirsty. This started after transumption and continued until *aindu*, but could continue for longer. It was the same custom for those who were buried, placed on a platform or put in a basket. This practice continues today.

Transumption during wartime

During wartime the children, the elderly and the casualties remained inside the hamlet stockade. All the able women and boys

assisted in carrying and supplying arrows, bow strings, water and food to the warriors during combat. If a man was killed by an arrow the older warriors broke off the shaft and then dragged the body by the legs to the women who carried it back to the hamlet. The women made a stretcher to carry the body using tree branches and tapa cloth. Four women carried the stretcher and the other women remained on the battlefield to assist the men. At first the body was placed in a designated mourning house in the *kami*, and then at the boundary between the *kami* and the *wawae vindi* (men's area in *atikamana*) when the warriors returned. The men cut down sugar cane from the deceased's garden and made a bed for the corpse, and then carried it into the men's house. During the night the widow and her 'poromeri' were allowed inside the men's house and sat by the body. Most of the women remained in the mourning house in the *kami*. A messenger was sent to fetch the maternal uncle to allow the deceased's *auma* to depart. The affines would prepare themselves and then travel to the deceased's village.

During the night the men were angry and blamed each other for the death. The women's songs would often make the men furious about the death. As the women cried those closest to the deceased

would shout about their loss of the man they loved. This would include the widow and the man's daughters. The women would shout out to the men that they would only eat the body when the death had been avenged. The women blamed the warriors for not looking after the deceased properly and allowing him to be killed. The men would vow to avenge the death and told the women to eat the body. When the death had been avenged the warriors would return and tell the women. It was the same for those killed in combat and for those killed by kuru or other sorceries.

One of the dead man's brothers would shout out to the *amani* for assistance in seeking revenge for the death. Before the men departed to fight one of them would go and stamp on the ground near the body and request the *ama* and *kwela* of the deceased to assist in avenging the death.

In the morning, after the departure of the warriors the *anagra* would dispose of the body in the normal places as the fights were often away from the village on pre-designated battlefields. All the women from the allied villages would come and assist in the transumption of the body.

If the affines were not able to reach the deceased's village because of the fighting the family would appoint another woman who had married into the clan to take the role of the senior *anagra*, and she would oversee the division and eating of the corpse. The family members of the appointed senior *anagra* would be the acting *anagra*. The body was divided amongst the sisters and daughters-in-law of the senior *anagra*, her husband's female cousins, husband's cousins' wives and her daughters. The *ename* would also come and assist in the transumption of the body. The women who ate the body maintained the rights to payments at *aindu*, *aluana* and *igoghana*.

If a woman was killed during the fighting her body was consumed by the affines. If the family could not send for the affines they appointed a woman to take on the role of the senior *anagra*. This was unusual, but showed how important transumption was in South Fore eschatology. If a female child was killed the father's oldest brother's wife was in charge of the disposal of the body, which was eaten by the aunts and cousins. No males were allowed to eat the body during wartime.

If more than one member of the community had been killed most of the rules around the transumption of the body were lifted as the priority was to eat them before they decomposed. A woman with a connection to the *anagra* would still be appointed to oversee the distribution, and to record it to ensure that the *aindu*, *aluana* and *igoghana* payments were made to the right people. All the women in the clan would help eat the bodies except widows in the *pamusagina*. The men would only find out who had eaten the body when *aindu* was performed.

The purification process was delayed until it was safe to hunt for possums and rats to perform *aindu*. The whole process was rushed and shortened, but a compromise was found between the obsequies and the survival of the community.

Pepatakina

Once the body was consumed the women could leave the mourning house in a ritual called *pepatakina* in *pamusakamana* and *avepatakina* in *atikamana*; this required the use of the leaves from the earth oven used to prepare *isosoana*, a feast of vegetables,

some of which were prepared for the women when they came out of the mourning house. This feast was for all those who grieved and was held in honour of the deceased. The cooked leaves were placed on the ground from the entrance of the widow's house to the piles of food for the women who had consumed the body. The women walked on the leaves and the steam purified the outside of their bodies, and when they breathed in it purified the inside of their bodies. The women then took their piles of food back into the mourning house to eat. The next day the women started to prepare for *aindu* as *pepatakina* freed them to move around the *kami* – except for the widow, who remained at the back of her house.

Isosoana

Isosoana in *pamusakamana*, and *isosoyena* in *atikamana*, means a public feast for those who ate the body and mourned the deceased. This feast was held after the deceased's bones had been eaten and included the *pepatakina* ritual. Women from the village who were not in the mourning house collected vegetables and prepared an earth oven inside the hamlet of the deceased. The food was given out of respect for the visitors who had travelled to share

the grief of the family. If the family had enough pigs available they would also perform *igoghana* at the same time; which was the compensation payment to the families of the women who had eaten the body. If pigs were not available *igoghana* would be performed after *aindu*, and always before *agona*, the final compensatory payment to the affines that marked the end of the mortuary rites. *Igoghana* is described in a later section.

The vegetables were peeled and packed into bundles and cooked in a steam oven. Women from the family would mark their own bundles and the others were for the guests. During *isosoana* the food was presented in two piles, one for the men and one for the women. These were further subdivided into piles for each village, then for each clan and finally each individual. The initiates would also receive a payment for their hard work of collecting firewood, water, stones and other forms of assistance during the obsequies.

Aindu

Aindu was the name used in *pamusagina* and *atikamana* for the second purification ritual after the completion of transumption.

This ritual was normally performed three days after *isosoana* to remove the pollution from those who had taken part in transumption. This ritual freed the participants to carry out normal domestic duties again, such as gardening, and most importantly allowed them to engage in activities to assist the obsequies. The women would collect wild and domestic green vegetables and hunted garden rats, and the men hunted tree kangaroos, possums and wild pigs. Everything was taken to the *kami* where the women gutted the animals and then placed them on the fire in the mourning house. The burning fur and fat gave off a strong smell that purified the *kami*. The burnt animals were then rubbed on the bodies of the participants, and anywhere they might have touched during the obsequies. This removed the pollution from the *kami* and ensured that the entire body was consumed. The women then purified themselves by rubbing the carcasses over their bodies, pulpuls and bark capes. Finally the women cooked the carcasses in bamboo with green vegetables and ate them. If a bark cape had been used to carry human meat it too was purified. Children sometimes took part in *aindu*, but it was not as important for them to be purified. This ritual purified the bodies and *aona* of the

participants, and also ensured that the whole body was consumed, so that the souls of the deceased would be happy and able to become an ancestor, and there was no further risk of pollution from the corpse in the village.

Kavunda

Isosoana marked the start of *kavunda*, the grieving period.

When grass started to appear on the grave it signalled the end of *kavunda* and the family then started to prepare for *aluana*.

Kavunda means ‘eating of wild greens’ in both *pamusakamana* and *atikamana*. This took place over one to two months when the mourning was still intense, and friends and relatives continued to visit the grieving family. The women and the widow collected vegetables from their gardens in the village and continued to feed the guests, and when the garden foods were finished they collected wild ferns, sweet potato leaves and grasses. The greens were mashed up with pieces of ‘pitpit’ and traditional salt to make them more edible. Every few days a steam oven was prepared full of sweet potatoes to feed the family and guests as the diet of wild

green vegetables was very poor. Visiting male relatives and friends would bring wild meat to bolster the mourners' diet. When the widow returned from the gardens she stayed in her house and the other women cooked the food in bamboo containers in the *kami* on small fires. During the night the women sang and expressed their grief and the men would come to the *kami*, and stay by the fires where the food was cooked and sing with the women. As the deceased's *ama* and *kwela* were outside so the mourners remained outside to be with them. The initiates would also sing in the *kami*, but they would depart back to the men's house before daybreak as they were not allowed to sleep there.

The stems of the wild plants that were eaten were heaped in a pile, and at the feast called *aluana* that marked the end of *kavunda* they were burnt. The eating of wild green vegetables by the family, affines, widow or widower symbolized their despair for the loss of a loved one. During forays into the forest to collect wild green vegetables edible plants that the deceased had seen or touched were collected, cooked and eaten. Anything that was connected with the deceased including domestic belongings such as clothing, tapa cloth or bush rope used to make a fence might be burnt and the ash

consumed with wild green vegetables. By eating items that were in some way connected to the deceased the mourners remembered their loved one and this helped them overcome their grief. *Kavunda* helped reduce the grief of the family; the wild green vegetables were eaten out of respect for the deceased, and as a sign of mourning, until *aluana* was performed, which signified the departure of the *kwela* and *ama* to the sepulture. The wild greens symbolized that the deceased had departed to another place: a wild and different world to that of the living. The size of the pile of stems also indicated when it was time to perform *aluana*, and their burning symbolized the end of the separation of the mourners from the world of the living.

During *kavunda* the family and relatives remained vigilant for any signs that might indicate who was responsible for the death of their loved one. If wild green vegetables popped out of the bamboo when they were being cooked or caught fire, these were interpreted as signs from the *kwela* that the family of the woman cooking the food was involved in the death. It was also believed that if she ate the food at a mortuary feast during *kavunda* the *kwela* would harm her. There were many interpretations of events at a mortuary feast

that indicated involvement in a death; food undercooked and stomach ache in a mourner are just a couple of examples. A sorcerer involved in the death would tell his wife not to attend the mortuary feasts and she would pretend to be sick and stay in her house. Not only would the wife not attend but her children, her husband's brothers and their wives and children and anyone else related to that line would also stay away. However, participation was really dependent on local politics, and clans who feared that they would be held accountable for a death might be too frightened to attend the rites if they were not politically and militarily strong enough. If they were strong enough they would attend to prove their innocence.

The family members, affines, age mates and sisters' children all gathered together during the middle of *kavunda* to distribute the deceased's possessions. The reason for this was so the living would remember the deceased when they saw the item that they were given. The arrows of the dead man would also be used for hunting as they were believed to have a connection with the deceased man's *ama* which, when requested, would assist the hunter who used the arrows.

Pugapugana

Another very common divination that did not have to be conducted immediately after death was called *pugapugana*, which involved cooking rats and possums and checking them for signs that implicated the guilty sorcerer. These animals were killed by initiates and given to a diviner who was normally an elderly male member of the family of the deceased. The man needed strong *yesegi* to follow the required taboos, and he was assisted by the deceased's *ama* and the clan's *amani*. The plants and animals used during this ritual came from the wild and were connected to the *bagina* through the *amani*. When the *amani* were created the *bagina* gave them magical knowledge about the land and its plants and animals, and the *amani* taught the humans. Humans, however, were not so clever and had to continually re-learn what the *amani* taught them. Men with powerful *yesegi* could work sorcery but many were not strong enough to manipulate the powers involved. To perform *pugapugana* the man remained by a fire so that his *yesegi* became hot and opened his *aona* for the *amani* and *ama* to enter his body to assist him in finding the sorcerers responsible for the death. Water, greens and some kinds of sugar cane cooled the

heat of the *yesege* so the sorcery would not work, so they had to be avoided. When the sorcerer sat by the fire and underwent certain taboos his *yesege* was strengthened so he could perform sorcery and divinations. The whole process could take up to six weeks and was performed in a small house at the back of the men's house. A sorcerer was both a healer and a killer for the clan: he fought, raised pigs, looked after gardens, shared food, healed and worked sorcery to kill enemies.

Women and children were not allowed near the area where the divinations were conducted as they would cool the power of the sorcerer's *yesege*. The animal carcasses were wrapped in leaves, tied up, placed in bamboo tubes and cooked on a fire. Each tube represented a patrilineal line and if the contents were not cooked properly when examined it was interpreted as a sign from the *ama* and *amani* that a member of that patrilineage was involved in the death. The diviner specifically examined the livers of the animals to see if they were cooked. The process was then repeated with each tube representing an individual man from the guilty patrilineal line. Once a guilty individual was found the process was repeated six times to confirm the man's guilt, and to avoid killing an innocent

man. Many divinations were ambiguous, and this was possibly a way of avoiding direct conflict with other clans. The cooked possums were then hung up and dried in the men's house above the fire and the rats in the women's houses in the *kami*.

Asana

When *pugapugana* was completed a feast called *asana* was prepared. This consisted of all the dried animal carcasses that were used in *pugapugana*. After the meat was eaten the men would get ready to fight those responsible for the death, who were exposed during *pugapugana*.

Aluana

This feast was called *aluana* in *pamusakamana*, and *aindu* in *atikamana*, which was also the name of the previous purification ritual in *atikamana*. This was the last feast in the funeral process to remove pollution from the mourners (except the widow) and consisted of meat presentations from wild animals. *Igoghana* might be incorporated into *aluana* if the family had enough pigs available. Sometimes a pig was also added into this feast to thank the affines

for consuming the deceased. It was a purification feast for those who had eaten the corpse and a way of saying sorry to the participants for eating meat that was not suitable for human consumption. This feast normally took place a couple of months after the body was eaten and marked the end of *kavunda* and the public mourning of the community. However, close family members would continue to mourn the loss of their loved one, and the widow was still officially in mourning and under certain prohibitions until after *agona*.

During the time between transumption of the body and *aluana* some people assisted the family with food, so piles were prepared for those who had assisted the family. Another pile was also given to those who had looked after the man when he was terminally ill. The food was prepared by the family and the *anaso*. The dead man's 'poroman' also received a payment at this time known as *aganda* and this was separate from the payment they received at *agona*. Food was given to those who prepared the sepulture. The purpose of these payments was to say thank you to all those who had assisted the family during the mortuary rituals. However, the primary

recipients were the women who had eaten the body, in particular the *anagra* who were the temporary sepulture for the *kwela*.

When a time was set for the end of *kavunda* the men would hunt for possums, wild pigs, cassowaries and eels, whilst the women and children hunted rats and collected grubs. Traditionally, the wild meat was readily available and allowed the purification ritual to take place without a long delay.

Once the animals were killed they were gutted, cooked, and then hung up over fires so they remained preserved until there were enough carcasses to perform *aluana*. When there was enough meat it was all re-cooked in steam ovens in the men's area of the village. The meat was divided by an older man who had the *aona* to divide food. There were two steam ovens, one next to the *kami* for the women's share and one inside the boundary of the men's house. The older men of the family cooked the pig, rats and possums, and the women of the family prepared heaps of vegetables for those who had consumed the body, and the meat was placed on top of each pile. At the men's house some of the pig meat and possums were cooked and shared amongst the men and their guests. The stems of the wild

greens collected during *kavunda* were burnt on top of the oven. The women shared the meat they received with the others who had helped them eat the body so that they too were purified. A pile was prepared for the *ename* and it was distributed to a senior woman from each clan who had participated. She would then oversee the subdivision of the meat amongst the women from her clan. After speeches of thanks by the family the affines and other guests departed home.

At the end of *aluana* the *kwela* departed from the temporary sepultures, which were the bodies of the *anagra* and joined the *ama* at the sepulture, which was the fireplace where the body was cooked. After *aluana* the women were free of pollution and able to concentrate on preparing gardens and raising pigs for *agona* and *igoghana* if it had not already been performed. It was a tremendous relief for the *anagra* when the *kwela* departed from their bodies.

Igoghana

Igoghana took place as soon as possible after *aluana* and consisted of presentations of cooked pigs and vegetables given to the

families of those who consumed the body, as a compensation payment for eating something that was not to be eaten. *Igoghana* often required the rearing of pigs, so it sometimes took place two years after transumption when pigs had been specifically raised for the event. The pigs were butchered the day before and placed in the men's house for the night so the guests could see the fruits of the family's hard labour. The next day they were cooked in an oven with vegetables from the family's gardens. The food was divided by the senior uncle and his wife and given to the men related to the women who had consumed the corpse. The payment was made to the senior males of the families who had participated in transumption, and not directly to their wives. This rite had no purification function.

When the men received the payment they would say that they had eaten, referring to their family members who had eaten the body. These payments were subdivided amongst those who had eaten the body, and those who had a right to eat the body but had not eaten. One payment went to all the initiates for their hard work during the funeral. Some of the meat was given to neighbours and friends without any immediate obligation, to thank them for their assistance during the mourning rituals.

Anikusaya

The favourite female affine of the deceased would invite the family and agnates for a feast called *anikusaya*, in both *pamusakamana* and *atikamana*, on a date arranged when she attended *aluana*. The family would eat the pig and the remainder was taken back to their village and distributed amongst the extended family. This feast was held by the affines for the agnates out of respect and sorrow for their loss.

Agona

The preparations for *agona* often took between two and three years as it might require ten to twenty-five pigs depending on the importance of the deceased. The payment to the affines was for the blood they had given. This payment was known as 'head pay' and consisted of: bows, arrows, headdresses, crops, salt, toea shells, stone axes, and cooked and live pigs. All of the affines received part of the *agona* payment and other participants who had rights received small payments of food. This payment was known as *ala*, which means forbidden, as the family were not allowed to eat any of this food. One man would represent the affines even if more than

one clan was to receive payments, and he was normally from the first wife's clan. He could be any male member of the clan who was a good orator and he received no payment for this responsibility. The first payment went to the *amiti* or mother's brothers' family, the second to the *waiati* or wife's brothers and the third to the sons' wives' families, also known as *waiati* in *atikamana*. If a man had more than one wife the largest payment went to his first wife's relatives and then the other wife's or wives' relatives would receive smaller payments.

As well as the affines there were others who had rights to payments and these included the dead man's *agaya*, *mavinava*, *namo*, *aganda*, *iyage*, *alaganu*, *wandagai*, *amapa*, *yevegisa* and *aekupa* (these are all *pamusakamana* names).

Agaya ('poroman') was the name for fellow initiates from the same clan who had their noses pierced at the same time as the deceased. Their sons received a payment as their fathers had bled at the same time as the deceased.

Mavinava was the name given to the man who bled the initiate during initiation, as he was regarded as a second father to the boy. This payment was out of respect for what the man had done and the family of the deceased would not refuse a claim by the family of the *mavinava*.

Namo was the name for the man who carried the boy from the river where the initiates' noses were pierced back to the men's house. This payment was also made out of appreciation for what the man had done.

Aganda ('poroman') referred to the families of anyone who participated in the same initiation ceremony as the dead man and included initiates from other clans and villages. This was a credit payment and was returned to the dead man's eldest son when the recipient men's fathers died.

Iyage was the name used to refer to an older male cousin who supported the man during initiation and kept him awake so he experienced visions. This payment was made out of respect for the man's help in the ritual during which the initiate received *aona*

from the clan's *amani*. If the man had already died then the rights to the payment were passed on to his eldest son, who collected the payment and distributed it amongst the family members.

Alaganu was a term used for a female member of the extended family who was attentive to the deceased, and she received a payment to sooth the sorrow for the loss of her favourite male relative.

Wandagai was the name for a man's male dancing partner and the payment was given to the man's eldest son if he died. This payment was reciprocal. The gifts that incorporated an obligation to return the payment after the death of the surviving man were viewed as ways of strengthening ties between families.

Amapa was for a man's adoptive parents and was a separate payment from the head pay that went to the biological affines for the blood they had given to the deceased.

Yevegisa was the payment made to the families of allies killed and injured in wartime who were known as *amindokupi*.

Aekupa was the name of the payment for the person who looked after the deceased when they were sick. This payment was made to the *anagra* and more distant relatives of the family who assisted in the care of the patient.

For a woman the payments were somewhat different (the terms are all from the *pamusakamana* dialect).

Ayoasana was a payment to the woman who acted as midwife when the deceased was born.

Kasanda was a payment for the woman who cut the umbilical cord when the deceased woman was born. The process of cutting the cord was called *amelo*.

Ayatinda was for the woman who purified the deceased when she was born. The process of purification was known as *aindu*.

Endai was a payment to the woman who looked after her when she was in the menstrual hut menstruating, or when she was giving birth.

Aganda was to her female friends of the same age group.

Amapa was to adoptive parents as for a man.

The *kwela* and *ama* were told that life was much better in *kwelanamandi* and they would live a life of ease without pain and sickness when they arrived there. Also their ancestors were waiting for them so they would not be lonely. The *ama* and *kwela* said goodbye to the *bagina* and then stayed and ate with the *amani* before it showed them the road to *kwelanamandi*. The shadows of food and any items used at any of the mortuary rites went with the *kwela* and *ama* to *kwelanamandi* after the final mortuary rite called *agona*. After *agona* the family were sad as the deceased had finally departed forever. The shadows of all the food and goods allowed the deceased to prepare a huge feast for the ancestors once the *kwela* and *ama* arrived in *kwelanamandi*, and the deceased was reborn as an ancestor.

The preparation of gardens and the raising of pigs for obsequies

At the time of death the women from the family contributed the largest amount of food for the mortuary rites and they were assisted by all the women in the clan, who contributed vegetables for the

rituals out of mutual assistance. The family contributed pigs to the feasts and sometimes neighbours assisted them as they knew that one day they would require assistance; so it was credit-based assistance, which was linked to the other credit bases in the local subsistence and gift economy.

The family prepared the gardens for the *igoghana* and *agona* payments, and it took 2 years for pigs to grow to the right size for either of these payments. New gardens were prepared in June or July during the dry season. First, the women removed the small trees and grass and then the men cut down the branches of the trees and ringed them so they would die. All the cut foliage was dried and then burnt. The dry trees were felled and the wood used for fences and firewood. The preparation of gardens was often a clan affair and men and women would assist the family, who reciprocated by preparing food each day for those who helped. The family in turn would assist other members of the clan to establish new gardens. Seeds were gathered from old gardens or taken from storage containers and planted, and the women collected green vegetables, pumpkin (introduced) and 'pitpit' from the old gardens and planted them. The dry seeds included cucumber, corn

(introduced), beans, yams and gourds. Sweet potatoes and taro were planted after the first harvest, and it would take a year for them to grow. Some assistance in planting and maintaining gardens might come from female members of the extended family.

When seeds were planted in the gardens magic was used to ensure they would grow. Certain foods were regarded as male: including bananas, taro, winged beans and some types of sweet potato, and these were affected by male or female magic to help them grow quickly. The magic spells often involved comparison to other plants. Bananas were told to grow to the size of a pandanus fruit, and taro told to grow downwards rather than upwards.

Bananas were told to grow like the arms and legs of a strong man in the village, and then the gardener spat on his hand and slapped the tree.

Taro was planted 6-7 inches into the ground with leaves or bark placed under it, which would magically help it grow. Once it had been planted people would immediately leave the garden as the taro was said to be sleeping. When the first leaf of each plant was dry

they were removed, and then the spell was retold to each plant.

When the plants had plenty of leaves they might be told that it was not a taro but an eel and then the gardener spat on their hand and hit the plant. It was believed that this would encourage the taro to grow even larger. At harvest time people would admire the best garden and try to acquire the owner's secret spells so they too could make a successful garden.

Shiny red clay was wrapped in a leaf, dried, grated and then fed to pigs so they would have a healthy skin colour. Bark from trees with a wide girth was grated and fed to the pigs in the hope that they would become fatter. Soot from fires was rubbed on pigs, as it was believed to act like oil making the pigs attractive and clever. These old traditions are frowned on by christianity and people are now told to pray before they start gardening and to plant in the name of god. Traditional gardening, rearing of pigs and hunting and gathering are described by Sorenson and Gajdusek (1969), as well as introduced crops and animals.

Removing bodies from sepultures

There were a number of circumstances when the *anagra* would remove a body from a sepulture and consume it out of love.

Sometimes the relatives decided to bury the body, place it on a platform or in a basket. The affines would prepare the sepulture and after the obsequy the affines and family members returned to the deceased's hamlet. The *anagra* and the family members would be mourning the deceased together when they decided to remove the body and eat it out of love. The *anagra* would tell the brothers of the deceased and they would assist the women in removing the body.

The corpse was dismembered away from the sepulture because people had seen the body buried and the *anagra* did not want to be accused of being 'dok meri' (women who behave like dogs). The distribution was the same as when the body was eaten normally.

The second circumstance was when the *anagra* removed the body during the night and consumed it secretly; however, the family nearly always colluded in this, and waited till the *anagra* informed them before admitting to knowing what had happened to the corpse.

Often the family put guards over the sepulture to stop enemy sorcerers from tampering with the body. The guards would kill the enemy if they were seen approaching the sepulture; however, they knew the *anagra* would come and remove the body, so after two or three hours they would leave the sepulture and return home. The *anagra* approached the sepulture carrying burning bamboo so they could see. They would stand above the grave and tell the *ama* and *kwela* that the family had not cared for him and that is why they had come to consume the body. Sometimes the women were frightened as it was night time, and the *kwela* was active. Sometimes a male affine might cover up the real sepulture and make a decoy one next to it, and hide there pretending to be the corpse. When the body snatchers arrived he would jump out and chase them away. This only happened when the agnates did not want the body to be consumed or if they were trying to avoid making the compensation and purification payments of *aindu*, *aluana* and *igoghana*. The *anagra* removed the body and placed it on a tapa cloth covered with breadfruit leaves and greens about 40-50 metres away from the sepulture. Some of the women would then try and cover up the grave so it looked as though it had not been

disturbed. In general it was the older women who took the body and they would share it with the other women in the *kami*, and the children were told it was pork. The women entered in and out of the village from the area where the menstrual hut was, as the men were forbidden to go near this area because it was dangerous to their *aona*. This allowed them to depart from and return to the village unseen by the men. The body was dismembered and taken to the mourning house. The whole body had to be eaten and treated with the same respect as when a body was officially eaten. The *ama* knew that the body was not meant to be eaten and felt sorry for the women who did so. The body was eaten quickly and shared with the other women who remained in the *kami*. The following night the same women would eat the bones during *ikwaya ana*. Then the participating women pretended that nothing had happened. The collar bones and jawbone were returned to the grave as the family might remove these later from the sepulture. The *kwela* remained inside the women who had eaten the body, so the family could not get angry with the women as their loved one was inside them.

The next morning the family would return to the sepulture to light a fire and to leave food and water for the *ama* of the deceased.

However, the men often knew that the women had stolen and eaten the body and *aluana* needed to be performed. The *kwela* did not harm the women or their families as it was sorry for them having to eat the body, and it realized that it had been done out of love and respect. When the women felt ready they would tell the family that they had eaten the corpse, and the family would perform *aluana* and *igoghana*. This was important as the *kwela* remained inside the bodies of the women who had taken part in transumption and as long as the *kwela* remained inside them the deceased could not become an ancestor.

Social behaviour and rituals after the completion of the mortuary rites

If a man died and his children were adults the first-born male would become the leader of the family. If the children were too young then it was the duty of the deceased man's brother to fulfil the duty of the father until the first male was old enough to take responsibility for the family's affairs. Traditionally, the land belonged to the clan so it was distributed amongst the clan members for use when required. The South Fore had a low population density so there was plenty of land available. The land

was owned by the clan and there was no pressure to claim ownership amongst the individual adult males of the same clan. When a member of the clan wanted to plant a new garden he would discuss it in the men's house and the issue would be settled there. Senior clansman tended to claim the best blocks nearest the hamlet as they were the easiest to access. Today, this has changed as people now have individual ownership to blocks that are passed on to their children. Now the population has increased people want to ensure that land is inherited by their children, and the introduction of coffee trees which are the basis of the cash economy in much of the Eastern Highlands Province has made individual land ownership an important issue. Legally, however, customary clan ownership of the land still prevails, except where it has been surveyed, registered and sold, and even then disputes often arise after the sale of the land.

Names were reused so that the family could easily trace their genealogical history. Grandparent's names were often given to grandchildren but this was not a rule. If a young person was thought to be similar to a deceased member of the family in some way the name of the deceased was given to the child. This ensured

that the ancestors were not forgotten. It also reinforced the family's ownership of land.

The widow

The widow was called *kila'we* in the *pamusakamana* dialect of the South Fore language. She mourned the loss of her husband as she remembered the good times they had together. She would wear the bark cape (*kwavi*) that her husband's body had laid on and carried a dirty old bilum given to her by one of her husband's cousins' wives. *Asi* (a bush rope) was tied around her limbs and all these items marked the woman as a widow in mourning. She applied red clay (the ground in the South Fore is red-coloured clay) to her body and this symbolized that someone had died and she was in mourning. On a deeper level the red clay symbolized that the deceased had departed to another land, in this case *kwelanamandi*. Red was the colour of many things that came from *kwelanamandi* so the red ground was symbolic for the land of the dead. The red clay was no longer placed on her body after *aluana*. It was never applied to the body at any other time or in jest, as a person by doing so would curse himself and their family to go to *kwelanamandi* in

other words they would die as a result of their action. The family would be angry if the widow was not dressed appropriately for mourning, as this would have been regarded as disrespectful to the deceased and the family might suspect that the widow was involved in the death of her husband. She would be suspected of having a lover whom she had assisted in killing her husband. Only women who had several children were completely trusted by their husbands, as younger women had married in from other clans and might be under the influence of their brothers who had divided loyalties. For this reason women were always suspected of assisting their brothers' possible requests for waste material from their husband that was then used in sorcery. It was important that the widow was seen to be under the control of her husband's family who had paid for her and that she mourned properly in public. If the widow was thought to be guilty of being involved in the death, the dead man's brothers might kill her. If the widow was young she underwent this ordeal to prove her innocence and her behaviour was vital as to the outcome. The family might request the widow to remain single for the rest of her life out of respect for her dead husband whom she loved. They might also request her not to marry

if they felt that a new husband would not treat her as well as the deceased. These requests were expected behaviour and allowed the family members to express their love for the deceased.

The widow would abstain from her husband's favourite foods, favourite place or drinking spot in a rite called *kasina* (in both the *pamusakamana* and *atikamana* dialects). This showed the widow's love for the deceased: as her husband could no longer experience these things the widow also abstained as a sign of affection for her husband. If the widow's mourning was intense she burnt her husband's possessions and cooked the ashes with greens and ate them during *kavunda*. This eased the pain of the loss when she remembered her husband. The widow would stay in the *kami* by her toilet during the day and the other women would come and visit her and comfort her. She was allowed to sleep in her own house during the night but during the day she was not to be seen around the village. The family would feed her wild green vegetables and other garden foods. This custom allowed the widow to grieve in the company of the *ama* and *kwela*. The widow was polluted by the *kwela* and presented a danger to the rest of the community, hence her isolation. Her presence would weaken the *aona* of the male

members of the family so they would not be able to avenge the dead man's death. During *isosoana* a ritual called *kilawe pepatawe* (*kilawe avepatauwe* in *atikamana*) was performed which allowed her to leave the mourning house with certain prohibitions; it was not an end to her mourning nor was she free from pollution. After *aluana* the widow was free to move around the community, but she maintained a connection with the *ama* and *kwela* of her husband through wearing the blood-stained bark cloth that her husband's body had been dismembered on.

Once her grief had subsided, after a respectable 2-3 years she might choose to remarry with her dead husband's family's approval. The dead man's 'poroman' had the first opportunity to request her hand in marriage, and often they would compete for her. They approached the widow one at a time with red sugar cane, and if she accepted the sugar cane from one of them it meant that she accepted his marriage proposal. The other 'poroman' would often attack him with their pieces of sugar cane, and often a fierce fight broke out which could escalate to the use of bows and arrows. The fighting was caused by the men's frustration at having their advances spurned by the woman and by venting their anger it

helped settle any ill feelings quickly amongst the ‘poroman’. To bring about peace the future groom would pay bride price to his own ‘poroman’ as compensation. The relationship of ‘poroman’ and remarriage is discussed by Lindenbaum and Glasse (1969). If the widow married a man from another clan the bride price went to the ‘poroman’ and the husband’s family. The compensation was presented as part of the ritual called *kilanu kasa*.

Kilanu kasa

Kilanu kasa in *pamusakamana* (*kiya nuku* in *atikamana*) meant to remove the widow’s cloths, and was a ritual that freed the widow from the *kwela* and *ama* of her dead husband, and removed the bilum, bark cape and *asi* that symbolized her status as a widow. This feast happened when the widow and family felt ready, which was normally 2-3 years or more after her husband’s death. The family prepared an earth oven containing banana cakes and then the widow shouted out to the sisters of her dead husband to release her from mourning. She would explain that she needed a new husband as she could not look after her children on her own. The widow’s brothers also came and spoke on her behalf, and one of

them would call out the new husband's name and by banging two stones together consummated the marriage. Pieces of banana cake were spat from the participants' mouths to remove the *ama* and *kwela*.

Kila'we

Kila'we was a *pamusakamana* word meaning the mourning was extended to a daughter or sister of the deceased who declared she would never marry because of her grief. This ritual was known as *kiyawwe* in *atikamana*. The daughter or sister requested the prohibitions of *kila'we* to express their love and respect for a deceased father or brother. The woman would wear the jawbone of her male relative as a sign of her vow and the *ama* remained with her. She might reaffirm her vow of celibacy if other members of her family died. Later, the family would perform a ritual called *kasiana* in *pamusakamana* (*kasiyena* in *atikamana*) to release the woman from the *ama* if she decided to marry.

The widower

The widower would remain in the men's house and after two or three years he would remarry; sometimes he did not. The *ama* of his wife remained with him during this time, but he was under no restrictions because of her *kwela*. When the widower started to forget his deceased wife it meant her *ama* had departed.

The history of transumption in the South Fore

Transumption is a deeply embedded practice among the Fore and was present long before the onset of the kuru epidemic. However, after the practice had been proscribed, some informants distanced themselves from the traditional practice by denying its ritual significance and stating that it had been adopted from the Kamano.

When the kiaps (patrol officers) came they appointed luluais and tultuls from the villagers in each community to enforce the laws of the colonial administration. These men were told to ensure that transumption stopped in their villages. The population was very much afraid of going to jail in those days, because they believed that

they would never return. So the women left their children at home when attending mortuary feasts, as they feared the children might tell the luluai or tultul that they had eaten the dead. The women would secretly carry parts of the body back to their houses and cook them by the menstrual hut so they would not be caught. Otherwise the dead were eaten where the body had been dismembered. Some women continued the practice in this way into 1958 in the South Fore but after that the practice generally ceased and bodies were buried. Occasionally, into the early 1960s, bodies were privately disinterred and partially eaten, but this practice gradually became restricted to the older women and, finally, ceased altogether.

Summary of cultural practices that may have affected the transmission of kuru

Kuru is thought to have originated as a single case in Uwami in the Keiagana and spread to Awande and then throughout the South Fore and into the North Fore (Glasse, 1962b). Over the next few decades the incidence of the disease gradually increased to become a major epidemic, especially in the South Fore. Because of its long incubation period the disease continued in the population for decades after transmission had ceased. The spatiotemporal

characteristics of the declining epidemic have been described (Alpers and Kuru Surveillance Team, 2005; Alpers et al., 2007) and the causes of these epidemiological patterns sought in the details of past mortuary practices in and around the kuru-affected region.

In the ethnographic description of mortuary rites in the South Fore there is a clear contrast between expected and actual behaviour at mortuary rituals. Ideally, corpses were only meant to be eaten by old women whose *aona* was fading. The old women were allowed to dismember the corpse, and ate all parts. Women with two or more children were allowed to participate in transumption, but they were only meant to eat the muscle and fat from the body. None of the younger women or children were meant to take part in transumption. This ideal was not upheld in practice.

Men were not meant to take part in transumption as it would have damaged their *aona* and they would become vulnerable to enemy arrows. This was especially relevant to the younger men who were in their prime and were the key defenders of their community. The older men's *aona* was already fading like their elderly wives so

any contamination from their wives did not endanger the community.

Those of the same 'blood' were not meant to consume the body. This term is used in Tok Pisin and will be clarified first. It means those members of the nuclear family plus the patrilineal grandfather. Nobody in this group was meant to take part in transumption of anyone else in this group. This rule applied to ownership of the body and if the rule was infringed then people's *aona* would be affected, and they would become ill or possibly die. This rule also applied to bride price, which was not consumed by the nuclear family when a girl married. The body belonged to the affines as they had contributed the flesh and blood of a woman, and she provided the flesh and blood to her sons whose bodies were also consumed by the affines. The brothers of a girl would claim their sister's body, but it was her cousins' wives who had married in from elsewhere who consumed her body, so again the rule of not consuming those with the same 'blood' applied. If part of the body was given to the agnates the rule no longer applied as ownership was transferred to the agnates, and there was no infringement in the agnates now consuming part of the body. These rules also

applied throughout the kuru-affected region. This outline of the ideal behaviours applies generally to all the linguistic groups affected by kuru, though there were permutations of the ideal practice in each of the linguistic groups, and these variations may have affected the spatial and temporal differences in the epidemiology of kuru.

The following is a summary of the key practices in the South Fore that might have affected the epidemiology of kuru. It is recognized that there were variations among the South Fore communities and that the study is unlikely to have recorded all of them.

Partially decomposed bodies and those who died of dysentery were never consumed. The bodies of those who died of leprosy and yaws were consumed in some communities, but not others. Those who died of sorcery were normally eaten, and those who died of kuru were always eaten. The corpse of an important leader was often placed on a platform and left to rot out of respect for his contributions to the community. A warrior mutilated in battle was sometimes not consumed, out of grief. Transumption was not the

only means of disposing of the dead: burial, platforms and baskets were also used; however, these sepultures were often only temporary, as bodies were often removed afterwards and consumed. Transumption was by far the most common means of disposing of bodies in the South Fore.

Amongst the affines the rights to a married man's body belonged to the mother's brother's cousins' wives and his wife's cousins' wives. If the man was unmarried, or a boy died, the body belonged to the mother's brother's cousins' wives. In practice all the adult female affines and the godmother claimed, and received, an equal share of the body. Although the body of a married or unmarried man or a boy belonged to the affines, it was accepted practice for them to give the head and an arm back to the agnates.

When a married woman died it was her cousins' wives who had the rights to the body but in practice all the adult female affines and the godmother claimed an equal share of the body. Again, the head and an arm would be given back to the agnates to consume. If a girl was unmarried her cousins' wives and aunts would claim equal shares of the body. Babies that died in the menstrual hut

were consumed by the mother's birthing attendants or buried. Once the child was bought to the *kami* the above rules applied to males and females.

When the agnates received a head and an arm they were shared equally amongst all the adult female agnates. So the rule of not eating one's own blood was ignored when parts of the corpse were given to the family and this rule no longer applied. There was also an underlying need for the family members to ensure the continuity of the clan through the transumption of the corpse, to allow the children to inherit the souls of the dead and to receive blessings, and to ensure that the deceased was reborn as an ancestor. These concerns ensured that all the women and children participated in transumption.

In the *atigina* the widow was given the hip bone, genitals and the intestines, which she shared with the female agnates and her 'poromeri'. In the *pamusagina* these parts were taken by the affines and the widow was prohibited from eating any of the body. This was a significant structural difference in the mortuary rites between groups that were culturally very close, and was adhered to.

However, more general prohibitions and taboos, certainly with respect to women and children, were ignored whenever people chose to do so, consistent with the important overriding principal that the body be completely, rapidly and lovingly consumed.

Half of the cooked body was placed in a communal pile for the other women who came to mourn the deceased. Normally they were not given bones, internal organs, genitals or intestines to eat. They were given the choicest parts, the muscle and fat, but often one of the bamboo tubes containing the brain was included in the communal pile as it was a favourite food with the women. These women were fed from the end of a stick and did not handle the meat. There were also some women who relished eating human meat and they would attend obsequies even if they were unrelated to the deceased.

Children were not meant to participate in transumption but they did. Those who participated were meant to eat muscle or fat from a male corpse for ritual purposes, but again the rule was not followed. The brain and spinal cord were soft and the South Fore believed that it would stop the children from growing properly. They

also believed that the internal organs contained too much blood and would make the children ill. In practice the children consumed the brain and spinal cord, and in some, but not all, communities they also ate the internal organs. Small children did not eat the intestines or bones as their mothers feared they might choke on them. The children also ate from the bodies of males and females.

Nearly all the women would participate in transumption. There were a very small number who did not participate due to opposition from their husbands who feared the pollution. Once a young girl stopped breastfeeding she would participate with her mother in transumption in her own or nearby communities. From the age of 9 she would attend obsequies in other communities as well. A newly married woman ideally stopped participating in transumption until she had one or two children to protect her husband's *aona*. In practice the women were fed directly into their mouths from the end of a stick and continued to participate.

Boys did not participate in transumption until they ceased breastfeeding at the age of about 3. They would then participate in transumption with their mothers in their own or nearby

communities. Those boys who underwent the minor initiation ritual at the age of 6-8 ceased to participate in transumption with their mothers. There were a few children who were frightened by ghost stories and did not take part in transumption, but they were the exception. Children over 6 were allowed to take part in *ikwaya ana*.

In the *atigina* boys were not meant to eat part of a female corpse, but this rule was not enforced until they were aged 6-8. From this age onwards they were only allowed to eat meat or muscle from a male body for ritual purposes. It is possible that these older boys had some exposure to spinal cord tissue. The boys were also fed directly into their mouths using sharpened wooden sticks.

In the *pamusagina* the boys were allowed to eat males and females till the age of 6 when those who underwent the minor initiation ceased to participate in transumption. The boys who remained with the women from 6 to 15 were allowed to consume males and females, and also continued to eat brain and spinal cord. By the time the boys reached 13-15 they had undergone the first major initiation rites and no longer participated in transumption.

There were a small number of elderly males who took part in transumption and there were also a small number of warriors who regularly took part in *ilevino*. Young boys also took part in this ritual once or twice in their lifetime.

Parenteral inoculation of the participants was possible as they had tropical sores, cuts, infections, scabies and fungal infections. Although the women purified their hands after handling the corpse this would not have removed the infectious agent that caused kuru. Hands were also rubbed on skirts and bark capes and children's eyes and noses wiped during the rituals. However, the brain tissue was never intentionally rubbed on the bodies of the mourners. In the *atigina* blood was sometimes rubbed on the bodies of female agnates. Old traditional wooden plates (these belonged to the women) were used during transumption and might have caused cross-infection. The tapa cloths used to dismember the body on were used after the feast, and meat from the corpse was placed on them during the night in the mourning house. All the leaves, containers, knives and anything else used during the mortuary rituals were burnt on a fire and the ashes cooked with greens and eaten by the family members and the affines during *ikwaya ana*.

Pregnant women rubbed fluids from the cooked body onto their bodies during a magic ritual called *andagosa*, which might have exposed them to the risk of parenteral inoculation.

During wartime bodies were consumed as normal if the affines could reach the deceased's village; otherwise a woman with a family connection to the affines was appointed to oversee the transumption of the body. The family and women from allied clans and surrounding clans would participate in transumption. If there were several dead nearly all the rules were disregarded and all the women who could ate the bodies. Bodies removed from sepultures were consumed following the normal rules for transumption.

Summary of the mortuary feast participants' exposure to central nervous system (CNS) tissue

Children under the age of 3 were unlikely to have been exposed to CNS tissue. Males were orally exposed until the age of between 6 and 8. In some parts of the South Fore they were no longer exposed from this age; however, in other parts some continued to be exposed until the age of 13 to 15. Once the males had entered the men's house as full initiates they were never exposed to CNS tissue again.

Women were exposed to CNS tissue from the age of 3 onwards. Newly married women had no or very little exposure until they had 2 children, when they again became major participants in transumption until they died.

Children may have been exposed to CNS tissue parentally, but the primary means of exposure was through the consumption of infective tissue.

Chapter 6:

Ethnographic descriptions of mortuary rites and related practices in the kuru-affected region: North Fore, Gimi and Keiagana

Traditional mortuary rites amongst the North Fore

Introduction

There are many similarities between the cosmologies, eschatologies and mortuary rituals of the North and South Fore. Some North Fore villages, such as Awande, were culturally much closer to the South Fore than the North Fore, and this also applied,

in reverse, to some South Fore villages. Although the ethnographic description of the North Fore is not as detailed, much of what has been written about the South Fore applies equally to the North Fore. However, there are some minor differences. Finally, some of the data collected in the North Fore could be used to enhance the South Fore ethnographic description of traditional mortuary rites.

Details of alternative sepultures in the Gimi, North Fore and Keiagana can be found in Appendix D, and further information on social structure and rites of passage can be found in Appendix F.

North Fore / English glossary

<i>North Fore</i>	<i>English</i>
<i>auma</i>	The deceased's soul similar to the western concept
<i>aona</i>	The deceased's inheritable qualities

<i>ama</i>	Simulacrum of the <i>auma</i> but more powerful
<i>kegina</i>	Harmful ghost of the deceased consisting of pollution
<i>yesegi</i>	A person's aggression seen in their attitude
<i>amani</i> (ancestor)	Founding ancestor of a clan
<i>amani</i> (ground)	Sacred ground of a clan <i>amani</i>
<i>bagina</i>	The creator
<i>kwelanamandi</i>	The land of the ancestors
<i>anagra</i>	Female affines
<i>anaso</i>	A married woman's godmother
<i>agona</i>	Final mortuary payment to the affines

North Fore cosmology

The *amani* and their sacred grounds

The *amani* is the sacred ground of the clan's *amani* as described for the South Fore. The clan members were not allowed to enter this area and only one part of the *amani* was used to make requests for assistance from the *amani*. *Amanikina* (called *kolekolepa* in the South Fore) were the 'masalai' who punished humans for indiscretions on behalf of the *amani*. The *amanikina* were the guardians of the places that had a connection to the *amani*, such as lakes, swamps, stones or any unusual natural feature on the clan's land. They could not be seen by humans, but lived in the same geographical space, and damage inflicted by humans in the *amani* affected their invisible land.

Human relationships with an *amani*

When a woman married she automatically changed clan and became a member of her husband's clan. When children were adopted into a new clan, they also became members of their adoptive father's clan. At first the patrilineal *amani* might not recognize the new clan members and they might be harmed if they

broke any taboo surrounding the sacred grounds of the *amani*. Once members of the clan carried out the appropriate ritual and informed the *amanikina* that the offender was a new member of the clan the *amanikina* would remove the curse from the offender. This also applied to children born into the clan, who might not be recognized at first by the *amanikina*.

Kwelanamandi

The *ama* of the ancestors would come and assist a dead person's *auma* on its journey to *kwelanamandi*. In the North Fore some people believed that the *auma* waited for 3 days at the top of an *aga* tree until it was told to depart to *kwelanamandi* by the family.

The five souls of the North Fore

The five souls that constituted a person in the South Fore are identical to the five souls that constitute a person in the North Fore. The souls are: the *auma*, *ama*, *aona*, *kegina* (*kwela* in South Fore) and *yesegi*. The *aona* is the familiar spirit of a man and all forms of *aona* take on the appearance of the man's familiar spirit in the dream world. The *yesegi* is also part of the person's *aona* so if they

have powerful *yesegi* their spirit familiar is likely to be an aggressive or dangerous animal. There are two types of *aona*: one is domestic and inherited from deceased family members, and the other is wild, and received by initiates during initiation rites including *kinomiyena* (the red pandanus ceremony), and by women on the night before they are married. An individual may have both types of *aona*. *Aona* is seen in a person's abilities and *yesegi* in the way a person thinks. Wild *yesegi* and *aona* came from the clan *amani* through the red pandanus. Finally, there is a third source of *aona* and *yesegi*, which is received in the form of a blessing from the *ama* of the deceased, and is an important reason for the practice of transumption in the North Fore.

Movement of the body to the sepulture

One of the deceased's senior matrilineal uncles claimed the corpse on behalf of the affines. If the uncles had died then their children claimed the body, and if there were no male children the first cousins claimed it. This is the same as in the South Fore. The deceased's body was carried to the sepulture by the matrilineal uncles and the male cousins. Later, two food presentations were

made to those who carried the body (they were both called *wasagaika*): the first presentation was after the disposal of the body, and the second a year later when the family's gardens were ready.

Preparation of the sepulture

If the planned means of disposal of the body was transumption, then the male affines prepared a bed for the body. If they intended to bury or expose the body, a brother of the deceased would tell the affines where the sepulture was to be constructed, and then the male affines led by the senior matrilineal uncle would prepare the burial pit or platform.

Methods of disposal of a body

Bodies could be consumed, buried, placed on a platform or placed in a basket. Before the kiaps arrived transumption was the most popular form of disposal, then burial and lastly platforms. Burial was often requested so the family members could continue to look at the deceased's face until it decomposed, as the head remained exposed above ground. The participants of one interview

estimated that 70% of bodies were consumed, 20% buried and 10% placed on raised platforms or baskets.

Transumption: rules for claiming and primary distribution of the corpse

Order of obsequies for transumption

Tuvuene was the name of the rite during which the body was divided and consumed.

Ayabuyaku, which means a fire to cook and eat bones in North Fore, was the name of the obsequy when the bones were eaten.

Yogidaku, which means 'knife fire', was the name of the obsequy when the ashes of the utensils used during transumption were eaten. A pig was given to the affines to eat with the ashes as compensation. The fireplace was then covered up and this became the sepulture of the deceased. There was no separate ritual in the South Fore, where the eating of ashes was included in *ikwaya ana*.

Iyoge kamana was the name of the time during which the family tried to avenge the death.

Kasala yena was the purification ritual that ensured any traces of the body, such as grease, were removed from the village and the mourners, and consumed. *Kasala yena* was known as *aindu* in the South Fore.

Kavunda was the mourning period from the end of transumption till *asa yena*.

Asa yena marked the end of *kavunda* and the feast removed the *kegina* from the female affines and sent it to the sepulture. The ritual was called *aluana* in the South Fore and served the same purpose.

Aiyoena was the compensation payment to the families of those who participated in transumption and was called *igoghana* in the South Fore. The *ename* also took part in this feast.

Bodies unsuitable for transumption

Those who died of leprosy and during the dysentery epidemic of 1943 were buried, as were some of those who died of yaws. Those

who died of leprosy were not eaten as people feared that the disease was contagious.

Before government control was established in the North Fore those who died of kuru were normally consumed or buried. When the kiaps arrived the North Fore did not stop eating their dead, as the kiaps did not give any explanation for their prohibition, and it was only after the arrival of the missionaries that the practice ceased. Importantly, many of those who died of kuru were buried as it was feared that kuru was contagious like dysentery, and the women never removed the buried bodies of those who died of kuru. It was estimated in an interview that 50% of those who died of kuru were buried, 30% consumed, 10% placed on platforms and 10% disposed of in baskets. The means of disposal of a body depended on the dying person's wishes; if these were not clear the family decided.

Rules for claiming and distributing a male body

Those mourners directly related to the deceased by blood did not have a right to any part of the body. This referred to the immediate family of the deceased. In a man's case, same 'blood' meant his mother, father, sisters, brothers, daughters and sons.

Importantly, those of the same 'blood' were not meant to eat part of the body, but out of love and respect for the deceased the rule was broken. The body belonged to the affines who often gave the head and intestines back to the widow and daughters-in-law of the deceased. The widow might be given the genitals to eat if the *anagra* did not consume them. The intestines were washed out, stuffed with cooking bananas, cooked in bamboo and eaten, as the young women were not meant to know that the men defecated. In Awande the head was given back to the family for transumption 50% of the time.

Amongst the *anagra* it was the cousins' wives who had the rights to consume the body. The widow's brothers' wives had a right to participate with the *ename* but they did not have a right to claim any part of the body. The *anaso* had an equal right as an *anagra* to part of the body as she had received part of the bride price. All the women who had a right to the body received an equal share.

The *anatu*, widow or one of the deceased's daughters would request the last digit of the thumb, and this bone was worn in memory of the deceased.

If a boy died his body was divided as for an adult male, and the head and intestines were often given to female agnates; the rest of the body belonged to the *anagra*.

Rules for claiming and distributing a female body

A woman's brothers claimed her body and their wives would eat it with her cousins' wives and the *anaso*. Those who received the bride price had rights to part of the deceased woman's body, but the other *anagra* such as the deceased's brothers' wives also made claims for parts of the body. The whole body was taken by the *anagra*, and only part of the vagina was given back to the agnates if requested. This was eaten by a pre-initiate or male warrior, in the hope of receiving *aona* and *yesegi* from the *ama* of the deceased. The *anatu* did not receive a specific part from the affines: they ate with the *ename* if they chose to, but a woman's daughters and sisters were not meant to participate in transumption as they had the same 'blood'. All the women who had a right to the body received an equal share. Her head was normally claimed by one of her matrilineal cousins' wives.

A girl's body was eaten by her male cousins' wives and aunts, and not by her sisters or female cousins. Again the rule of not eating the same 'blood' was applied to the patrilineal line, but in practice this rule was not always followed. Her cousins or 'poromeri' were not meant to participate in transumption out of respect for the deceased. The head was consumed by the male cousins' wives of the deceased and the aunts. Approximately 50% of unmarried females were consumed and 50% buried. If the girl was buried the affines were given a small payment, and a larger payment was given to the cousins of the deceased who would have received her bride price.

Transumption: subdivision and consumption of the corpse

Kavito

During this ritual a woman rubbed liquid from the cooked meat on her body, or her children's bodies, and requested assistance from the *ama*. The mothers also rubbed their hands on their skin so the *ama* would protect them from sorcery. The eating of the corpse and the rubbing of fluids on the participants' bodies gave protection from sorcerers, healed sickness or gave abilities to the mourners, as the *ama* helped those who ate the body out of love and respect. The

jawbone and hair were also kept by the family to request assistance from the *ama*.

Rules surrounding participation in transumption

Children's participation in the obsequies

Ideally, children in the North Fore were not meant to participate in transumption, but in practice this rule was not enforced, as in the South Fore. Children stayed with relatives when their mothers attended mortuary feasts in other communities, apart from those who were breastfeeding, as the adults feared for their safety when travelling. Children attended mortuary feasts in their own communities. Children who were still breastfeeding, between 0 and 3 years, were not meant to participate in transumption, as in the South Fore.

In practice children of both sexes participated in transumption. In Anumpa and Awande from the age of 3 there were no restrictions on children's participation in the transumption of male and female corpses. Boys were supposed to eat only the meat and fat from the corpse, and ideally, on at least one occasion, they would eat a piece

of vagina from a dead female relative in the hope that they would receive *aona* and *yesegi*. As the boys became older some spent more time with their fathers rather than their mothers, and these boys stopped participating in the feasts at the age of about 6. Others stayed in the *kami* with their mothers and ceased to eat when they became initiates. In Anumpa and Awande the boys who remained with the women after the age of 6, and continued to participate in transumption, only ate muscle or fat, and this rule was enforced.

The children in Anumpa under 6 were not meant to eat the bones, genitals, intestines, sexual organs or brain of the deceased. Some parents only allowed their children to consume muscle, particularly if the child was male, but again this rule was not always enforced. In Awande children participated in transumption and ate all parts of the body except the spinal cord, intestines, genitals and uterus. In Anumpa and Awande the brain was not meant to be given to children, as it was soft and wobbly, and it was believed that the children would take on these qualities if they consumed it; furthermore, it was also prepared with wild green vegetables, which the children might choke on. However, the children ate the brain, although it was forbidden, especially when

they cried for a piece and their parents indulged them. The spinal cord of pigs and humans was a favourite of the children, who liked to play with it before they ate it, and some parents allowed their children to eat it. However, some parents did not let their children eat the spinal cord, as they feared they might choke on the bones that contained it.

Girls aged 9 or over started to attend mortuary feasts in other communities with their mothers, and meat was sometimes taken back for the children who remained at home and for the women who had looked after them.

Women's participation in transumption

A woman's participation in transumption was governed by the rules of her husband's clan. As with children, there was an ideal set of rules for women's participation in transumption, but these were often ignored. Ideally, a married woman was allowed to participate in transumption when her parents-in-law decided she was old enough. She might be allowed to participate as soon as she was married, or she might have to wait until she had two children. Women were meant to be over the age of 40 before they could eat

brain tissue, as this was for the older women. The rules in Anumpa, Mage and Kasoru for the consumption of the brain were the same, but there might have been the occasional exception. An example was when a newly married woman was made to eat part of her husband's brain by her parents-in-law. Occasionally, a man might stop his wife from participating in transumption, but this was unusual. According to one interviewee 90% of women entitled to participate in transumption would participate, and 10% would refrain because their husbands did not want them to participate. Brain tissue was not intentionally rubbed on the bodies of the mourners. The female agnates sometimes rubbed blood from the corpse on their bodies out of grief.

In practice the females took part in transumption from the age of 3 to old age and did not cease at the onset of menarche. When a woman reached the age of 9 she would attend feasts in other communities and participated in transumption with her mother. It was the older women who had the rights to the brain, internal organs, genitals and spine, but, as stated, they would share these with the other women when the food was cooked, and they would sometimes share with their children and grandchildren.

Occasionally an old man might participate in a feast but this was not a common event.

Transumption of enemy relatives

In the North Fore the bodies of warriors related to women of the victorious group were often eaten out of love and respect. A woman who was closely related to the deceased would take the role of senior *anagra* and oversee the dismemberment of the warrior's body. The parts were placed in bilums and taken back to the *kami* where the women would consume the body. The enemy could not continue to fight with a clan who had consumed one of their warriors so the action of transumption instigated peace negotiations. Once peace had been negotiated the women were presented with food to complete *asa yena* and to compensate them for eating the corpse. The *kegina* would not harm the women of the same 'blood' so it was safe for the women to consume the body, and the *kegina* knew that the corpse was being eaten out of love and respect. The head was often returned to the deceased's family so they could see his face for a last time and mourn over it. If a body

was left on the battlefield to rot, then hostilities between the warring parties would intensify.

The history of kuru in the North Fore

Kuru is thought to have first occurred in the North Fore at Awande and spread north and south-east from there (Mathews et al., 1968). After the dysentery epidemic of 1943 people were very much aware of the danger of contagious diseases. Kuru first came to the attention of the people in Anumpa, Mage and Kasoru when it appeared in Kasokana and then in Ofafina. The first cases appeared in this area after the dysentery epidemic according to local sources. The inhabitants of these villages normally intermarried, so they did not have much reason to visit kuru-affected areas. The leaders of these communities discouraged the inhabitants from visiting areas with kuru, as they believed that they were populated with dangerous sorcerers. This happened before the arrival of the kiaps. When the Lutherans and kiaps arrived people quickly stopped transumption as they feared imprisonment.

Summary of the cultural practices that may have affected the transmission of kuru

In the North Fore the same ideal rules applied to the transumption of bodies as in the South Fore. Bodies were consumed, placed on platforms or in baskets, or buried. It was estimated in one interview that 70% of bodies were consumed, 20% buried and 10% placed on platforms or in baskets. Those who died of dysentery and from leprosy were buried, and those who died of yaws were sometimes buried and sometimes eaten. Kuru was regarded as contagious like dysentery and therefore the bodies of those who died of kuru were never removed from sepulchres and consumed. It was estimated in an interview that 50% of those who died of kuru were buried, 30% consumed, 10% placed on platforms and 10% disposed of in baskets.

The mother's cousins' wives had the rights to a man's body, but in practice all the female affines on the mother's brothers' side claimed part of the body. In the North Fore the widow's female family members did not have a right to any of the man's body, but they could participate with the *ename*. The body of a man belonged to his mother's affines, but the head and intestines were often given

to the widow to consume. The widow was sometimes given her husband's genitals. The godmother (*anaso*), a woman from the same patriclan who had married into the same village as the deceased and cared for her in her new community, had an equal right to the body as the other female affines. If a boy died his body was divided as a man's with the head and intestines being returned to the female agnates. In practice all the female agnates participated in transumption and the rules of the same 'blood' were ignored.

When a married woman died the affines took the body and the female agnates ate with the *ename*. The deceased woman's cousins' wives had the rights to the body but the other adult female affines also claimed parts. The woman's sisters and daughters were not meant to take part in transumption as they had the same 'blood' as the deceased but in practice this rule was not followed.

If an unmarried girl died her body was eaten by her cousin's wives and aunts who had married into the clan. Her female cousins were not meant to participate as they were regarded as having the same 'blood', and her 'poromeri' were not meant to take part in respect of the deceased. Again these rules were not always followed.

It was estimated that 50% of unmarried women and girls were buried and 50% consumed.

Children aged 0-3 did not take part in transumption, but from 3 onwards they participated with their mothers in the transumption of male and female corpses. They were not meant to eat the genitals, intestines, internal organs, spinal cord or the brain. Some parents only allowed their children to eat muscle and fat, but this varied from place to place. The children were not meant to eat the brain in Awande, but the rule was not enforced and many mothers indulged their children. However, in Awande the children did not eat spinal cord, intestines or genitals. In some communities the children liked the spinal cord as they could play with it first. From the age of 6 boys who underwent the minor initiation ritual ceased to participate in transumption, and those who remained with the women only ate muscle or fat.

In practice the women took part in transumption from the age of 3 till they died. Girls did not participate from 0 to 3 years of age and then they followed the same prohibitions as the boys. At the age

of 9 they started to participate in transumption with their mothers in other communities.

The occasional old man also took part in transumption and there were a handful of warriors who ate for ritual purposes.

The women did not intentionally rub brain tissue on their bodies, but the agnates sometimes rubbed blood from the deceased on their bodies. During the *kavito* ritual women rubbed fluids from the cooked body on their bodies and those of their children for magical purposes.

The female agnates consumed the maggots that ate bodies placed on sepultures and also the fluids from the decomposing body. The fluids of the cooked body were rubbed on the abdomens of pregnant mourners for magical purposes.

During the kuru epidemic, before the kiaps exerted their control over the area, the North Fore leaders discouraged their people from visiting areas with a high incidence of kuru.

Summary of the mortuary feast participants' exposure to central nervous system (CNS) tissue

Children of both sexes were exposed from the age of 3 to CNS tissue; however, males ceased to have any further exposure from the age of 6. Girls continued to be exposed throughout their lives, with an interlude of varying lengths when they were first married. Oral inoculation was the most likely cause of infection.

Traditional mortuary rites amongst the Gimi

Introduction

The Gimi who were affected by kuru occupy the south-western corner of the kuru-affected region. They border the Fore, Yagaria and the Keiagana. To the south they had some interaction with the Pawaians from whom they possibly contracted leprosy. Movement between the above populations was common as people became refugees due to constant fighting. The first government patrols moved through the area in 1948-49 and a New Tribes Mission was established in the Yani River area in 1957. The Gimi were noted as adapting to change slower than their neighbours in the Keiagana and Fore and this is relevant regarding transumption. Most of the cases of kuru in the Gimi could be traced to marriage exchange and immigration from the Fore (Gajdusek and Alpers, 1972).

Anthropological studies have been conducted amongst the north-western most Gimi on the opposite side of Mount Michael. Glick (1963) has written about traditional Gimi medicine and includes a lot of ethnographic data about the Gimi. Gillison's book 'Between Culture and Fantasy' (1993) is based on her hypothesis of a

clandestine debate between male and female myths in Gimi society, and that the unspoken assumptions upon which the myth debate rests reflect the deepest structure of Gimi social life.

Of particular interest are her data on transumption and mortuary rituals. The reasons behind transumption that are mentioned, although very brief, correlate with the data collected in the South Fore and elsewhere. These include: for the dead to achieve an afterlife; for those who participated in transumption to receive the strength of the deceased; and so that the mourners could defeat their enemies. The women did not want the body to rot and transumption helped alleviate their grief.

According to Gillison (1993), if a man died he was likely to be eaten by women of his father's clan, his mother, his wife, his brother's wives, his real and classificatory sisters (cousins, and women of about the same age who had married into his patrilineage), his daughters, his father's real and classificatory sisters, his wife's mother and the wives of his sons. A mother would eat her dead son's genitals and his wife his head and stomach.

When a woman died, none of her real or classificatory sisters, age mates or the wives of her husband's age mates, nor her husband's mother, nor those who contributed to her bride price, ate part of her body. Her body was eaten by her husband's kin, but sometimes the affines would also join in with the above restrictions. The mother's brother had the rights to the body, but he was compensated as were the other female affines for having that right pre-empted by unruly women who consumed the body (Gillison 1993).

Glick (1963) takes a broad approach to the Gimi medical system, and his work also describes in detail the social structure of the society. Much of what he has written about social structure of the Gimi is equally applicable to the Fore and the Gimi of the Yani River valley. There are no references to mortuary rites or to transumption. However, there is a mention of *aona*, which is described by Glick as 'vital force'. He states that *aona* is a familiar spirit which represents the person's abilities (Glick, 1963). Glick (1967) also mentions that ghosts, called *kore* in the dialect of the Gimi language where he worked, of the recent dead can cause illness. The Gimi also engaged in medicinal cannibalism. They

ground small amounts of an ancestor's bone and mixed the dust with herbs, which were then cooked and given to the patient (Glick, 1967). The Gimi of the Yani River also had the same practice.

It is possible that the researchers were unable to collect detailed data about Gimi cosmology and eschatology because they were secret subjects, and the interviewees might have feared a negative response from researchers enquiring about transumption. This problem is also mentioned by Salisbury (1956) who worked amongst the Siane and was unable to penetrate their religious system.

Gimi / English glossary

The following is a glossary of terms in the Gimi language.

Gimi

English

auwasi

The deceased's soul similar to the western concept

aona

The deceased's inheritable qualities

<i>ama</i>	Simulacrum of the <i>auwasi</i> but more powerful
<i>ole</i>	Harmful ghost of the deceased consisting of pollution
<i>nahedaena</i>	A person's aggression seen in their attitude
<i>nehima</i> (ancestor)	Founding ancestor of a clan
<i>tulipi</i> (ground)	Sacred ground of a clan ancestor
<i>imeto</i>	The creator
<i>olenamai</i>	The land of the ancestors
<i>amau</i>	Female affines
<i>avaisa</i>	A married woman's godmother
<i>hamotuna</i>	Final mortuary payment to the affines

Gimi cosmology

The creation story

The creation story is similar to that of the South Fore with the *imeto* creating the landscape and then the *nehima* from whom all the clans are descended. There are two stories about the origin of the *nehima* and the human clans amongst the Gimi. One is the Andai story of the South Fore and the other is from Oliguti to the north of the Gimi. Gimi-speaking communities in the south refer to the Andai story and those who inhabit the north tell the story about creation at Oliguti.

The five souls of the Gimi

The Gimi have 5 souls that constitute a person, which are identical in description and function to those that constitute a person in the South Fore.

Departure of the deceased's souls

The *auwasi* departed first to *olenamai* assisted by the *ama* of the clan's ancestors. The *ama* and *ole* departed to *olenamai* after

hamotuna (head pay rite known as *agona* in Fore, and was the final payment to the affines for a deceased woman who had been taken in marriage) and when they joined the *auwasi* the deceased was reborn as an ancestor. The *nahedaena* and *aona* were passed on to the deceased's children.

Transumption: rules for claiming and primary distribution of the corpse

Bodies that were unsuitable for transumption

Those who died of dysentery, swollen abdomens, leprosy, yaws and kuru were not always eaten, as these illnesses were believed to be contagious.

Rights for claiming and distributing a man's body

The body belonged to the affines and was claimed by the mother's brother's cousins. The mother's brothers and their sons did not claim it as they were most closely related to the deceased (of the same maternal 'blood') and it would have been disrespectful to speak at this time, as they were the key mourners amongst the affines.

The affines kept half of the body and the head, and gave the other half to the agnates. The family did not have a right to the body but it was an unspoken tradition to give them half, so there would be a good relationship between the two groups. However, sometimes the family received the head if they agreed to compensate the affines with a pig at *hamotuna*; however, this did not happen very often.

One 'blood' (*hia ora*) refers to members of the nuclear family and the patrilineal grandfather; however, this interpretation could be extended to include more distant relatives, including the maternal line as above. The Gimi believed that if a member of a family ate someone of the same 'blood' their *aona* would be destroyed, and this would result in severe illness or death. However, when part of the body was given back to the agnates the restriction no longer applied. It is important to note that the rule of not eating one's own 'blood' applied to ownership of the corpse. If the agnates ate the deceased they would have broken a traditional law as the body belonged to the affines and this would have destroyed their *aona*.

The following women from the patrilineal line participated in transumption of a dead male: his real sisters and their daughters, female cousins, male cousins' wives, his widow, daughters-in-law, daughters, brother's wives and their daughters and daughters-in-law, and the patrilineal uncles' wives. The *avaisa* had an equal right to the body as any other woman from the family. As in the South Fore, all the women of the agnates participated in transumption even though some of them were not meant to.

Mother's brothers' wives, mother's brothers' sons' wives, mother's brothers' daughters, mother's sisters and mother's cousins' wives of the affines participated in transumption. If these women had one or more children, they had a right to claim an equal portion of the body and they shared with the younger women and children. As in the South Fore, all the mature women of the affines could claim part of the body even if they technically did not have a right to part of it. The widow's patrilineal line received half of the affines' share, which was shared amongst the widow's brothers' wives, their daughters and daughters-in-law, and the cousins' wives and daughters.

The *ename waya* had no claim to part of the body, but the other women would give them a piece if they were asked. All the *ename waya* could take part by asking one of the women with a right to the body for part of it, and they were not refused as the *ename waya* had come to show their respect for the deceased.

If an unmarried man died the same rules applied as for an adult man; the body was divided in half and the affines took half the body and the head, and half was given to the agnates.

Rights for claiming and distributing a woman's body

The rules were described as being the same for that of the distribution of bride price, but this was not the case in reality. Although the body belonged to the affines half was given back to the family for the purpose of transumption and the affines kept the other half, the head and the intestines. The head might be given back to the family, but they would then have to compensate the affines at a later date. The following women from the affines participated in the transumption of a woman. The brother's wives would participate with their daughters and daughters-in-law; the deceased's sisters and their daughters-in-law and daughters; and

the deceased's cousins' wives and their daughters and daughters-in-law. Although the bride price was principally distributed amongst the deceased's cousins' wives, the other *amau* found reasons to make a claim for part of the body, and all the claimants received an equal share of the body.

Amongst the agnates, the following women participated in transumption: the husband's sisters with their daughters-in-law and daughters; the daughters and daughters-in-law of the deceased; the brothers-in-law's wives and their daughters and daughters-in-law; the aunts and cousins' wives; and the mother-in-law. The *avaisa* had an equal right to part of the body as the other women from the family. In other words all the mature women of the affines claimed part of the body.

This was the same for a married or unmarried woman or a girl; the body belonged to the affines and half was given back to the family to consume. A mother might eat part of her dead son or daughter from grief, and to help her child's souls to depart to *olenamai*. Again, the head belonged to the affines.

Transumption: subdivision and consumption of the corpse

This was called *ahne* in Gimi and meant to cut a dead man. The affines carried the body to one of the deceased's gardens, as this was the preferred site for dismemberment in the Gimi. The corpse was placed on top of banana leaves covered with wild green vegetables. The children were chased away as they were not meant to witness the dismemberment of the body. It was the old men and women who took charge of dismembering the body as they were the most experienced. Members from both sides of the family helped to cut the corpse so there was no argument about its distribution. Only the old people witnessed the cutting, so the younger people did not see the intestines or genitals of the deceased. After the body was dismembered those who had a claim took their parts and put them in old bilums full of wild green vegetables. A fire was prepared in the *hami dama* (women's area of the hamlet) and the body cooked in bamboo tubes, and very occasionally in an earth oven. If the body had been removed from a sepulture, and the relatives wanted to keep it a secret they would cook it in bamboo tubes in the *hami dama*. The widow received the intestines and she shared these with other women from the agnates who attended the obsequy.

The women ate with their hands to show their respect for the deceased, and in the hope that they would receive *aona* from the deceased's *ama*. The body was eaten by the fire and any remaining meat taken to the widow's house and shared with all the other women who remained there during the night.

Sometimes the head was taken by the family and sometimes by the *amau*. If a man died the *amau* would claim it by saying that their sister had given birth to him, and the widow would claim it out of love for the deceased. If a woman died the *amau* claimed the head saying that she belonged to them, and the family would claim it out of love and respect. The head was eaten at the same time as the rest of the body. Firstly, the hair was removed and then the head defleshed and the jaw removed. The brain was pulled out through the foramen magnum assisted by the hands that pushed it down via the greater wings of the sphenoid that had been broken open. The brain was mixed by hand with wild green vegetables on a wooden plate, put in two bamboo tubes and cooked. All the women could eat it if they participated in the obsequy and it was a favourite part of the body to eat. The spinal cord was eaten by the

women and there were no rules regarding the adult women eating this part of the body.

Avada

A man's genitals were not immediately consumed, and during the night after transumption the men called the *nehima* and the widow held up the deceased's genitals, and the *nehima* took the shadow of the genitals to the entrance of *olenamai* and this released the *auwasi* to go to *olenamai* with its genitals. The widow said:

“You gave this to me for reproduction and now I am returning it to the rightful owner, the *nehima*.”

The shadow of the genitals was then returned to the *auwasi* by the *nehima* and it then departed to *olenamai*. This ritual was called *avada*. Afterwards the genitals were eaten by a young male, so he inherited the deceased's *nahedaena*. He would be aged about 9 and was not yet an initiate; he also came from the same family, but not the immediate family of the deceased. If a woman died the genitals were eaten by a boy of the same age and family, but not immediate

family, to receive the *nahedaena*. They did not perform *avada* for a woman.

Avapu naiye

The bones were hung up in old bilums in the widow's house until the meat was finished and then the bones were crushed and eaten with wild green vegetables. Close female relatives on both sides helped eat the bones and this obsequy was called *ayapu naiye* (*ikwaya ana* in South Fore). The bones were dried by a fire and then crushed between two stones with banana leaves underneath and *uveuve* (*iyoioyo* in South Fore) on top. The wild green vegetables and bone dust were then cooked in bamboo tubes and eaten.

Luina

After the body was consumed a feast called *luina* was performed which equates with *isosoana* in the South Fore, but it might also include *hamotuna* (*agona* in South Fore) if pigs were available. The women who stayed with the widow in her house could not leave until *luina* had been performed; it consisted of presentations of pig meat and vegetables. The pigs were for

purification and compensation to the women who had consumed the body and for those who prepared the sepulture and carried the body. During this feast a purification ritual that freed women to move around in the village was performed called *hili nadaina* (*pepatakina* in South Fore).

Bya nadaina

Bya nadaina was a term in Gimi that covered three separate obsequies in the Fore language called *aindu*, *kavunda* and *aluana*. The first feast involved the purification of the village by consuming any traces of the body, and purifying the bodies of the participants. The next stage was the mourning period that was marked by the consumption of wild green vegetables and finished with a feast of cooked wild animals, which released the *ole* from the female affines who consumed the body and allowed the *ole* and *ama* to join the *auwasi* in *olenamai* if all the obsequies had been completed.

At the end of *bya nadaina* the remaining hard bones were placed in one of three places requested by the deceased, which then became the final sepulture. The bones might be put in a bamboo

grove, at a waterfall under a pandanus tree or at another favourite place of the deceased. The bones were a portal for the *ama* in *olenamai* and the family would shout out to the *ama* to come and assist them in hunting, preparing a feast, or in more serious matters like warfare. The jawbone and hair were worn around the neck and used to request assistance from the *ama*, and later when they began to lose power, as the ancestor started to forget the living, they were placed in the same location as the other bones. The locations chosen reinforced clan ownership of the land, as these were permanent or long-lasting locations.

The feast to free the widow so she could remarry was called *hahe nana*.

Possible parenteral inoculation or cross-infection of participants during mortuary feasts

Fluids that leaked from a corpse were often rubbed on the bodies of the mourners. After the body was dismembered, the women rubbed their hands on their bodies out of grief and respect. The brain was never intentionally rubbed on the body. The women cleaned their hands with young ‘pitpit’ leaves, water and sand from

the river bed to ensure they were cleaned, and cleaned their fingernails with small sticks.

New wooden plates were used to put pig meat on and were kept in the men's house. Older wooden plates were used for mortuary rituals and were kept in the women's houses.

Yodaina

The fluid in the bamboo tubes used for cooking was rubbed on the bodies of the women and children who participated in transumption. In this rite, the fluids were removed from the cooked bamboo tubes and a mother would rub it on her child; at the same time, the mother requested the *ama* to give blessings to her child to make the child grow strong, or remove an illness etc. Those who rubbed the fluid of the corpse on their bodies created a connection with the deceased's *ama*, which gave *aona* to some of the participants of the obsequy.

Very small children did not participate in this ritual as it was believed that the *ole* would harm them; boys ceased when they

entered the men's house and women ceased when they married if requested to by their husbands. Otherwise they would continue.

During transumption, among the South Fore it was the *kwela* that dominated behaviour but, in contrast, among the Gimi it was the *ama* that played the dominating role.

Hia hoaisa

In this rite the fluids from the cooked body were rubbed on the abdomen of a pregnant women and the deceased's *ama* requested to turn the unborn child into a physical simulacrum of the deceased, or to give the deceased's *nahedaena* to the unborn child.

Rules surrounding participation in transumption

Warriors did not participate in transumption as it would have damaged their *aona*, and they would not have been able to avenge a death or protect their families during wartime. Children did not have any *aona*, and adult women's *aona* was not regarded as important, so they were allowed to participate in transumption. The old men and women cut up the corpses as their *aona* was already

fading and would not be significantly weakened by the pollution of the body.

Children's participation in transumption

Children aged under 3 years were not fed part of a corpse, and when a mother ate she gave her child to someone else to hold, and afterwards she cleaned her hands before she held her baby again. If someone died in another community the women would take their breastfeeding children, and girls aged 9 and over to assist and to learn about the obsequies. A girl aged 9 and over who accompanied her mother participated in transumption. Children under the age of 9 were not allowed to participate in transumption in other communities. No part of the body was taken back to the home village; all the meat had to be eaten where it was cooked or in the widow's house.

If the death occurred in the family's village girls under the age of 9 might take part in transumption; this depended on the parents, but it was usual not to feed the girls under this age. The boys might or might not eat; it depended on the parents, and if they did it was to inherit *nahedaena* or *aona*, and after the age of 6 they did not

participate in transumption. The boys could participate in transumption of males and females, and were only given muscle or fat to eat. The spinal cord and brain were not given to children to eat, as it was believed that they would stop the children from growing properly. Children did not eat any of the internal organs and these rules were enforced.

Women's participation in transumption

Girls over 9 participated in the mortuary rites and ate what their mothers gave them. In Oraratu, and the Gimi in general, it was common for the women to stop participating in transumption once they were married. A newly married woman might take part in transumption or might not; it depended on her husband's family, and if she was prohibited, it might continue till she had two or three children. The reason for this was that she might become polluted, and damage her husband's *aona*.

A daughter-in-law would always assist her mother-in-law in transumption if she requested her help; otherwise her in-laws would have been offended. The older women ate the intestines,

internal organs and the brain as these were not considered suitable for anyone else.

Male participation in transumption

Some of the old men participated in transumption but this was not very common.

Summary of the cultural practices that may have affected the transmission of kuru

The same ideal rules as those that applied to the South Fore applied to the Gimi. Bodies were normally disposed of on a platform, by burial or by transumption. It was estimated in one interview that 50% of bodies were buried, 30% consumed and 20% placed on platforms. Those who died of dysentery, swollen abdomens, leprosy, yaws and kuru were not always consumed as the Gimi thought these diseases were contagious.

When a man died it was his mother's cousins' wives and his wife's cousins' wives who had the rights to claim the body, and the other adult female affines claimed shares and received an equal portion. The affines normally kept half the body and the head, and

the other half was given to the agnates. Sometimes the agnates took the head and then they compensated the affines with a pig at *hamotuna*. The godmother had a share equal to that of the other female affines. All the female agnates participated, even if they were not meant to because some had the same 'blood'. If an unmarried man died the affines took half the body and the head, and the remaining half was given to the agnates.

If a married woman died the affines kept half the body, the intestines and the head, and the rest of the body was given to the agnates. Sometimes the agnates were given the head and they later compensated the affines. The same divisions applied to an unmarried woman in the Gimi as a married woman. The deceased's godmother had the same right as one of the affines to part of the body. All the adult women of the affines and agnates claimed part of the body and received an equal share.

Fluids that leaked from the corpse were rubbed on the bodies of mourners, but brain tissue never was. As in the South Fore, the women had sores and scratches on their bodies and although they attempted to clean their hands and clothing the technique would

not have removed the infectious agent from their hands or from contaminated 'pulpuls' and bark capes. Only the old traditional wooden plates that were kept in the women's houses were used during mortuary rites.

Fluids from the cooked body were rubbed on the women and their children during a ritual called *yodaina*. Very small children (under 3) did not participate in this ritual, boys ceased when they entered the men's house and newly married women refrained if their husband's family asked them to. During *hia hoaisa* a pregnant woman rubbed fluids from the cooked body on her abdomen for magical purposes.

Children who were breastfeeding did not participate in transumption. Girls under 9 and boys under 6 did not participate in transumption in other communities; they only participated in their own communities. Often girls under 9 did not take part in transumption, and it was only when they were 9 and started to assist their mothers during transumption that they took part. If they took part they only consumed muscle or fat. A boy's participation after the age of 3 depended on the parents' decision as

to whether the boy might inherit the deceased's *nahedaena* or *aona* and possibly receive blessings. Boys were only allowed to eat muscle or fat, and not the brain or other organs that would have affected their growth.

When a girl was married she might or might not continue to participate in transumption – it depended on her parents-in-law. It was common for women to stop participating when they were married and they would not participate again until they had two or three children.

A few old men participated in transumption but this was rare.

Interviews in the Hepavina region of the Gimi, which borders the South Fore show that the Gimi of this region conducted their mortuary feasts in a way very similar to the South Fore. This probably accounts for the higher incidence of kuru in this region of the Gimi (Gajdusek, 1963).

Summary of the mortuary feast participants' exposure to central nervous system (CNS) tissue

Male children were unlikely to have been exposed to CNS tissue during the period when they were allowed to participate in transumption between the ages of 3 and 6, as they were only meant to eat muscle or fat.

Girls were unlikely to be exposed from the age of 3 to 9 as those who participated only ate muscle or fat. From the age of 9 they had more exposure to transumption. Newly married women were likely to cease participating in transumption until they had two or more children. It was the older women who consumed the CNS tissue.

Traditional mortuary rites amongst the Keiagana

Introduction

The Keiagana linguistic group is surrounded by the Fore, Gimi, Yagaria, Yate and Kanite linguistic groups. There are 5 senior clans in the Keiagana, the largest of which is the Tarabo. The Lutherans set up a mission at Tarabo in 1949 and built an airstrip there. Later the government built a patrol post at Moke in the North Fore, which then became officially known as Okapa. There are three migrant villages in the Keiagana whose inhabitants came from the Yagaria. They exist in a pocket in the southern Keiagana area and have strong connections with the surrounding South Fore villages and other Yagaria pockets in the North Fore. Two of these villages have recorded cases of kuru, and the incidence is much higher than that found in other Keiagana villages. Kuru has affected the Keiagana from the beginning of the epidemic but the incidence is much lower than that in the Fore (Gajdusek and Alpers, 1972).

Keiagana / English glossary

<i>Keiagana</i>	<i>English</i>
<i>tutumopa</i>	Soul or who we are
<i>awamu</i>	Person's abilities that were inherited
<i>ame</i>	Simulacrum of the <i>tutumopa</i> but more powerful
<i>afe</i>	Ghost consisting of pollution from the flesh
<i>imamu</i>	A person's aggression that was passed on
<i>aparu</i>	The land of the ancestors
<i>mani</i>	Founding ancestor of a clan
<i>anugaro</i>	Women of the affines
<i>negafō</i>	Affines
<i>noganekae</i>	A married woman's godmother

Keiagana cosmology

The creation story

According to the creation myth of the Keiagana clans they originally came from Manyavindi near Okasa, and this story is described in detail in the section on cosmology of the South Fore. In the story, the *mani* built a large house with a fire pit and then placed upright bamboo tubes in the fire pit. At first, he heard insects crying from the bamboo and then the sound changed to insects singing, and finally the *mani* saw that male and female *mani* had been created and he was happy, as he was no longer lonely. The *mani* prepared a feast for the male and female *mani* and then told them what language they spoke and what clan they belonged to; then they departed to their own homes. The myth tells of the expansion of the *mani* population at Manyavindi and its subsequent dispersal.

Names of the obsequies performed for the transumption of a body in Fore and Keiagana

Fore

Keiagana

<i>tuvuana</i>	<i>feruemue</i> (to eat the dead)
<i>ikwaya ana</i>	<i>sigi sugu huta negaine</i>
<i>igoghana+pepatawe</i>	<i>apawayaya vrine</i>
<i>kavunda</i>	<i>awanu yane</i>
<i>aluana</i>	<i>inuya atregaune</i>
<i>agona</i>	<i>nogane yane</i>

Traditional methods for disposing of a body

In the Keiagana bodies could be disposed of by burial or transumption. There was also a third option, placing them on platforms, but this was not used very often. Transumption was by far the most popular means of disposal of a body.

Transumption: rules for claiming and primary distribution of the corpse

History of transumption

Transumption was a tradition that could be traced back to the ancestors. The eating of the dead was called *waya neha* (custom of eating the dead).

Why the dead were eaten

The dead were eaten out of grief and respect, as it was not acceptable to let worms or maggots eat the bodies of loved ones. The eating of the dead also brought assistance from the *ame* of the deceased, which gave *awamu* to the family members who ate the body, and sometimes to others who ate out of sorrow. The body was also eaten by the deceased's children so they could inherit the *awamu* and *imamu* from their parent or grandparent. The living had to replace the deceased, and for this to happen it required the blessings of the *ame*, and for the children to inherit the *awamu* and *imamu* of the deceased.

Bodies that were unsuitable for transumption

Those who died of dysentery, yaws and leprosy were buried because the Keiagana feared that these types of illness and sorcery were contagious, but occasionally the bodies of those afflicted with these diseases were removed from sepultures and eaten out of love. Those who died of kuru were initially eaten; but later, as kuru became endemic, the bodies of those who died of kuru were buried, as the Keiagana began to think that kuru was contagious. Transumption was used to dispose of bodies of men, women and children.

If the deceased had been killed by multiple arrow wounds the body was buried. There were two reasons for this: the first was that the deceased had been affected by sorcery and this had caused the man to die in battle, and the second was the fear that the enemy women might have urinated on the corpse when it lay on the battlefield. If the contaminated body was eaten, it would weaken the *awamu* of those women who ate and the pollution would in turn damage the *awamu* of the warriors. Those who died of one or two arrow wounds were always eaten.

Rights to claiming and distributing a male body

When a man died the *negafo* would come and mourn over the body. The older men and women dismembered the body as they were experienced and their *awamu* was already fading. The mother's brothers' senior wife oversaw the dismemberment. The mother's sisters and cousins' wives had a right to the body and the mother's brothers' wives and other *negafo* would also make claims to part of the corpse. The *noganekae* (godmother) had the same right to the body as a *negafo*. The rights to part of the corpse belonged to the women of the men who received the bride price but in practice all the *negafo* would claim part of the body.

The genitals and intestines were given to the widow and an arm or leg to the other female agnates. The widow shared with the wives of the deceased's 'poroman' and the brothers' wives, daughters-in-law, daughters, cousins and cousins' wives of the deceased. A man or woman who was experienced in food distribution divided up the limbs and gave the pieces to all the women in the family, as they had all eaten or benefited from the deceased's hard work. The dead man's sisters were not meant to eat

the body as they were regarded as having the same 'blood' as the deceased, but this rule was not always upheld. The widow's sisters and their daughters and daughters-in-law would assist her in transumption. The head was often given to the wife of the man who had initially negotiated a wife for the deceased, and she would share it with her female relatives.

If an unmarried man or boy died then the deceased's mother's brothers' wives would take the same parts as for a married man and share with the same women who ate an adult man. His sisters and mother were not meant to consume part of the body as they had the same 'blood'. On the side of the agnates the same rules applied as for an adult male.

Rights to claiming and distributing a female body

The mother's brothers' wives, their sons' wives and the cousins' wives, and their daughters and daughters-in-law participated, and they would claim part of the body by putting their hand on it. All the *anugaro* received an equal share so there was no arguing amongst the women. They would share with their daughters and daughters-in-law. The deceased's sisters would come with their

daughters-in-law and daughters and they would be given a small piece of the body to eat by the women who had a right to it. The *noganekeae* (*anaso* in South Fore) received her portion from the affines' share.

The family would request to be given the deceased's head and an arm and it was very unusual for the affines to refuse. The dead woman's daughters and daughters-in-law and their children would participate in eating the body. Her brothers-in-law's wives, daughters and daughters-in-law would participate. All the cousins' wives and aunts also participated. Other women who came to show their respect and sorrow for the deceased did not receive part of the body because the family feared that the women might not eat the part given to them. The women had also not eaten the deceased's food when she was alive so they were not entitled to eat the body.

The body of an unmarried girl or woman belonged to the family. When the girl was born a son of the man who contributed the biggest portion of the bride price (one of the cousins) for the mother would make a payment called *maya hageya* (*tiana* in South Fore). By making this food presentation he could claim the biggest part of

the bride price when the girl eventually married. This man's wife would be in charge of the distribution of the body. If nobody had made the *maya hageya* payment, one of the father's brothers' wives would claim the body. The dead girl's sisters, cousins and mother were not allowed to eat part of the body as they were related by 'blood' to the deceased. It was the women who had married into the patrilineal lineage who ate the body. This included father's brothers' wives and their daughters-in-law, cousins' wives and aunts. The grandmothers on both sides could help eat the body. The *anugaro* would come, and the family would give small pieces of the body to them.

Transumption: subdivision and consumption of the corpse

Feruemue

The corpse was taken to a sugar cane, taro or banana garden of the deceased as a sign of respect for the food the deceased had contributed to the family when alive. The decision as to where the corpse should be dismembered was made by the parents or the brothers of the deceased. The body of the deceased was always dismembered in a garden that belonged to the family in case any

blood was spilt on the ground. It would have been disrespectful to the *ame* if blood were spilt on a non-family member's land. They believed that the *ame* would be delighted at the location chosen to dismember the body and would give *awamu* to the family members so they would raise fat pigs and plant successful gardens etc.

The body was placed on banana leaves covered with woven wild pandanus leaves. The children were allowed to stay and some had small bamboo knives, which they used to help cut up the meat, and then they cooked small pieces on the end of a small stick over the fire. As soon as the babies had teeth at around one year of age their mothers would feed them part of the body. As the body was cut up the meat was put on one side and the bones on the other. The meat was then cut into smaller pieces and the body divided up with the bones and given to the women. The meat was placed on wild greens in the women's bilums and taken to a place set aside for cooking the dead. This was a site about 50 metres away from the village palisade (defensive wall made of wood). The body was cooked at this location so that the pollution did not endanger the warriors. The men prepared bamboo tubes and three fireplaces for the women to cook at: one for the widow, one for the family and one for the affines.

All the women cooked their meat at this location, normally in bamboo tubes with wild greens or occasionally in an earth oven. Once the body was cooked the tubes were emptied onto wooden dishes or large breadfruit leaves. The meat was then shared and eaten by the women. When meat was handed to a woman it was placed on a banana or breadfruit leaf with wild greens. The place where the body was dismembered became the sepulture of the deceased. Any remaining meat at the end of the day was taken to the widow's house. During the night the meat was reheated on the fire and then the tubes were emptied onto wooden plates. All the women who had a right to eat the body and their children helped consume the body. They sang songs during the night to make the *tutumopa* happy and to tell it about the road to *aparu*. Women who were unrelated to the deceased might ask a participant for a small piece of meat and her request might be entertained, but she had no right to claim or to expect part of the body.

After cutting up the body the women washed their hands using sand at a riverbank. This also applied to the women after they had eaten the body. The small children were not required to do this.

Hahmo hamo e

During this ritual the fluids from the cooked meat were rubbed on the abdomen of a pregnant woman so the *ame* would transform the unborn child to have the same physical appearance as the deceased. The name of the deceased was given to the child when it was born even if they were of the opposite sex.

Waya masavene

The women and children rubbed the fluids from the cooked body onto their skin and ‘pulpuls’ so they would receive *awamu* from the *ame*. The participants requested the *ame* to protect them from sorcerers, and to help the children grow strong and to give them protection from sorcerers etc. This ritual was performed by the agnates and affines. Male children stopped participating in this rite at the age of 6.

Transumption of the head and spinal cord

Firstly, the hair was burnt off on a fire, and then placed on wild green vegetables with the ashes of the hair. The head was defleshed with bamboo knives and the meat and wild green vegetables were

cooked and eaten. The ashes of the hair were cooked in a separate bamboo tube with wild green vegetables. The brain was then shaken out through the foramen magnum, mixed with wild ferns and traditional salt, and finally placed in one or two bamboo tubes. Once it was cooked it was emptied onto a traditional dish. The brain was shared out amongst the women of the affines and agnates as it was regarded as delicious to eat. For this reason it was shared with the women of the family. The brain could only be eaten by women who had at least two children, and this rule was tightly enforced. The children were not allowed to see the preparation or eating of the brain, as the brain was soft and they believed that if the children ate it they would not grow up to be strong. It was forbidden to feed the spinal cord to children as this was soft like the brain, and the children would suffer the same effects. Women who had at least two children could eat the spinal cord. These taboos were handed down from the ancestors.

Sigi sugu huta negaine

There were two types of bones, the soft bones that were eaten with the meat and the hard bones that were eaten the following

day. The hard bones were put in old bilums and hung up in the house during the night when the remains of the meat were being consumed, or placed on the wooden dishes and covered with leaves so they were not touched by flies. In the morning the bones were placed by the fire and the soft bones eaten. The rest of the bones were crushed on a wooden plate covered with wild ferns with a flat stone on top and a round stone that was used to crush them. A pig was killed and the grease mixed with the bone dust and wild green vegetables, and then the mixture was cooked in bamboo tubes. The women who had eaten the body ate the bones and the children were also allowed to participate. The meat from the pig was eaten by the men. It might take up to two days to eat the flesh from the body and one day to eat the bones. All the bamboo utensils were then burnt on a fire where the body had been cooked. The hard bones that could not be crushed were placed by the sepulture.

Kogu ane kita gmategaune

This meant to remove the widow from the mourning house. Vegetables were prepared. When the earth oven was opened the leaves were placed at the entrance to the mourning house and the

women walked over these as they left the house. This was done out of respect and to start the purification process. Afterwards the widow was only allowed to collect wild greens from the bush and the other women kept her company and assisted her when necessary.

Inuya atregaune

This was the end of the official mourning and a pig was killed and prepared with wild animals and vegetables.

Rules surrounding participation in transumption

Warriors did not participate in transumption as it would have damaged their *awamu*, and they would not have been able to avenge a death or protect their families during wartime. Children did not have any *awamu*, and adult women's *awamu* was not regarded as important, so they were allowed to participate in transumption. The old women and men cut up the corpses as their *awamu* was already fading and would not be significantly weakened by the pollution of the body.

Children's participation in transumption

The boys under 6 participated in the transumption of males but not females. The boys under 6 ate to get more meat, and in the hope of gaining *imamu* and *awamu* from the deceased. The boys completely ceased to participate when they entered the men's house around the age of 6. They were not allowed to eat a woman, as it would have stopped them from growing into strong men. The women enforced this rule for the boys, but the girls were allowed to participate in the transumption of males and females. The children were not allowed to eat the brain, spinal cord and womb, and these prohibitions were enforced by the women.

Sometimes the boys ate the genitals of a female relative to gain the *imamu* of the deceased. They ate out of shame and the *ame* blessed them with the *imamu* as they were just children.

Women's participation in transumption

Ideally from the age of 9 girls attended feasts in other communities with their mothers. When girls entered menarche they still participated, but they soon ceased as this practice was

unsuitable for potential brides, so the women aged about 14 or more often stayed at home. A newly married woman might take part in transumption or might not; it depended on her husband's family, and if she was prohibited from doing so, this might continue till she had two or three children. The reason for this was that she might become polluted, and damage her husband's *awamu*.

When she had 2 or 3 children she would start to participate again, and when she was old she could eat the internal organs, spinal cord and brain.

Transumption of enemies

The Keiagana frequently ate the bodies of their enemies and this included those of men, women and children. As in the North Fore this was done to try and stop the fighting as the enemy would not be able to fight those who had eaten the body of one of their own. A woman who was related to the deceased would be in charge of transumption and distribution of the body and the women and children would eat it. After the fighting stopped compensation and other payments were made to the women who had consumed the body. No part of the body was returned to the family whilst the

fighting continued. Pigs were given to those who ate the body and this was called *amuse neya*, which means to bring peace.

The history of kuru

The first case of kuru is thought to have occurred in a woman from Uwami of the Havriyata clan. Kuru means to shake in both Fore and Keiagana languages. There were no stories about other outbreaks of kuru elsewhere, or previously in the kuru-affected region. During the Second World War, transumption was still practised, and it was only after the arrival of the kiaps that the practice started to be replaced by burial. In the Uwami area those who died of kuru were initially eaten but later they were buried, as it was feared that kuru sorcery was contagious. Gradually with the imposition of Australian law and the arrival of missionaries, the practice of transumption ceased.

Summary of cultural practices that may have affected the transmission of kuru

In the Keiagana, bodies could be disposed of by transumption, burial and sometimes by placing the body on a platform though this

was not a common sepulture. Transumption was by far the most common form of disposal.

Those who died of dysentery, yaws and leprosy were buried, but occasionally they were removed and eaten out of love. At the start of the kuru epidemic those who died of kuru were eaten, but later they were buried as the Keiagana feared that kuru was a contagious sorcery.

When a man died his body belonged to his mother's cousins' wives but in practice all the adult female affines claimed and received an equal share of the body. The deceased's wife's godmother also had an equal right to part of the body. His genitals and intestines were given to the widow who shared them with the female agnates and her 'poromeri'. The agnates received an arm or a leg, which was shared equally amongst them. The head was normally given to the wife of the man who had negotiated a wife for the deceased. Although those related to the deceased by 'blood', such as the deceased's sisters and daughters, were not meant to participate in transumption, in practice they took part. If an unmarried man died the same affines consumed his body and the

same agnates. His mother and sisters were not meant to consume part of his body as they had the same 'blood', but the rule was not followed.

When a married woman died the body was claimed by the cousins' wives who had a right to it but in practice all the adult female affines claimed an equal portion of their share. The godmother also received an equal share. The deceased's sisters were also given a small share of the body.

The family were normally given the head and an arm, and all the female agnates participated in transumption. An unmarried girl was meant to be consumed by the women who had married into the agnates and not by those related to the deceased by 'blood'. The dead girl's sisters, mother and cousins were not meant to participate in the transumption of her body; however, the grandmothers were allowed to, and as usual the rules were generally not followed.

The women and children rubbed the fluids from the cooked body onto their bodies for magical purposes during the obsequies.

Boys only took part in this ritual till the age of 6. Pregnant women also rubbed fluids from the cooked body on their abdomens in a separate ritual. Traditional wooden plates that belonged to the women were used during transumption and the women purified their hands with whatever materials they had available. Brain tissue was not intentionally rubbed on the bodies of the mourners.

Children started to participate in transumption from when they could chew and boys were only allowed to consume males. When the boys were 6 and underwent minor initiation they ceased to participate in transumption. Girls participated in the transumption of males and females.

The children were not allowed to consume the brain, spinal cord, genitals, uterus or internal organs and these rules were enforced by the women. The young boys sometimes ate part of a vagina in a secret ritual to receive *imamu*.

The children only participated in transumption in their own community and girls started to attend obsequies in other communities when they were 9. Soon after menarche the women

ceased to participate in transumption and they did not start again until they had 2-3 children. When a woman stopped having children she was allowed to eat the internal organs, brain, spinal cord and genitals.

Summary of the mortuary feast participants' exposure to central nervous system (CNS) tissue

Boys only ate muscle and fat from deceased males from the age of about 3 till 6 when they ceased to participate in transumption. Girls ate muscle and fat from deceased males and females. At the onset of menarche they were likely to be betrothed and they would cease to participate in transumption until they had 2 or more children. The brain and spinal cord were eaten by old women.

Chapter 7:

Ethnographic descriptions of mortuary rites and related practices in the kuru-affected region: peripheral linguistic groups and general summary

Introduction

The chapter contains detailed descriptions of transumption and related practices in the Kanite, Yagaria, Kamano, Usurufa, Auyana, Awa and Yate linguistic groups. Descriptions of alternative sepultures to transumption can be found in Appendix D, and

further information on social structure and rites of passage can be found in Appendix F.

Traditional mortuary rites amongst the Kanite

Introduction

The Kanite linguistic group consists of 9 villages in a small mountainous area. The first patrols entered the region in the late 1940s from Kainantu and they were followed by evangelists from the mission station at Raipinka. All the Kanite villages had cases of kuru (Gajdusek and Alpers, 1972).

Kanite / English glossary

<i>Kanite</i>	<i>English</i>
<i>haimu</i>	The soul similar to the western concept
<i>hawamu</i>	Simulacrum of the deceased but with magic powers
<i>haiyane</i>	The pollution from the decomposed body

<i>auneme</i>	A person's good nature
<i>tokea</i>	A person's aggressive nature
<i>tu'u maha</i>	Life force
<i>manu</i>	Abilities passed on to the children
<i>tusi</i> (ancestor)	Founding clan ancestor
<i>haiyamu</i>	Land of the ancestors

Kanite cosmology

The creation story

Humans were created in Manyavindi, which is a name used by the Fore and Keiagana; the Kanite call this place Agile. The ancestral clan spirit was called *tusi* and so was the sacred ground of the *tusi*. The *tusi* built a cordyline fence and then a house. He built five fire pits inside the house and placed an upright piece of bamboo in each one. The *tusi* then told the bamboo tubes to talk and a male and female *tusi* emerged out of each bamboo. According to the

Kanite each couple were the founding ancestors of the following linguistic groups: Kanite, Fore, Gimi, Auyana and Keiagana.

Kuriwamo was the name of the male *tusi* and Makorume the name of the female *tusi* who first populated the Kanite linguistic group. The founding clan was the Kimi clan and the junior clans are Agomo, Funi and Kigopa. The couple took seeds from the pine trees at Manyavindi and planted them as they walked to Eguamu where they built their house (this meant they marked the border of their land).

The seven souls of the Kanite

Five of the souls are the same as those described for the South Fore. These are: *haimu* is similar to the western concept of the soul, *hawamu* is a simulacrum of the *haimu* but has magical powers, *haiyane* is the dangerous ghost that consists of the decomposing body, *tokea* is the person's power, and *manu* their abilities. There are two additional souls in the Kanite: *tu'u maha*, which can be described as an animating life force, and *auneme*, which is the

person's good qualities and the opposite of the qualities which describe *tokea*.

Departure of the haimu to haiyamu

The *hawamu* of the ancestors came and took the *haimu* of the deceased to the *tusi* and then to *haiyamu*.

Transumption: rules for claiming and primary distribution of the corpse

History of transumption

In Kimigomo transumption had been practised since the time of the ancestors out of love and respect for the deceased. The bodies of those who died could be buried, placed on a platform, consumed, placed in a tree trunk or placed on a rock. These methods were used for men and women and the favourite means of disposal were transumption and burial. The bodies of those who were placed in sepulchres were sometimes removed and eaten out of love and respect. It was estimated that 70% of bodies were consumed, 20% buried in the ground, on rocks or in tree trunks, and 10% placed on platforms. Respected men and women were consumed as it was

considered disrespectful to allow worms or maggots to eat their bodies.

Bodies that were unsuitable for transumption

Those who died at the start of the 1943 dysentery epidemic were eaten, but when people realized that this was an epidemic they became afraid and buried those who died of this disease.

People who died of leprosy, yaws and kuru were not eaten as they feared that they were caused by contagious sorceries.

Rules for claiming and distributing a male body

The body of a man belonged to the affines, but half of the body was given to the family so they could inherit the souls of the deceased. The head belonged to the affines but it was often given to the family: they would mutually agree as to who would take it.

Whoever took the head would share it with the other women. The intestines and genitals were given to the widow and the other internal organs to either the widow or the older women from the affines and agnates.

On the affines' side, the senior mother's brother's wife was in charge of the dismemberment and distribution of the body. All the women of the affines could participate: this included the mother's brothers' wives, their daughters and daughters-in-law, the cousins' wives, and their daughters and daughters-in-law. The godmother of the wife of the deceased joined the affines and ate an equal share of the body.

On the family's side the deceased's man's sisters and daughters did not eat the body as they had the same 'blood' as the deceased. One of the deceased's brother's wives was in charge of the dismemberment and distribution of the family's share of the body. The daughters-in-law would eat with their children, and so could a daughter's children. As long as the participants were once removed from the deceased they were no longer regarded as having the same 'blood'; as they had a different father they could participate.

The widow shared with her 'poromeri', her brothers' wives, her sisters, and all their children and daughters-in-law. Her cousins' wives would also come with their children and aunts.

If a boy or young man died the distribution of the body was the same as for an adult man.

Rules for claiming and distributing a female body

Half of the body went to the family and half to the affines; the head, internal organs and vagina were taken by the deceased's senior brother's wife. On the affines' side, only the deceased's sisters were not allowed to eat. On the family's side, the husband's sisters and the deceased's daughters did not participate.

If an unmarried woman died the body belonged to the family; a sister-in-law would be responsible for cutting up the body and she would receive the head, internal organs and vagina. She would share with the women who came as guests and the other women in the family.

Rules surrounding participation in transumption

Warriors did not participate in transumption as it would have damaged their *manu*, and they would not have been able to avenge a death or protect their families during wartime. Children did not

have any *manu*, and adult women's *manu* was not regarded as important, so they were allowed to participate in transumption. The old women and men cut up the corpses as their *manu* was already fading and would not be significantly weakened by the pollution of the body.

Children's participation in transumption

Very young children did not participate in transumption, but by the age of 2-3 they started to participate in transumption in their own and other communities. As soon as the children could eat solids they started to participate in transumption. The mother would chew the meat in her mouth first and then give it to her child. Children of both sexes were allowed to eat males and females. The children ate the parts that their mothers gave them with exceptions listed below. When a boy entered the men's house at the age of about 6-7 he was no longer allowed to participate in transumption. Children were not allowed to eat the brain and spinal cord as they were soft foods and it was believed that they would stop the children from growing properly. The internal organs and uterus were never given to the children to eat; they were always eaten by the old women. An

aggressive male child was sometimes given the deceased's vagina to eat in the hope that it would make him a great warrior.

Women's participation in transumption

As soon as a woman had her first period she was no longer meant to participate in transumption and this remained in force till she had 2-3 children. The young women and their mothers were afraid that the men would regard her as polluted if she continued to participate in transumption, and thus an unsuitable bride. This rule was followed by some families and not by others. A newly married woman might take part in transumption or might not; it depended on her husband's family, and if she was prohibited from doing so, this might continue till she had 2 or 3 children. It was only when a woman had 3-4 children that she was allowed to eat the internal organs, brain and spinal cord.

Transumption: subdivision and consumption of the corpse

Masave flemina

The body was normally cooked in bamboo tubes and the fluids in the tubes were rubbed on the bodies of the participants to give them protection from sorcerers and for *manu* from the *hawamu*. This ritual was called *masave flemina* (to rub liquid on the body for protection) and was performed by adults and children who attended the feast. Once the boys entered the men's house they were no longer allowed to participate in this ritual, and girls stopped participating after menarche. The blood and brain were not rubbed on the body as a sign of mourning when the body was dismembered.

Pregnant women also rubbed the fluids on their abdomens in a ritual called *tokiya foresaya* (*andagosa* in South Fore) so that the newborn would have the physical characteristics or similar personality to the deceased.

Possible parenteral inoculation of participants and cross-infection during mortuary feasts

Hands were cleaned after the dismemberment of the body using fragrant leaves, lemon grass and water from a stream. After the body had been eaten the hands were washed at a stream and cleaned with scented flowers. The children would wash their hands at the same time as their mothers.

Traditional wooden plates were used at the obsequies and cleaned with water. The bamboo knives and tubes used during the obsequies were placed under a tree or at the sepulture and were not burnt.

Waya nemaine

The dead could be dismembered in the men's house, or in the deceased's garden; an enemy relative was dismembered where he had been killed and the body carried back to the village.

A leader's body was dismembered in the men's house by two senior old men. One would be from the affines and one from the agnates. When the corpse was dismembered all the men were

present. The body was placed on banana leaves and breadfruit leaves and the body divided into two piles. The men would take the meat from the thighs and upper arms and the rest of the body was given to the women for the purpose of transumption. The older men would consume the meat with wild green vegetables cooked in bamboo tubes in the men's house, and this made the younger warriors angry and impatient to avenge the death. Once the body was eaten the warriors would set out to avenge the death. After the body was eaten the *hawamu* gave the deceased's *tokea* to his 'poroman', brother or son to help avenge the death. Afterwards the *tokea* returned to the *haiyane* and was inherited by the deceased's son. The men cleaned their hands the same way as the women after dismembering the corpse and after transumption. Since the deceased was a leader, out of respect his body was dismembered in the men's house and this ensured that the *tokea*, *haiyane* and *hawamu* assisted in avenging the death.

Other bodies were taken to a sugar cane, banana or taro garden and placed on a bed of banana and breadfruit leaves with wild ferns on top. The old men and women of the family and affines would dismember the body. The body was dismembered by cutting it at

the waist, and then the rest of the body was dismembered. The body was normally cooked in an earth oven. After the cooked food was removed from the oven it was cut up into smaller pieces, and then placed on breadfruit leaves and given to the mourners.

The internal organs were eaten by the old women who cooked them in bamboo tubes with wild greens. The intestines were cut up and cooked with wild green vegetables in bamboo tubes and then eaten. The head was cooked in the earth oven and given to the widow. The head was defleshed and the brain shaken out through the foramen magnum and mixed with wild greens and cooked again in bamboo tubes. The meat and soft bones were all eaten on the first day and if there was any left over it was carried back to the mourning house and eaten during the night. The meat was re-cooked in bamboo tubes and shared with the other occupants. The head and bones were hung up in the mourning house until the next day.

Unrelated women who attended the feast were given a small piece of the body to eat as they came to mourn the deceased and it was disrespectful not to give them part of the body.

Ayanfa nemaina

On the second day the bones were ground into dust so they could be eaten in an obsequy called *ayanfa nemaina*. A flat stone from a river covered with breadfruit leaves with wild green vegetables on top was prepared, and the bone put on top, covered with more wild green vegetables and crushed with a round stone. It was the old women of the family who ate the bones in the widow's house and it took one or more days to consume the bones.

Ken toha kiya agamaintena

The women remained in the widow's house for one to two weeks until transumption was completed. They came out during a ritual feast called *ken toha kiya agamaintena*. The women who had not participated in transumption prepared this feast of vegetables for the widow and the women who had supported her during her mourning seclusion, and for those who had participated in transumption.

Hagifiya

This was the mourning period during which wild greens were eaten, and normally lasted for up to a month. As the grief lessened *hagifiya* came to an end. The *haiyane* remained in the wombs of the female affines who ate the body.

Hagomegimini

This feast marked the end of *hagifiya* and would take two to four weeks to prepare. It was similar in function to the *aluana / aindu* of the South Fore. The men from the family and affines collected wild meat that was smoked and preserved in the men's house. At the time of the feast the meat was washed, wrapped in garden greens and placed in an earth oven and cooked. Those who ate the body were given the food for purification and to remove the *haiyane* from the wombs of the affine women who had eaten the body. At the end of this feast the *haiyane* and *hawamu* departed to *haiyamu* where they joined the *haimu* and became an ancestor, as long as head pay had been given to the affines. Sometimes this feast was included in *kiya agamaintena*. The strong bones were left

hanging in trees and on fences and later these might be buried in the sepulture.

Transumption of enemy relatives

This kind of transumption was practised to bring about peace with the enemy, as they could not fight a clan who had eaten their dead. It was normally a sister or other female relative of the deceased enemy who was in charge of the transumption of the corpse. The family returned the deceased's head with a pig to the enemy warrior's family. The family would then compensate the women who ate the body with pigs.

Summary of cultural practices that may have affected the transmission of kuru

Corpses were placed in a tree trunk, on a rock, on a platform, buried or consumed in the Kanite. It was estimated that 70% of bodies were disposed of by transumption, 20% by burial in the ground, in tree trunks or on rocks, and 10% placed on platforms.

Those who died of dysentery, leprosy, yaws and kuru were not eaten as the Kanite thought that these illnesses were contagious.

A man's body was claimed by his mother's cousins' wives, but all the other adult female affines also claimed part of the body and received an equal share. The affines gave half of the body to the agnates, and the head was taken by either party depending on what they agreed. The intestines and genitals were given to the widow, and the other internal organs were either given to the widow if she was old, or divided up amongst the elderly women of the affines and agnates. The widow shared with her cousins' wives, brother's wives, sisters and 'poromeri'. The godmother received an equal share as the other female affines. If a boy died the body was divided as for a man.

When a married woman died the body belonged to the deceased's cousins' wives, but all the adult female affines would claim part of the body. They also took the head, genitals and all the internal organs. Half of the body was given back to the agnates. The deceased's daughters, sisters and husband's sisters were not meant to take part in transumption. If an unmarried woman died the body was divided amongst the adult female agnates and the sister-in-law responsible for dividing the body took the head, internal organs and

vagina. The body was shared with the other women who came to mourn the deceased.

Children started to participate in transumption at the age of 2-3 when their mothers placed chewed meat in their mouths for them to eat. The children were allowed to attend obsequies in their own and other communities, and participated in the transumption of men and women. Boys ceased to participate in transumption when they entered the men's house after the minor initiation at the age of 6-7.

The brain, spinal cord, internal organs and uterus were not given to the young children to eat and this rule was enforced. A male child would eat part of a vagina for ritual purposes once or twice in his lifetime.

Fluids from the cooked body were rubbed on the bodies of the mourners for magical purposes. Boys participated until they were aged 6-7 and the girls till menarche. After this the boys did not participate again and the girls only when they were allowed to participate in transumption again after bearing children. The blood

and brain tissue were not rubbed on the body as a sign of mourning. Pregnant women rubbed fluids from the cooked body on their abdomens during *tokiya foresaya*.

The women and children purified their hands with leaves, lemon grass and water after transumption. Traditional wooden plates that belonged to the women were used during the obsequies.

When a warrior died the old men consumed meat from the arms and thighs of the deceased in the men's house and the rest of the body was given to the women.

Summary of the mortuary feast participants exposure to central nervous system (CNS) tissue

Boys took part in transumption from the age of about 3 till they were 6 when they ceased to participate. Girls took part in transumption until menarche when they stopped until they had at least one child. The children were not allowed to eat CNS tissue and this rule was followed by the women. Only the old women ate the CNS tissue.

Traditional mortuary rites amongst the Yagaria

Introduction

The Yagaria inhabit the area to the north and east of Mt Michael and are part of the Yagaria and Faiyantina census divisions. Traditionally they had no name for themselves or their language and their name derives from the people to the north of them. There are 6 dialects of Yagaria one of which is called Frigano. The Yagaria border the Yabiyufa, Bena Bena, Kamano, Yate, Keiagana, Gimi, Elimbari and Siane language groups. There are three Yagaria villages in the Keiagana: Aneiga 1 and 2 and Yagaria-Yagusa. There are also hamlets of Yagaria people in the North Fore villages of Agayagusa and Yagusa who maintain relations with communities in the Yagaria (Gajdusek and Alpers, 1972). Since 1957 six Yagaria villages have had cases of kuru and two others have a history of kuru in the past.

Yagaria / English glossary

<i>Yagaria</i>	<i>English</i>
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<i>tutumopa</i>	The soul similar to the western concept
<i>amu</i>	Deceased's abilities which are inherited
<i>leyane</i>	Person's occult power
<i>aune vha</i>	Simulacrum of the <i>tutumopa</i> but more powerful
<i>haiyana</i>	Harmful soul from the decomposing body
<i>konolu</i>	Land of the ancestors
<i>banu</i>	Blessing that increases a person's <i>amu</i>
<i>negi</i>	Sacred clan ancestor

Yagaria cosmology

The creation story

The Yagaria *negi* had the form of a giant python and lived in a cave in Dakipa near Nupuru. One day the python ate a pig and returned to its cave and coiled itself around its own excrement. The excrement became full of maggots and these gradually changed into the first male and female *negi* from whom the Yagaria were

descended. The male *negi* was called Masina and the female *negi* Kumo. Pythons are regarded as sacred by the Yagaria and are not hunted. The myth suggests a link between creation: from excrement to maggots and finally humans with the reverse process at death. All the cosmologies in the kuru-affected region tell of the formation of humans from the *negi*; and mortuary rituals are about their return to the *negi* and the land, and their rebirth as ancestors.

The five souls of the Yagaria

Tutumopa

Tutumopa is described as:

“They way we think and talk.”

“What we think and do.”

“Whatever we think and do.”

The *tutumopa* departs on the last breath of the dying person and resides at the deceased’s favourite garden or creek, and finally in *konolu* (the land of the dead) after the completion of the obsequies.

Leyane

Leyane was the aggressive side of a person's character and was described as the power of their *amu*. If the deceased possessed *leyane* it was temporarily transferred to a warrior from the family to help avenge the deceased's death. The warrior held the arrow that had killed the deceased and the *leyane* was transferred to him. The chosen warrior then avenged the death by killing an enemy warrior of equal status. Afterwards the arrow was returned to the hand of the deceased and the *leyane* transferred back to the corpse. Later the *leyane* transferred to the deceased's son or another close male relative. Although *leyane* had a separate name it was incorporated and transferred with *amu*. Women did not have *leyane* to pass on to their children. During male initiation some of the initiates would receive *leyane* and *amu* from the *negi*.

Amu

Amu is the name of a person's abilities passed on to one of the deceased's children after death. A man's *amu* was normally inherited by a son and a woman's by a daughter. This type of *amu* can be described as domestic, and there was another form known as

wild *amu*. Wild *amu* was received by initiates during the initiation ceremony from the *negi*. The males undergoing initiation would hallucinate under the effects of a tree bark they had consumed and experience a vision of an animal, tree, flower or other living creature, which became their *amu*. This creature became the link between the warrior and the land through the *negi*, and when the man died his spirit familiar that represented his wild *amu* also died. If a man saw a cassowary it symbolized that he would be a fast walker and a great warrior. A cassowary's behaviour was compared to a thunderbolt and this was why it was symbolic for a warrior. If a man saw a possum he became a great hunter etc. A man never ate his own spirit familiar. Women received *amu* from their dead relatives and possibly from the *negi*. They might receive wild *amu* from the *negi* on the night before their marriage when they underwent a rite of passage into marriage.

The blessings of a dying man given to his children were called *banu*. These blessings took the form of *amu* which would give some ability to the recipient. Sometimes the family members experienced a dream as their parent was dying and this would be interpreted as

receiving *banu*. These kinds of blessings were commented on in retrospect.

Aune vha

Aune vha is a simulacrum of the deceased which has magical powers used to assist the family during the obsequies. It told people in distant villages that the person had died by appearing in their dreams. The aune vha transferred the amu to one of its family members, which gave them new abilities such as raising pigs successfully, or becoming a good hunter etc. It also blessed mourners with amu, and this was an important reason for transumption in the Yagaria.

Haiyana

Haiyana is the name of the soul that can harm the family members if they do not perform the obsequies correctly.

Departure of the souls to *konolu*

When a man died the souls of the ancestors came and comforted the souls of the deceased. The *tutumopa* departed at death to

konolu accompanied by the *aune vha* of his ancestors. The *aune vha* and *haiyana* of the deceased departed after *apuwa kitute* or *ivona* to join the *tutumopa* in *konolu*.

Methods for the disposal of a body

There were four ways of disposing of a body in the Yagaria: burial in the ground, burial in a cave, placing on a platform and transumption. Transumption was the favourite means of disposing of a body and those bodies that were disposed of in other sepultures were sometimes removed and eaten out of love. A man often told his family where he wanted his body to be disposed of before he died. The interviewees estimated that 80% of bodies were consumed, 15% buried or placed in caves, and 5% put on raised platforms.

Transumption: rules for claiming and primary distribution of the corpse

History of transumption in the Yagaria

According to the Yagaria the custom of transumption came from the ancestors. All the surrounding linguistic groups practised transumption of their dead; the bodies of enemies were eaten by

women from the dead man's clan who consumed the body out of love and to bring peace.

Bodies that were unsuitable for transumption

The corpses of those who died of dysentery, yaws and leprosy were not consumed. There were cases of kuru in Daginava (this is the village where the interviewees came from) in the Yagaria, but they were not eaten as the inhabitants thought the sorcery might be contagious, so those who died of kuru were buried. Most of the women who developed kuru in the Yagaria married in from the Fore and Keiagana linguistic groups, according to the interviewees.

Rules for claiming and distributing a male body

The senior mother's brother's wife was in charge of dismemberment and distribution of the body, which was carried out by the older affine men and women. The body belonged to the affines and the family asked them for part of the body. They enforced their claim by saying that they had paid for the deceased's blood when they bought his mother, and were therefore entitled to receive part of the corpse. The body was divided in half and shared

between the family and affines; the head, internal organs and genitals were given to the widow who shared these with her 'poromeri', female agnates, and lastly with her brothers' wives on the affines' side.

All the female agnates participated in the transumption of the body, except the dead man's sisters, who did not always consume part of the body: it depended on their reaction to the death. The rule of not eating the same 'blood' also applied in the Yagaria, so technically sons, daughters and sisters should not have eaten the body, but in some circumstances they did eat part of the body out of love, grief and to ensure that they inherited the *amu*. The widow was not regarded as having the same blood as her husband so she could participate. The *heugukipato* (the deceased's wife's godmother) also had a right to part of the body and she received an equal share as the other women. Occasionally an old man would also participate in transumption.

Amongst the affines, the mother's brothers' wives participated if they were still alive. The wives of the mother's brothers' sons and

the cousins' wives took part. The widow's brothers' wives participated and normally ate with the agnates.

Few men participated, and if they did, they were elderly and only ate meat or fat from the body.

The *aune vha* gave *amu* to those who ate the body: on the affines' side it was received by one person and on the family side by several. The domestic *amu* and *leyane* of the deceased would go straight to his favourite son who was normally the oldest.

If a man died the affines ate the testicles, and the penis was given back to the family. One of the deceased's sons wore it, as the Yagaria believed that the *leyane* of the deceased was inherited by the wearer and would make him a fierce warrior. If the deceased was not a skilful warrior then the penis was given to his widow to consume.

The rules of ownership and division of the body of a married man, unmarried man and boy were the same.

Rules for claiming and distributing a female body

The body was claimed by the man who made the biggest contribution to the 'bilas' given to the husband's lineage when the deceased married. The body belonged to the affines, but they gave half to the family, and kept half of the body, the intestines, internal organs and the head. Sometimes the head was given to the agnates; especially if they complained that they had paid bride price so the head belonged to them. If this happened, the head was taken by a sister-in-law and shared amongst the female agnates who were allowed to participate. The deceased woman's sisters and daughters were not meant to eat part of the body as they had the same 'blood' as the deceased. The deceased's agemates did not participate out of respect for the deceased. All the women with a right to the body received an equal-sized piece of the body on a breadfruit leaf.

If a girl or unmarried woman died the body belonged to the family and was consumed by the cousins' wives, aunts and their children. Her sisters, agemates and female cousins were not meant to consume part of her body. The body was eaten by the women who

had married into the patrilineal line and not by those directly related to her by 'blood'.

A woman's genitals were eaten by a warrior from either the family or affines to receive *leyane* and *amu* from the deceased.

Rules surrounding participation in transumption

Children's participation in transumption

As soon as children had teeth their mothers gave them meat to eat; by chewing it first it was soft and easy for the children to swallow. The children were allowed to participate in the transumption of male and female bodies. The internal organs, genitals, brain and spinal cord were not meant to be eaten by children. The brain and spinal cord were regarded as soft food and would damage the growth of the children who ate them. The internal organs were regarded as having too much blood in them and this would also have damaged the growth of the children. Ideally, children should not have participated in transumption at all, or at the least they should have followed the prohibitions. The

boys were allowed to participate in transumption until they were aged 6-7, and the girls till menarche.

Women's participation in transumption

When a woman had her first period she was not allowed to continue to participate in transumption. This was to ensure that when she married she would not damage her husband's *amu* with pollution from the practice of transumption. When a woman had three or more children, she was officially allowed to participate in transumption again, but it was the family who decided when she could start to participate. If the women participated in feasts in other communities, they still followed the rules of their husband's patrilineage. The brain, spinal cord, internal organs and intestines were meant to be eaten only by the old women.

Transumption: subdivision and consumption of the corpse

The body was placed on wild green vegetables, on breadfruit leaves on top of banana leaves. The family and affines were present when the body was dismembered, but the children were not allowed to stay nearby when it happened. The women with at least three

children held the parts of the body they wanted to claim, and after some arbitration by the senior woman in charge of the process they proceeded to dismember the corpse. The older women hid the genitals and intestines from the younger participants who were not allowed to see them. The faeces was secretly removed from the intestines and later eaten by the widow and older women of the agnates. The body was heaped into two piles: one for the affines and one for the agnates. The older women then cut the meat into small pieces and cooked it in bamboo tubes with wild green vegetables on two fires, one for the family and one for the affines. The place where the body was dismembered became the deceased's sepulture. Once the contents of the bamboo tubes were cooked they were emptied onto traditional wooden plates covered with banana and breadfruit leaves.

The older women cut the meat into even smaller pieces, which were then placed on cooked wild green vegetables on a banana or breadfruit leaf, and given to all those who had a right and wanted to participate in transumption. The women ate the meat with their hands to show that they and their families had not been involved in a sorcery-related death. If a woman did not eat part of the body the

other participants might suspect that one of the woman's male family members was involved in the death through sorcery. A mother fed her small child by placing the chewed meat directly into its mouth, and the older children were allowed to hold the meat and eat it. The children also cleaned their hands in the same way as their mothers after taking part in transumption.

The cartilage was eaten on the same day as the meat. If any meat remained at the end of the day the women took it back to the mourning house and reheated it and ate it during the night. The bones were hung up in the mourning house during the night and in the morning the women returned to the same fireplaces with the bones. The bones were wrapped in wild greens and crushed between stones taken from a river bed, and the dust was cooked in bamboo tubes with wild green vegetables and traditional salt. The older women ate the bones as they feared children might choke on them.

The head was eaten on the second day. Firstly, the skull was defleshed, the skull broken open with a stone, and the brain shaken out onto a plate and mixed with wild green vegetables by hand. It was then placed in two bamboo tubes and cooked. It was meant to

be eaten by the widow and the old women; however, it tasted delicious and was quickly consumed by the women. The cranium and the jawbone were kept by the family for their connection with the *aune vha*. The rest of the skull was buried where the body had been dismembered, which was the deceased's sepulture.

Possible parenteral inoculation of participants and cross-infection during mortuary feasts

Flagava

The fluids from the cooked body were rubbed on the bodies of the women and children who participated in transumption to give them protection from sorcerers and for other blessings that were received from the *aune vha* during the obsequy. The children ceased to participate in *flagava* when the boys entered the men's house, and the girls reached the same age (6-7 years). The women started to participate again when they had three or more children.

Hamihama

A pregnant woman rubbed the fluid from the cooked body onto her abdomen in the hope that the child would take on the physical

characteristics of the deceased. The *aune vha* would change the unborn child so it would have the same appearance as the deceased, and this was commented on as the child grew up.

Cross-infection

Traditional wooden plates lined with banana and breadfruit leaves were used during the feasts. The plates were cleaned with pig grease not water, since regular contact with water caused the plates to rot.

The women who dismembered the corpse cleaned their hands with fragrant leaves in a stream to remove the pollution of the corpse. This procedure was repeated after the women and children had eaten the body. The leaves and flowers used for purification were burnt on a fire with the bamboo tubes and knives after the body had been consumed. Blood and brain were not rubbed on the body as a sign of mourning.

Mortuary rites after the transumption of the body

Koglapa

This was the name of the rite where the women rubbed white clay on their bodies. When the women left the widow's house and participated in *havli* they removed the white clay that symbolized mourning from their bodies.

Havli

This feast was performed after the body had been consumed and compensated the women who participated in transumption.

Hagomea dota begune

This was the mourning period when wild green vegetables were eaten by the family and their guests. It started after *havli* and lasted for 1-2 months finishing with *ivona*.

Ivona

This feast marked the end of the public mourning period and consisted of wild animals cooked and then smoked in the houses. Many of these animals were used first in divinations to find the

sorcerers responsible for the death, and then smoked so there was adequate wild meat for the feast. This mortuary rite also freed the widow from the *haiyana* and *aune vha*, which departed to the sepulture after *ivona*.

Summary of the cultural practices that may have affected the transmission of kuru

In the Yagaria a body could be disposed of by transumption, burial, in a cave or on a platform. It was estimated that 80% of bodies were consumed, 15% buried or placed in caves and 5% placed on raised platforms. Those who died of dysentery, yaws and leprosy were not consumed. Those who died of kuru were buried as the people believed that kuru was contagious. Most of the women who developed kuru in the Yagaria had married in from the North Fore.

The body of a man belonged to his mother's cousins' wives but all the adult female affines claimed part of the body and received an equal share. The affines kept half the body and gave half to the agnates, and the widow was given the head, intestines and genitals. The widow shared with her 'poromeri' and her brothers' and cousins' wives. All the female agnates participated in transumption

except the deceased's sisters, daughters and mother; his sons took no part if they were still uninitiated. However, this rule was not always followed and female agnates would often participate with their children for magical purposes. The godmother also received a share equal to that of one of the affines. There was the occasional elderly male who participated in transumption who would eat only muscle or fat. An unmarried man's or boy's body was divided in the same way.

A married woman's body was divided in half between the agnates and the affines, who also received the intestines, internal organs and the head. Sometimes the agnates took the head: it depended on the two groups of women working out an amicable agreement on how the body should be divided. The dead woman's daughters and sisters were not meant to eat part of the body, but as explained previously this rule was often ignored. Her agemates were also not meant to participate in the transumption of her body out of respect for the deceased. If an unmarried girl died her body was consumed by her cousins and aunts and their children. Her sisters and 'poromeri' were not meant to participate in the transumption of her body.

As soon as a child could chew a mother would give her child some meat that she had already chewed. The children took part in transumption of men's and women's bodies with their mothers. The children were not meant to be fed the brain, spinal cord, intestines or internal organs. Boys continued to participate until they were aged 6-7 and girls until menarche.

A woman did not participate again until she had 3 or more children, or when her husband's family decided that she could do so. The brain, spinal cord, intestines and internal organs were all meant to be eaten by the old women.

All the female guests at the obsequy were given a small piece of the body to eat. Small children were fed from the end of a stick and the older children and women ate with their hands. The women rubbed fluids from the cooked meat onto their bodies and those of their children for magical purposes. The boys ceased to participate in this ritual when they entered the men's house and the girls at the same age; however, the women started to participate again when they had 3 or more children. A pregnant mother rubbed the fluids on her abdomen for magical purposes in a ritual called *hamihama*.

Traditional wooden plates were used during the obsequies, and the women washed their hands with fragrant flowers and water after transumption. Blood and brain tissue were not rubbed on the bodies of the mourners.

Summary of the mortuary feast participants exposure to central nervous system (CNS) tissue

Children started to participate in transumption around the age of 3 with boys stopping at about 6 and girls at menarche. Women started to participate again when they had 3 or more children. The CNS tissue was eaten by the old women.

Traditional mortuary rites amongst the Usurufa

Introduction

The following data were collected from residents of Osená, which is an outlier in the Auyana linguistic group adjacent to the 4 Usurufa villages. The language is very similar to the Usurufa language, and the culture of this small cluster of villages was the same.

Usurufa / English glossary

<i>Usurufa</i>	<i>English</i>
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<i>auyananei</i>	Soul similar to the western concept
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<i>tima</i>	Simulacrum of the <i>auyananei</i> but more powerful
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<i>kwata</i>	Ghost from the decomposition of the body
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<i>akona</i>	Aggressive side of the character
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<i>ama</i>	The deceased's abilities
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<i>kwata valei</i>	Land of the dead
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mani Founding ancestral clan spirit

Usurufa cosmology

The creation story

The *mani* population increased in Manyavindi (as explained in the South Fore myth about the spread of the *amani* population), and then the sacred clan guardians moved into the surrounding areas. Yeoawo, the clan guardian for the Usurufa, travelled up to Asendi, which is the name of a stony hill with a cave, near to Asempa village in the Auyana.

Yeoawo was the mother of a python and a flying fox who went to a dance at Kovindi, a rocky hill with a plateau on top (which is near Arora in the Auyana), where two female humans lived. The *mani* changed into human form when they arrived and after dancing with the two women they married. Later, they changed back to their *mani* forms on top of the plateau and the two women were not frightened, and told their *mani* husbands that they were happy to remain with them. So the python and the flying fox took their wives to their caves in Asendi where they lived.

Later, the python's wife became pregnant, and gave birth to four humans and a python. Then she gave birth to all the insects, and the python and his wife put them in a bilum, tied up the top, and hung it up on a hook in the cave, as they were frightened the insects would be burnt in their fire. One day the python's mother-in-law came to see the insects, and when she opened the bilum the insects took off and some were burnt in the fire. Yeoawo rescued the surviving insects and put them back in the bilum, and then sent the mother-in-law to Kovindi with some sweet bananas with instructions to eat them when she reached home. When the python and his wife returned from their garden Yeoawo told them about the unfortunate accident. The python was furious and chased after his mother-in-law. On her way home the mother-in-law became hungry and ate the bananas as she walked on the track. Finally the python caught up with her and ate her. His wife knew what would happen so she cooked some green vegetables in a bamboo tube and a stone in an earth oven. The python returned home and told his wife what had happened, and she told him not to worry and to eat the food she had prepared. When the python was not looking she wrapped the stone in the green vegetables and placed it in the

python's mouth and he swallowed it. She then told him to drink some water so the food would not stick in his throat, and as he did so the water turned to steam and cooked the python. The python fell down the hillside, and as he fell ditches appeared in the landscape, until eventually he landed in the Taivapa River. Yeoawo was not aware of her son's death and when she could not find him she told her daughter-in-law to accompany her to find him, and when they did find him, he was dead. They returned back to the cave and collected all their bilums, and went back to the corpse and cut it up, and placed the parts in their bilums. The daughter-in-law asked Yeoawo what she should do, after confessing what she had done, and Yeoawo told her that she had committed a grave mistake and should help her carry her son's body to Tauna. As they walked they threw pieces of the python's body out of their bilums, and the pieces symbolized the different linguistic groups, and when they arrived at Iwaki in the South Fore the python's heart was thrown out of the bilum. They continued around the South Fore and Gimi, then to Chimbu, and on to the coast. This story was considered to explain the origin of human populations in PNG and the rest of the world.

The five souls of the Usurufa

Auyananei

The *auyananei* was the soul of the deceased, and similar to the western concept of soul. It departed to *kwata valei* once it had been forgiven by the living affines for any transgressions the deceased had committed during his life. This happened when the *auyananei* appeared in the dreams of the living and brought peace between them. When a man was dying he would say that the ancestors had come to escort him (his *auyananei*) to *kwata valei* (the land of the ancestors).

Tima

The *tima* was a simulacrum of the *auyananei*, but also possessed extraordinary powers that were used to assist the living family members. The *tima* helped expose sorcerers, helped avenge a death and enlarged food presentations. When the official mourning was over those close to the deceased could still communicate with him or her through the hair and bones of the deceased that were worn around the neck and acted as a portal to the *tima* in *kwata valei*. Gradually as memories of the deceased faded the connection

with their *tima* was lost and the deceased's help was no longer summoned.

Kwata

The *kwata* was the dangerous soul formed from the decomposition of the body. After transumption the *kwata* remained inside the female affines until after *musane*, the mortuary ritual that removed the *kwata* to the sepulture.

Akona

The *akona* of the deceased was the power of his *ama* which was inherited by one of the deceased's children during the mortuary rituals.

Ama

The *ama* was the deceased's abilities, which were passed on to one of the deceased's children when a man or woman died.

Transumption

Not all the dead were consumed: roughly 60% were buried, 30% consumed and 10% were either placed on a platform or between the buttresses of a tree. This was the same for men and women, except that women were not buried between the buttresses of a tree; this rite was exclusively for males.

The men and women had to have at least two children before their bodies were disposed of by transumption. The bodies of the adult men and women were consumed out of grief and to stop the worms or maggots from consuming the body. Men who were not greatly respected by the community were normally buried. The bodies of fight leaders and other respected men were placed on platforms in a domestic pandanus tree, between the buttresses of a tree or disposed of by transumption. Women's bodies were normally buried or consumed. Children were always buried, as the Usurufa did not like to dismember the body of a child whose life had been cut short.

Transumption: rules for claiming and primary distribution of the corpse

History of transumption

The tradition of transumption in the Usurufa, Keiagana and Fore was believed to have come from the ancestors. Transumption ceased at the end of the Second World War as the Usurufa came under government control.

Bodies that were unsuitable for transumption

Those who died of dysentery, yaws, leprosy, kuru and any other strange diseases were all buried, as these forms of sorcery and disease were considered contagious.

Rules for claiming and distributing a male body

A man's body belonged to the affines and one of the mother's brothers' wives was in charge of dismembering and distributing the body. Normally, no part of the body was given to the family or the widow, as the Usurufa believed that the *kwata* would remain with family participants forever if they took part in transumption.

However, in some cases the deceased's head was returned to the

family and consumed by the female agnates. The female participants were meant to have at least two children before they took part in transumption. The distribution of the body amongst the affines followed the rules of head pay, and bride price, with the wives of the cousins all receiving an equal share of the body.

Rules for claiming and distributing a female body

If a woman died the body belonged to the affines and it was shared amongst the cousins' wives and aunts following the rules of bride price. Her body was meant to be eaten by old women who had white hair and it was forbidden for the young to eat women's bodies, as they were full of pollution. The very old women ate them as their *ama* and their husbands' *ama* were already dissipating, and therefore it did not affect the clan security if they ate the body. The head was normally given to the deceased's brothers' wives who consumed it amongst themselves.

Rules surrounding participation in transumption

Children's participation in transumption

Children started to participate in transumption when they were old enough to run around and chew meat. The babies, aged 0-3, did not take part in transumption as it was feared that the *kwata* would harm them. The boys were meant to be fed muscle from males, never females, and they ceased to participate in transumption when they became initiates at the age of about 6. The girls were also allowed to participate under the same prohibitions as the boys.

The children were not allowed to go with their mothers to participate in transumption in other communities as the family feared that the children might be killed by sorcerers, or in an ambush by enemies, or that their participation would damage their growth.

Women's participation in transumption

When a girl was aged 9 or older she would start to attend feasts in other communities with her mother, and she would participate in

transumption. Women did not cease to participate in transumption at menarche. There were a small number who chose not to participate and they were free to make their own decisions. Some women ceased to participate in transumption when they were married as they feared the *kwata* would make them barren. The decision to allow a woman to participate in transumption was made by her husband and his family. If a woman's husband was a key warrior in the community she was less likely to participate in transumption as it was feared that the pollution of his wife's transumption might damage his fighting ability and endanger the community. When a woman had 2 or more children she was traditionally allowed to participate, and when she had 4-5 children she was allowed to eat the internal organs, spinal cord and the brain. The other female guests who attended the mortuary rites did not participate in transumption unless they were entitled to through kinship with the deceased.

If a woman returned to her community of origin in another linguistic group she would be likely to follow the rules of the affines out of respect. So a woman married into the Usurufa from the North Fore would return home and participate in transumption. She still

relied on her brothers' support if she had a dispute with her in-laws and also needed their support to find wives for her sons. When she participated in transumption she showed her love and affection to her dead male family member and she and her children might receive a blessing from the *tima* of the deceased. Usurufa women who married into the Auyana, who did not eat their dead, were buried in their husband's village and the affines did not eat her body when she died out of respect for the agnates. This rule also applied to any of her children.

Transumption: subdivision and consumption of the corpse

Oma omnika

Oma omnika was the name given to the mortuary practice where the body was consumed. The women entitled to claim part of the corpse did so by marking it, and then the mother's brothers' senior wife with the assistance of other old men and women who participated in transumption dismembered the body. All the women who had a right to the body received an equal share. The pieces were cut up, wrapped in wild green vegetables by the recipients and cooked in an earth oven. The intestines were secretly washed in a

stream by the older women before being put in the earth oven, as was the gallbladder. The brother of the deceased came and cut the nose of the deceased from the base to the bone at the bridge and it was then placed back in position. The *akona* is found in the nose, and by cutting the nose, it was allowed to depart from the body to one of the deceased's sons. It was believed that men with short noses were inferior to those with long noses, who were regarded as having the ideal physique of a warrior. The hair was burnt off the head, which was then wrapped in a green vegetable bundle and cooked in an earth oven. Once cooked, the head was defleshed and the meat re-cooked with wild green vegetables in bamboo tubes, and shared amongst the women who supported the recipient. A breadfruit leaf was placed under wild green vegetables and the brain forced out through the foramen magnum. It was mixed with wild green vegetables, wrapped in breadfruit leaves and then cooked in 2 to 3 bamboo tubes.

The spine was removed, cut into sections and cooked in bamboo tubes with wild green vegetables. The spinal cord and cartilage were consumed and the vertebrae returned to the family with the other bones of the deceased. The women shared with their own

friends and relatives who assisted them in their duty of transumption.

Once cooked the body parts were removed and put in bilums and the women went to the mourning house (not the widow's house in this case). The women then opened their bundles and separated the bones from the meat. Women who arrived late to mourn the deceased were given an equal share of the body by each of the women so that her share equalled each of their shares. All the women with a right to the body received an equal-sized piece of the body on a breadfruit leaf. Occasionally an old man participated, but this was unusual. The deceased's wife's godmother also participated. On the following days the remaining meat was reheated in bamboo tubes and eaten and this continued until the body was consumed. The cousin's wives shared their portions during the night with their guests who came to support them, and officially, as long as they had at least two children, they could participate and were given muscle or skin to consume. All the women remained in the mourning house until the whole body had been consumed.

Possible parenteral inoculation of participants and cross-infection during mortuary feasts

Rubbing of body fluids onto the bodies of mourners

This ritual was not conducted in the Usurufa as they feared the *kwata* would harm anyone who performed such a practice.

Cross-infection

After the body was dismembered the participants cleaned their hands with wild green vegetables which were then cooked. After transumption the participants washed their hands in a stream.

Wooden plates were not used at obsequies as their subsequent use would have damaged the men's and children's *ama*. Stone axes used to cut up the body were reused in everyday tasks having been wiped clean. Bamboo knives, bamboo tubes and the stems from the ferns that were eaten were rubbed with pig blood during *ayanta utaleiye* and afterwards placed by the sepulture.

Mortuary rites after the transumption of the body

Ayanta utaleiye

The family killed a pig and prepared a feast for the women who had eaten the body. After the food was cooked the steamed leaves were placed in front of the mourning house where the transumption had taken place and the women then departed from the mourning house. As the women walked over the leaves they were purified by the steam so they could return to their homes and gardens. A sister of the deceased was given the duty of assisting the widow during her mourning. The pig's blood was collected in breadfruit leaves and one of the deceased's brothers' wives rubbed the pig's blood on the bones. Afterwards, they were tied together, placed in a new bilum, put in tapa cloth and buried in a sugar cane, taro or yam garden. A short trench was dug at a depth of one metre and the bones placed inside; then the sepulture was filled with leaves from the garden of the deceased and covered with earth. Flowers were then planted to mark the sepulture.

Musane

After *ayanta utaleiye* the family prepared for a feast called *musane*. The women collected garden rats and the men hunted possums, tree kangaroos and any other edible wild animals. The meat was cooked, hung up and smoked in the men's house; some was previously used for divinations to find out who was responsible for the death. The family then prepared a feast with the wild meat, pigs and vegetables. The food was shared amongst all the mourners, not just the women who ate the body. The purpose of *musane* was to remove the *kwata* from the wombs of the affine women who had eaten the body, so it departed to *kwata valei* with the other souls. This was done as quickly as possible after death, as the Usurufa feared that the *kwata* would kill a child or a sick person. The *tima* and *auyananei* also departed at the end of this feast with the *kwata*. It was the smell of the cooked wild meat that would send them away as the strong smell travelled a long way and reached *kwata valei*. All the agnates and affines had to agree first that it was time for the souls to depart. Once the mourners agreed they cut a piece of 'pitpit' with a knife and this symbolized the departure of the souls. The hair of the deceased was kept and the *tima* would return and

assist the family members when requested. *Musane* was the last obsequy to be performed for all methods of disposal of a body. Head pay was distributed before the body was removed to the sepulture if pigs were available. The head pay had to be settled before *musane* was performed.

The widow

Eventually, after two to three years, the widow would be ready to remarry if she chose to. The deceased's 'poroman' had the right to ask the widow first for her hand in marriage. If she married a 'poroman' of the deceased he would pay compensation to the other 'poroman', and if she married another man he would pay compensation to all the 'poroman'.

Transumption of enemy relatives

The enemy dead were eaten out of respect and to bring peace between the warring factions. A woman who was in some way related to the deceased would be in charge of dismembering and distributing the body. Once the body had been eaten all the bones were returned to the family by the female relative.

Kto unakanato ayuviye

During the mourning period the widow was dressed in rags, bush rope was tied on her arms and legs, and her head was covered with broken bilums to mark her as a widow. When she decided to remarry with the family's permission *kto unakanato ayuviye* was performed, and her broken clothes were removed and placed on the sepulture. After this she was free of her dead husband's souls.

Summary of cultural practices that may have affected the transmission of kuru

In the Usurufa it was estimated that 60% of bodies were buried, 30% consumed and 10% either placed on a platform or between the buttresses of a tree. This was the same for men and women except that the sepulture between the buttresses of a tree was reserved exclusively for men.

The bodies of men and women who had at least two children were disposed of by transumption. Warriors or other respected men were consumed, placed on platforms or placed between the buttresses of a tree. Men who were not highly respected were

buried. Women were either buried or, if they had two or more children, consumed. Children were always buried.

Those who died of dysentery, yaws, leprosy, kuru and other strange diseases that were considered contagious were buried.

A man's body belonged to his affines and normally none of the body was given back to the agnates. Occasionally the head was given to the female agnates. If a woman died her body was shared amongst her elderly cousins' wives and other elderly female affines. The head was normally shared amongst her brothers' wives.

Children took part in transumption once they stopped breastfeeding at the age of about three. Boys were only meant to eat muscle from male corpses, and they ceased to take part in transumption when they reached the age of six. Girls were also meant to eat only muscle from male bodies. The children were not meant to eat the brain, spinal cord, bones and internal organs. From the age of nine girls assisted their mothers in obsequies in other communities. They did not cease to participate at menarche, but a few ceased when they became married if their in-laws so

wished. When she had 2 to 3 children she would participate again and when she was elderly she would eat the internal organs, brain, spinal cord and bones.

The rubbing of fluids from the cooked meat did not happen in the Usurufa as they feared that the *kwata* would harm anyone who carried out such an action. The women cleaned their hands with whatever materials they had available and washed them in a stream after transumption. Wooden plates from the men's house were not used during transumption as they would have been polluted but the older plates that belonged to the women were used. Stone axes used to dismember the body were wiped clean and reused.

Summary of the mortuary feast participants' exposure to central nervous system (CNS) tissue

Boys ate only muscle between the ages of 3 and 6 after which they ceased to participate in transumption. Girls continued till menarch or marriage when they ceased until they had two or more children. Only the old women ate the CNS tissue. Liquid from the

cooked meat was not rubbed on the bodies of mourners in the
Usurufa.

Traditional mortuary rites amongst the Kamano

Introduction

The Kamano have a long history of contact with Europeans starting with Captain Herman Detzner who hid at the headwaters of the Markham River and may have contacted them between 1917 and 1918 (Gajdusek and Alpers, 1972). By 1926, native preachers from the Lutheran Church had begun teaching in the area of the Purari-Ramu headwaters (Radford, 1987). Ned Rowlands, a gold prospector, entered the Kainantu area in 1929. He was followed by Michael Leahy and Michael Dwyer, who crossed the Ramu divide in 1930. A patrol post was established in Kainantu in 1932. It was only after World War II that the government attempted to bring the area under its control. Patrol Officer McGregor was attacked in the Sonofi limestone caves, and other patrols led by Patrol Officer Skinner were attacked in the Kainantu area. There have been a number of cases of kuru in Kamano villages, some of which have had refugees from communities to their south in the kuru-affected region. Most cases have occurred in Yababi, Garufi, Tirokave and the Onamuga area. Yababi has had migrants from the Hogateru

region of the Keiagana and Onamuga from the Moke region of the North Fore (Gajdusek and Alpers, 1972).

Before the arrival of the colonial administration, fighting was common throughout the region, and people often fled long distances to escape from their enemies. The Musanofi clan in Garufi (in the Kamano linguistic group) originally came from Tarabo. Not only had the Musanofi clan moved a great distance they had also changed linguistic groups. The Musanofi clan have a close connection to their land but they do not have stories of ancestral beings like the Fore, and it is likely that the interviewees did not remember them. The kiaps had appointed tultuls and luluais in Garufi and the surrounding villages prior to the outbreak of the Second World War in Papua New Guinea in December 1941. The colonial administration prohibited the eating of the dead and warfare. The customs of the Garufi inhabitants are the same as those in other Kamano villages, and similar to those in the North Fore. All clan names in the Kamano end in *ofi*, which means a group of people, but can be described as a hive of people.

Kamano / English glossary

<i>Kamano</i>	<i>English</i>
<i>asimu</i>	Same concept as the soul in western society
<i>amemaha</i>	Simulacrum of the <i>asimu</i> but more powerful
<i>hangro</i>	Harmful pollution from decomposition of the body
<i>asan kovo</i>	Aggressive side of the deceased's character
<i>avimaha</i>	The deceased's abilities
<i>kumatege</i>	The land of the dead

Kamano cosmology: the five souls of the Kamano

Asimu

The *asimu* was the same as the concept of the soul in western society.

Amemaha

The *amemaha* was a simulacrum of the deceased but more powerful.

Hangro

The *hangro* was the powerful pollution from decomposition of the body that harmed the family members if they did not carry out the mortuary rites correctly.

Asan kovo

Asan kovo was the aggressive side of the deceased's character and was the power of a person's *avimaha*.

Avimaha

Avimaha is the deceased's abilities such as hunting skills, raising pigs, planting successful gardens or catching eels. At death *avimaha* was passed on to one of the deceased's children.

Mourning before the disposal of the body

When a man was dying his brothers were the first to gather around him and then the affines arrived – of particular importance to the dying man was the arrival of his favourite uncle on his mother's side who would open the road to *hangro kumatege* by forgiving his mistakes made during his life. After death, the family and affines prepared a platform in the men's house to display the body. This consisted of a wooden framework (like a bed) decorated with bilum string. The body was supported at 45 degrees on a wooden framework consisting of four sticks firmly anchored in the ground. The sticks supported the body from underneath and the sides, and were fastened together behind the head of the deceased. The body was placed in the fetal position with the hands between the legs and the jaw fastened with *kafina* (same material as used to make 'pulpuls'). The platform was then decorated with traditional objects. The body stayed in the men's house and the women and children were allowed in to mourn the deceased once all the ritual objects had been removed. When the first signs of decomposition appeared the men from the family and affines carried the body to the sepulture. A person would normally let their relatives know

where they wished to be buried and what kind of sepulture they preferred before they died. If for some reason the deceased had not let their wishes be known the family decided.

The bodies of important women in the community were also mourned in the men's house before being taken to the sepulture. Other women's bodies were placed in a house in the women's area of the village called the *kemeno*. The bodies of men and women, important and unimportant, were prepared in the same way prior to disposal. Children's bodies remained in the *kemeno* on a bed made to size. Babies were wrapped in blankets, placed in bilums and buried after 2-3 days.

Transumption: rules for claiming and primary distribution of the corpse

History of transumption

Bodies were placed in raised baskets by a bamboo grove, by water flowing through the deceased's land, at the base of trees, buried or disposed of by transumption. The practice of transumption came from the ancestors and there were no myths surrounding this

practice. The favourite means of disposal of the body of a man, woman or child was transumption.

Bodies that were unsuitable for transumption

Those who died of leprosy, yaws and dysentery were buried, as these forms of sorcery or disease were considered contagious. Cases of kuru in the Kamano were consumed early in the epidemic, but the Kamano soon decided that kuru was contagious.

Rules for claiming and distributing a male body

A man's body belonged to the family, and all the women and children participated in transumption except the widow and those who were directly related to the deceased by 'blood'. All the mature participants received an equal share of the body. The women ate so that they and their children received blessings and to ensure that the *asan kovo* and *avimaha* were transferred to the deceased's children. The body of a boy or girl was disposed of as a man's.

Rules for claiming and distributing a female body

A woman's body was dismembered by two elderly female affines and two elderly female members of the family. The body and internal organs were divided in half and the head was taken by the affines.

Rules surrounding participation in transumption

Children's participation in transumption

The children started to participate in transumption when they stopped breastfeeding. Girls and boys under 6 could take part in transumption of male and female corpses from their own community, but were only allowed to eat the skin or meat. They were forbidden to eat the internal organs, brain and spinal cord. Boys aged between 6 and 7 entered the men's house and ceased to participate in transumption at this time.

It was feared that the *hangro* of another clan would harm them if they took part in transumption in other communities. However, if transumption took place in their own community the women would participate with their children.

Women's participation in transumption

When a girl entered menarche she continued to participate in transumption. Women had to have at least 2 children before they ate any of the above-mentioned internal organs including the brain and spinal cord. Women with 3 or more children could dismember the body safely, but old women were preferred to perform this task. If a woman participated in transumption in another linguistic group, she obeyed her husband's wishes regarding her participation in the obsequies. There were occasional women who did not participate in transumption but they were rare.

Transumption: subdivision and consumption of the corpse

Vahera nenaze was the name given to the mortuary rite of transumption. The body was taken to a new garden that belonged to the deceased and placed on a bed of banana, breadfruit and wild 'pitpit' leaves. Four old women who were experienced in dismemberment then cut up the body. The older women who dismembered the body had to have at least a couple of children, and normally they would be much older. Men, young women and children did not witness this event. First, the meat was filleted off

the legs and arms and then the joints were cut to dislocate the bones. The head was cut off, the torso cut up and the intestines cleaned out with water. The bed of leaves was disposed of so sorcerers could not steal any part of the body that was accidentally left behind. The women washed their hands with water afterwards.

All the women of the patrilineal clan had rights to a man's body. The bones, internal organs, intestines and head were consumed by the four older women (45 plus years) who dismembered the body, as these were the least desirable parts. Their share was divided into four equal piles, except for the head, which was taken by one of the elderly women who dismembered the body. The bones, including the head and spine, were equally divided amongst the four women. The meat was divided equally amongst the other women who had a right to participate in transumption and chose to. Sometimes the meat was cooked in bamboo tubes and sometimes it was cooked in a steam oven. If it was cooked in a steam oven the whole body was put inside, including the bones, and wild green vegetables were placed at the bottom of the oven to retain any fluids from the body. The soft bones were eaten and the rest kept for burial later. If the meat was cooked in bamboo, the

tubes were kept and placed next to the sepulture in memory of the deceased. A man's genitals were eaten by a woman, and a woman's by a man or a woman. The eater of these organs had powerful dreams about their future and received *avimaha* in the form of a blessing from the *amemaha*. The women handled the cooked meat with their hands and sticks were never used to pick up the meat, as it would have been regarded as disrespectful to the deceased.

Once the meat was eaten, the women washed their hands with water and used 'pitpit' leaves to help clean them. They would also rub the grease on their bodies and 'pulpuls'. If a woman did not eat, her husband or other male relatives might be suspected of involvement in the death if it was caused by sorcery.

The family ate a man's body, so that the deceased's *avimaha* stayed within the clan, and was recycled to the women and children by eating the body. When a woman died the family and affines ate her but her *avimaha* went to her children through their participation in transumption. Four old women dismembered a woman's body and ate the intestines, internal organs and head, and the rest of the body was consumed by the other women. The family

ate children and the aunts played the leading role. A mother never ate her own children, as they were the same 'blood'.

The skull of a man was sometimes kept by the widow who carried it around in her bilum. A mother might also carry her child's skull with her. The skull was protected from flies by leaves and when it dried, the family members were still able to see the deceased person's face. Eventually there was a feast that marked the end of mourning and the skull was buried and the *amemaha* told to stay where the skull was buried as this became the sepulture.

After some years, the skull of a man might be removed from the grave and placed on a pole in memory of the deceased and to reinforce land ownership.

Asentene

The day after transumption the bones were collected and placed on a platform in the deceased's garden or by a bamboo grove. The bed consisted of four posts and was high enough to ensure that the bones were not disturbed by pigs or dogs. It was then decorated

with leaves and the bones covered with dry leaves and this became the sepulture. The collar bones, jawbone and hair were kept for assistance from the *amemaha* for the family members. Head pay was settled before the body was disposed of.

Possible parenteral inoculation of participants and cross-infection during mortuary feasts

Waeline

This was the ritual where cooked body fluids were rubbed on the bodies of the women and children who practised transumption. They did this to receive blessings and protection from sorcerers from the *amemaha*. This ritual was only performed by family members. Girls had to be at least 12 years old before they took part and the ritual was conducted so that the participants received *avimaha* from the *amemaha* to make them good gardeners and rearers of pigs etc before they were married; adult women also took part in order to receive blessings. Adult men and initiates participated in this ritual to receive *avimaha* that protected them from enemy arrows or gave them other magical powers that would help them in battle.

Masave maha

The fluids from the cooked body were rubbed on the abdomen of a pregnant woman so that the unborn child would have the same physical appearance or personality as the deceased.

Removal of bodies from sepultures

Bodies placed on sepultures were sometimes taken by the women at night and consumed. They explained that they did not want the body to be eaten by worms or maggots so that the family understood their actions. The family could not say anything critical of this behaviour, as they knew that it was done out of love and respect.

When the body was buried the family members did not witness it being removed and dismembered, nor did they have to worry about this happening. The women came at night and ate so their identities remained hidden and this behaviour soothed the family members, as they believed that the women ate the body so that the worms could not. This made those who wanted the body buried happy and those who wanted it eaten happy.

Transumption of enemy relatives

If the enemy were routed in battle and the body of one of their warriors remained on the battlefield it would be returned to his family if possible. If the dead man had sisters or cousins married into the victorious side it was their duty to carry the body of their male relative back to his family. In nearly all cases there was a woman with some family connection to the enemy who could take on the role of returning the body without any danger to her. Although most of the clan would be celebrating the death of an enemy they would also feel sorry for a woman who had lost a brother, father or cousin and comforted her. Once a score had been settled it was no longer necessary to continue hostilities and by returning the body to the enemy a clan might hope to calm their anger, so it would be possible to enter peace negotiations.

If it was not possible to return the body due to continued hostilities, or if the enemy had fled to distant parts, the body was eaten. A female relative of the deceased would organize the transumption of the body out of love and respect for the deceased. If the body was allowed to rot the enemy would be infuriated and

hostilities would continue. By consuming the body, the women expressed their loss and brought about peace. It was not safe to keep an enemy's *hangro* and *amemaha* on their land, even if the body had been eaten out of respect, so the bones were returned as soon as possible to the deceased's family. It also gave a chance for the family of the deceased to mourn their loss through the burial of the bones. This brought happiness to the widow and children and allowed the transfer of *avimaha* to the deceased's children. Children killed in battle were not eaten by the women of the victors, because the women did not have a blood connection with their brother's offspring (the children's flesh and blood had come from women of a different clan), nor were their bones returned: they were not complete people (they did not have *avimaha* and *asan kovo*). People loved their children and mourned their deaths but it is important to understand that the flesh and blood did not belong to the women of the victorious group: it belonged to the affines of the defeated and it was therefore not the victors' duty to consume the bodies of these dead children. The recreation of the clan through the recycling of souls was an important reason for the practice of transumption, and

since the children did not have inheritable souls it was not necessary to return their bones to the grieving relatives.

Mortuary rites after the transumption of the body

Omokave (purification feast)

3-4 days after the body had been eaten, the purification feast called *omokave* took place, and pig meat was given to the women who took part in transumption.

Avigamo (wild greens)

Avigamo lasted for 1 to 2 months and was the period of mourning for the family. The end of *avigamo* was marked by a purification ritual called *hefatafe*.

Hefatafe

This was the final obsequy when wild animals were consumed, and the souls of the deceased sent to *hangro kumatege*. This included the *asimu*, which had inhabited the body of a small bird, and the *amemaha* and the *hangro*. The *hangro* was removed from the wombs of the female affines who had participated in

transumption. The *amemaha* stayed around the sepulture which was the place where the body was dismembered. All three souls departed after *hefatafe*.

***Nanogo* (head pay)**

Nanogo took place before the disposal of the body if pigs were available, and often consisted of 10 to 20 pigs depending on the importance of the deceased. When a man died the following payments were made:

Nanogo was the largest payment and was given to the affines and this was also known as 'head pay'.

Vegafa was given to the relatives of the deceased man's father or patrilineage. Therefore this payment went to the patrilineal line. In most cases the payment went to a clan in another village and created ties back to their original village if the family had moved. This is the only difference between the South Fore and Kamano payments.

Nefaru payments went to the deceased man's 'poroman'. These were the men of the same clan that the deceased was initiated with.

Usajakono: this payment was given to the man who bled the deceased at initiation.

Nona payments were credit payments to the families of those who attended the same initiation ceremony as the deceased, but came from different clans.

Mizana was given to a female of the extended family who was attentive to the man, and the payment soothed her sorrow.

Kasenahaki went to a man's male dancing partner, or his family if he had died, and was a reciprocal payment.

Kruveni was a payment made to adoptive parents.

Hakave was a payment made to wartime allies who had been killed or injured in the fighting.

When a woman died the following payments were made:

Nanogo was the largest payment and went to the affines, and was also known as ‘head pay’.

Nuna payments went to the children of the deceased woman’s sisters. The sisters could not receive these payments as they were still connected to the deceased by ‘blood’ – according to the rule that you cannot eat your own head pay.

Sesehizih payment went to the woman who helped deliver the deceased, and if she had died it went to her family.

Alikonofi miza was for the woman who cut the deceased’s umbilical cord when she was born.

Namunoke was for the woman who purified the deceased when she was born.

Anukanahe payment was for the deceased’s ‘poromeri’. These were women of the deceased’s age group.

Namuno was for the woman who looked after the deceased when she was giving birth.

Kruveni was an adoption payment if this was relevant.

Summary of cultural practices that may have affected the transmission of kuru

Bodies were placed in raised bamboo baskets, beside a river, at the base of trees, buried or disposed of by transumption.

Transumption was by far the most common means of disposing of bodies in the Kamano. Bodies were sometimes removed from sepultures and consumed. Those who died of dysentery, yaws, leprosy and other strange contagious diseases were buried. Early cases of kuru in the Kamano were disposed of by transumption.

When a man died his body belonged to all the women of the patrilineal clan and they participated in the transumption of his body with their children. Those who were directly related to the deceased by 'blood' and the widow were not meant to take part in transumption. However, in practice this rule was ignored. The body was divided by four elderly women who divided the bones (including the spine), internal organs, intestines and head amongst themselves, and the rest of the body was divided amongst the other

adult women. If a child, unmarried man or woman died the same rules applied as for an adult man.

If a married woman died her body was divided by two old women from the affines and two from the agnates, who divided the intestines, head, internal organs and bones between themselves. The rest of the body was divided equally between the adult female affines and agnates.

Children started to participate in transumption of male and female corpses when they stopped breastfeeding, and were allowed to eat only muscle and fat. Boys ceased to take part in transumption when they underwent minor initiation at the age of 6-7. Children only took part in transumption in their own community.

Girls continued to eat only muscle and fat till they had 2 or more children when they could consume the internal organs, bones and brain.

Waeline was a ritual that was performed by girls over 12, initiates and adult men and women to receive protective powers from the deceased. It involved rubbing the fluids from the cooked

body onto their bodies. A pregnant woman rubbed the fluids onto her abdomen for magical purposes in a ritual called *masave maha*.

Summary of the mortuary feast participants' exposure to central nervous system (CNS) tissue

Children participated in transumption from the age of 3, and boys stopped when they were about 6. Girls continued till they had 2 children and during this time they and the boys were only allowed to consume muscle and fat. Women with two or more children ate the CNS tissue.

Traditional mortuary rites amongst the Awa

Introduction

The Awa linguistic group is on the eastern fringe of the kuru-affected region and is separated from the Fore by the Lamari River. The south of the area is bordered by the Aziana River and the area south of the river is populated by the Moraei-speaking people. There are a total of 8 villages, 6 south of the Lamari River and two to the north as it curves eastwards. The area is largely grassland with forested summits. The Awa are famous throughout the area for their skill in making black palm bows and barbed arrows. There are three dialects of Awa: Mobuta, Elakia and Tauna.

The Awa live in large villages and hamlets. The women's houses were traditionally shaped like beehives and raised a foot off the ground. The men's houses were larger beehive domes constructed with earth floors. There was one house for the uninitiated boys, one for the initiated unmarried boys, and the largest one for the married men. Boys married at an earlier age than in other linguistic groups. There have been 3 cases of kuru in

the village of Yakia. The Awa only came under administrative control during the five years after 1967 (Gajdusek and Alpers, 1972).

The Awa hardly ever intermarried with the Fore, but they stayed as refugees in Fore villages. The Awa traded bows and arrows to the Fore so they were well looked after when they stayed there. In return the Fore traded with pigs, shell money and salt. The Fore men feared that if they married a woman from the *porekina* (grass people), their *yesegi* (Fore word for the aggressive side of a person's character) would be weakened. Hayano (1973) states that Fore women were avoided as the Awa believed that intercourse with them would result in death.

David Hayano (1990) describes his time conducting ethnographic fieldwork amongst the Awa; their beliefs in sorcery, warfare, ghosts, clan structure and ancestors are similar to many of the beliefs in the Fore. He also states that transumption did not take place amongst the Awa.

David Boyd documented the affects of migration labour on subsistence farming in the region, attempts to increase pig numbers in the community as a response to the cash economy and inflation of traditional payments, and, finally, further changes as people were influenced by missions and new ideas (Boyd, 1981; Boyd, 1985; Boyd, 2001).

Awa / English glossary

<i>Awa</i>	<i>English</i>
<i>iya</i>	Soul, as in the western use of the word
<i>kwanda</i>	Harmful pollution from the body
<i>ayantane</i>	Aggressive part of a person's character
<i>waukainave</i>	Simulacrum of the <i>iya</i> with magical powers
<i>auwane</i>	Person's inheritable abilities
<i>kwanda naope</i>	Land of the ancestors
<i>manikayani</i>	Founding clan ancestor

Awa cosmology

The creation story

The *manikayani* built a house in Ilakia, and in the morning he woke up, found there were no humans and felt lonely. The *manikayani* returned to his original home near Obura and told the other *manikayani* about the problem. Then the *manikayani* brought a man to Ilakia and 4 more to other parts of the Awa. The first man stayed in Ilakia and the village is named after him. The *manikayani* then brought a woman from the Obura side and she married the man who lived in Ilakia. They were happy together, but the four younger men complained, so the *manikayani* returned to Obura and brought four more women so they would all be married. The five married couples were the founders of the five Awa clans.

The five souls of the Awa

The five souls of a person in the Awa are the same as those of the South Fore. The *iya* is the equivalent of the western concept of the soul and was the first of the souls to travel to *kwanda naope*. The *kwanda*, the harmful pollution from the body, and the *waukainave* departed to *kwanda naope* after the completion of the

mortuary rituals so the deceased became a complete ancestor. The *ayantane* and *auwane* were inherited by the deceased's children.

Death

The *iya* would depart from the body of a dying person and travel straight to *kwanta naope* to tell the ancestors that he was about to die, and then returned to the living person. When he finally died, the *iya* would travel to the *manikayani* and then to *kwanta naope*.

When the person died the affines came and killed the deceased's animals and destroyed his gardens. It was the responsibility of the affines to dress the corpse, cover it with pig grease, and place it on a platform in the women's area of the village. Songs were sung during the night to send the souls of the deceased to *kwanta naope*.

Transumption: rules for claiming and primary distribution of the corpse

Bodies were consumed in the Awa to incite revenge amongst the survivors. The bodies of those who committed suicide were also

eaten. Suicide normally occurred after a loved one had been killed in battle or by sorcery, and was normally conducted in the residential area or in their garden. Only the women from the affines and family were entitled to eat the body, and the other female guests and their children did not participate in transumption.

History of transumption

Transumption was hidden from the kiaps (patrol officers), and ceased when the luluais and tultuls were appointed.

Bodies that were unsuitable for transumption

The principal reason cited for transumption in the Awa was revenge so the bodies of male warriors killed in battle were always disposed of by transumption. Men and women who died of sorcery were also consumed to incite revenge amongst the clan members. Those who died of contagious sorceries or illnesses were placed in the ancestral cave.

Rules for claiming and distributing a male body

The head belonged to the family and the body was divided in half, with the pelvis and everything below it belonging to the family, and everything above to the affines. The widow had no right to part of the body and did not participate in transumption. All the affines participated in transumption, and this included old men, women and children. The intestines belonged to the senior uncle, who gave them to his wife to distribute amongst his brothers' wives and cousins' wives. The affines would also give a piece of the body to the widow's brothers' wives.

The deceased's sisters had the rights to their brother's legs. The deceased's cousins' wives took the feet and knee joints. All the women of the family participated in transumption, apart from the widow. The body of a boy or girl was divided like that of a man.

Rules for claiming and distributing a female body

If a woman died, the family took the head, arms, torso, half the backbone and internal organs; and the affines half of the backbone, the lower part of the body and the legs. One of her blood brothers

ate the genitals so that he would receive *ayantane*. All the female affines participated in transumption if they fell into the right age groups. The family gathered on one side of the body and the affines on the other, and the family was responsible for dismembering the body.

Rules surrounding participation in transumption

Children's participation in transumption

The children started to participate in transumption when they were about 3 years old and able to chew properly. They were not allowed to eat the uterus, intestines, genitals and their surrounding areas. Unusually, male children were allowed to eat the brain. The brain was only fed to male children after being prepared with special plants, as it was believed that it would make them wise and great warriors. The spinal cord was not given to children as it was contained in the vertebrae and the mothers feared the children might choke or throw the bones away. Boys who entered the men's house at the age of 6-7 were no longer allowed to participate in transumption. When a girl had her first period the rule was that she was no longer allowed to participate in transumption and was

not meant to participate again until she was an old woman; however, this rule was not generally followed.

Boys were not allowed to eat any part of a body below the genitals and they were only given small pieces of muscle to eat from a male body; they did not participate in the transumption of a female body. Girls were allowed to take part in the transumption of male and female bodies, but were only meant to eat the muscle from the upper part of the body. From the age of about 9 the girls would start to attend obsequies in other communities with their mothers and they would openly participate in transumption.

Women's participation in transumption

Girls started to participate in transumption from when they were first able to chew, and in practice did not stop with menarche or when they became married. However, females did not consume brain tissue until they were old women. They started to consume the internal organs and spinal cord after they had two or more children. A man's sister consumed his genitals when he died as they were regarded as polluted, and this was done before the rest of the body was dismembered and consumed. A woman's brother

consumed her genitals, for the same reason and at the same time. The brother would receive *ayantane* from his sister's *waukainave* which would make him a fearsome warrior.

If an Awa woman married into the Fore she would follow the customs of the Fore during mortuary rites, and if a woman from the Fore married into the Awa she would obey the traditions of her husband's family.

Transumption: subdivision and consumption of the corpse

The body of the deceased was taken to a garden, and placed on a bed of banana leaves covered in garden greens. The deceased's brother would be in charge of dismembering the body of a man, and if a woman died her brother was in charge of dismembering the body. If a child died one of the mother's brothers would be in charge of cutting up the body.

The pieces of the body were placed into two piles as the leaders watched. The female affines stood behind those who cut up and divided the body, and the family members remained in another group further away as it was hard for them to witness such an

event. The bones for the relevant parts of the body were piled on top of the meat. Traditional wooden plates called *iwale* were used during the feasts.

The body was divided into equal shares and the women who received part of the body would share it with their daughters and daughters-in-law and their children. The meat was then cut into smaller pieces and cooked in bamboo tubes on fires. The temporary sepulture was the place where the body had been dismembered. At night, the remaining meat was taken back to the widow's house and eaten by the women, who remained in their own groups (agnates and affines) eating the parts of the body allocated to them. The women returned to their own houses in the morning and continued to eat till the whole body was consumed. The hard bones were then placed on a platform on top of four posts by a bamboo grove which became the final sepulture.

Possible parenteral inoculation of participants and cross-infection during mortuary feasts

The women did not clean their hands after transumption and waited for several weeks until they did so, when they used heated

pig fat to purify them. Fluids from the cooked body were never rubbed on the children, as it was believed that the *kwanda* would harm them. The mothers avoided touching their babies after transumption and picked them up using their tapa cloth capes. Certain men would carry out a purification ritual on a mother who had participated in transumption, so she could breastfeed her child. To do this the man would wave a glowing piece of wood over her chest. A pregnant woman would rub fluids on her abdomen, so her child would have a similar appearance or character to the deceased.

Mortuary rites after the transumption of the body

Agaga (time to eat greens)

This lasted for about one to two weeks during which the mourners ate wild and domestic green vegetables. It was the mourning period between the disposal of the body and the departure of the souls of the deceased.

Nae

During this ritual blood was rubbed on the bones and then they were removed from the platform and hung up on a fence or bamboo

grove to reinforce land ownership. The family of the deceased then prepared *pale pale*.

Pale pale

The *waukainave* would stay with the family and magically assist with the obsequies. The *waukainave* and *kwanda* departed in a final obsequy known as *pale pale*, when up to 15 pigs were presented to the affines and other mourners (this included the head pay for the deceased). This obsequy also removed the pollution from those who had taken part in the transumption of the deceased. This feast marked the end of *agaga*. At this ritual the fireplace used to cook the body was dispersed after a libation of pig's blood was poured into it.

Awen

Eventually, when the widow decided to remarry, a ritual called *awen* was performed, which removed any connection between the widow and the *waukainave* and *kwanda* of her dead husband. During this rite, the broken bilums and bush rope tied onto the widow were removed and her brothers gave her new clothes. The

waukainave and *kwanda* were told why the woman had to remarry and that they should now leave her alone.

Summary of cultural practises that may have affected the transmission of kuru

The principal reason for transumption was revenge, so the bodies of those who died in battle or from sorcery were consumed. This ensured that the souls of the deceased would help the living avenge the death. Those who died of infectious sorceries and illnesses were placed in the ancestral cave.

When a man died his body was divided in half at the waist and the lower half plus the head was given to the family and the upper part of the body to the affines. All the female affines and their children took part, as did all the female agnates and their children, except for the widow, who was prohibited from taking part.

If a woman died, the affines took the lower half of the body and half the backbone and the family the head, arms, half the backbone, internal organs, genitals and the torso. One of the deceased's brothers ate her genitals for magical purposes.

Children started to participate in transumption from the age of about 3. The boys were only allowed to participate in the transumption of male bodies but the girls were allowed male and female bodies. Children were forbidden to eat the uterus, intestines, genitals and their surrounding areas. Normally the children were only fed muscle from the upper part of the body. Brain was fed to boys after it had been especially prepared, in a ritual to help them become wise and great warriors. Spinal cord was not fed to children as the mothers feared the children might choke on the bones. Boys ceased to participate in transumption at the age of 6-7 and girls were meant to cease at menarche and not participate again till they were old women.

In practice the girls started to take part in transumption as soon as they could chew, and they continued after menarche and when they were newly married. However, only the old women consumed the brain, and women with two or more children were allowed to eat the internal organs and the spinal cord.

Fluids from the cooked body were never rubbed on the bodies of mourners, especially not the children, though a pregnant woman

would rub fluids on her abdomen. The women waited for several weeks after transumption till they purified their hands with pig grease.

Summary of the mortuary feast participants' exposure to central nervous system (CNS) tissue

Boys participated in transumption from the age of 3 till they were 6. They were only allowed to eat muscle from male bodies taken from above the waist. In a special ritual the boys were fed male brain tissue. Girls participated from the age of 3 and only consumed muscle from male and female bodies. If they stopped at menarche, women started to participate in transumption again when they had two children; they were then allowed to eat spinal cord. Finally, it was the old women who normally consumed the brain.

Traditional mortuary rites amongst the Yate

Introduction

The Yate inhabit 10 villages in the northwest of the kuru-affected region which are included in the Faiyantina census division of Henganofi District. Yate is very similar to the Kanite language and they may in fact be dialects of the same language. The Yate border the Kanite, Keiagana, Yagaria and Kamano (Gajdusek and Alpers, 1972). The Yate area was first patrolled in the late 1940s. Only 5 of the 10 villages in the Yate linguistic group have had cases of kuru since 1957, with no more than one or two cases in each village, but all have a history of kuru in the past.

Yate / English glossary

<i>Yate</i>	<i>English</i>
<i>nanofero</i>	Female affines
<i>vegofago</i>	Female members of a clan
<i>aprufina</i>	Home of the ancestors

<i>lusi</i>	Founding clan ancestor
<i>hawamu</i>	Same as the western concept of the soul
<i>ayomopa</i>	Life force of the living
<i>hamea</i>	Simulacrum of the <i>hawamu</i> but more powerful
<i>hangro</i>	Dangerous pollution from a decomposing body
<i>himona</i>	The deceased person's abilities
<i>tokea</i>	The aggressive power of the person's <i>himona</i>
<i>himanu</i>	The patient good qualities of the <i>himona</i>

Yate cosmology

The creation story

The land created the *lusi*, and the *lusi* then created humans who entered the world from a cave. The *lusi* created a woman first, and she sat down on top of the cave; then a man was created and the woman was happy. Finally pigs and pig faeces came out of the cave. The man and woman grew wings under their arms and their

heads went eastwards towards Okapa and their tails towards Goroka explaining the spread of humans across the land.

Humans came from the ancestral cave, so they had to be returned to their creator, the *lusi*, after death. The ancestors lived in *aprufina* which was inside the cave and occupied the same geographical space as the living in a parallel world that could be entered via a portal controlled by the *lusi*.

All the Yate subclans belonged to one of the two founding clans and were disposed of in one of the two caves. In Ulele there are four senior clans and refugees came under these four clans but remained as subclans.

The seven souls of the Yate

Women had the same souls as men, and their *himona*, *himanu* and *tokea* were passed on to their children. Young children did not have these inheritable souls.

Hawamu

This is the soul of the deceased person that corresponds to the idea of the soul in western society.

Ayomopa

This is the concept of a life force that exists in all living things. This exists in the heart of humans and goes straight to *apruřina* when the person dies.

Hamea

This is described as the shadow of the deceased and remains in the land of the living till the secondary burial rite is performed, when it departs for *apruřina*. The *hamea* was found in the bones of the living; after death it helped the family to perform obsequies and gave *himona* to the deceased's family members. The *tokea* combined with the *hamea* to avenge the death of the deceased.

The *hamea* was present in the hair, fingernails and bones of the deceased, and especially in the jawbone and collar bones. The fingernails were ground and the dust was fed to pigs or buried in

gardens and the *hamea* was requested to bless the pigs or gardens to grow well. Water was poured over the hair or bones and requests made to the *hamea*. If seeds were about to be planted then water was poured over the hair onto the seeds and the *hamea* requested to bless the seeds to grow well.

Hangro

This was found in the flesh of the living and was the pollution of the decomposition of the body. The *hangro* would harm the family members if the obsequies were not performed properly. It departed with the *hawamu* and *hamea* after the last mortuary obsequy. All the above had to enter *aprufina* for the deceased to be reconstituted as an ancestor. The following souls were passed on to the children of the deceased.

Himona

This was the deceased person's abilities, and this was passed on to a man's favourite or eldest son.

Tokea

This was the aggressive part of the deceased's character and was passed on to one of his children.

Himanu

This was the opposite of *tokea* and consisted of the gentle and peaceful qualities of the deceased's character.

Aprufina

The ancestors from the affines' side came to show the souls the road to *aprufina*. There is a river in the Yate called Fufureka and the souls of the deceased would float downstream on the top of the river till they saw a pleasant spot which was the home of the *lusi*. The ancestors then washed and dressed the deceased, and he changed into an ancestor and entered *aprufina*.

Mourning the deceased before disposal of the body

The body of the deceased was dressed and displayed in the men's house on a bed of cordyline and banana leaves. After a couple of days it was removed to the sepulture. If the body was heavy it

was tied to a stick and carried by the men: the affines carrying the head-end and the family the feet-end. If the body was light it was tied up and carried like a bilum, under a man's arm. Head pay was called *nogare miyane* and this was normally presented before the body was taken to the sepulture. The *hawamu* would remain close to the body of the deceased until it departed to *apruфина*.

Methods of disposal of the body

Ancestral cave

Burial pit

Placed in a tree

Placed in a cave

Place on a platform

Transumption.

It was estimated that 40% of male bodies were consumed and 60% disposed of by other methods. 10% of women's bodies were

disposed of by transumption and 90% by other means. Bodies placed in sepultures were sometimes removed and consumed.

Transumption: rules for claiming and primary distribution of the corpse

History of transumption

Before the arrival of the kiaps the people practised transumption, or placed bodies on platforms, in trees, in burial pits or in an ancestral cave that was the home of the clan *lusi*. Most bodies were placed in the ancestral cave. Kuru arrived in Ulele before the kiaps arrived, and the bodies of those who died of this disease were buried. Kuru was called *tete* in Yate, which means shaking.

Bodies that were unsuitable for transumption

Nearly all the children were buried except for the occasional boy who would be at least 12 years old. The bodies of those who died of dysentery, leprosy and yaws were buried. The Yate were frightened of carrying these contagious bodies to the ancestral cave so they were put in a burial pit. Traditionally, women's bodies were

placed in the ancestral cave, but occasionally an important woman was consumed.

Rules for claiming and distributing a male body

The body belonged to the affines, but it was divided in half: one-half was given to the family and the other kept by the affines. The head was not cut in half; instead it was kept by the affines, or given to the family or the widow: it was up to the parties to reach an amicable decision over ownership of the head. The wife of a deceased man would normally request the intestines, internal organs, genitals and sometimes the head. She would share these with her 'poromeri'. The rest of the body was divided equally between the claimants of the agnates and affines. In Yate there were three groups of claimants: the affines, the agnates and the widow and her agemates.

Children were not eaten; their bodies were buried near their mother's and her *hamea* told that her child's souls were coming to join her. However, in practice the occasional boy over the age of 12 was consumed out of grief. Women's and boys' bodies were divided

as a man's but the head was taken by the agnates, and the internal organs by the affines.

Rules surrounding participation in transumption

Children's participation in transumption

Children were forbidden to eat the brain tissue, spinal cord and internal organs as the Yate believed it would stop them from growing properly. This rule was enforced by the women. Children were fed chewed meat by their mothers from the age of about 2, and when they were a little older they used their hands and fed themselves. Male children were allowed to eat muscle and fat until they entered the men's house aged 6-8. In general, the older children were frightened by ghost stories and only a few would participate in transumption.

The mothers did not take their young children to feasts in other communities, but if the mothers brought meat (muscle) from the body back to the village they participated in transumption, as it was also regarded as meat by the mothers and was good for a child's growth.

Women's participation in transumption

Girls were only allowed to eat muscle and fat until menarche. At the age of 9 girls went with their mothers to assist in the preparation of the obsequies; however, if they were prospective brides they would not openly participate in transumption, preferring to eat in their mother's house when they returned home. After menarche, a woman no longer participated in transumption until she had one or two children. Her parents-in-law would make the decision as to when she could participate in transumption again. Old women ate the bones, spinal cord, brain and internal organs.

If women had married in from other linguistic groups and returned to an obsequy in their home village, they would participate in the obsequy. If a woman took her children she never allowed them to participate in transumption as the body belonged to another group and the *hangro* might harm the child.

Transumption: subdivision and consumption of the corpse

The body of a dead man would be taken to the sugar cane garden of one of his brothers and placed on a bed of banana leaves

and edible greens. The body was cut in half using stone axes by old men skilled in dismembering corpses, and whose *himona* was not in danger of being harmed, since they were already old and their *himona* was dissipating. The warriors stayed far away when the body was dismembered as the pollution would damage their *himona*, and in extreme cases this could result in their death. Once the body had been cut in half the women came and claimed parts of the body for themselves, and subdivided it with bamboo knives. A pig was killed at the same time and the meat given to the participants as head pay. When the body was divided, the children were scared off by ghost stories, as they were not allowed to witness dismemberment. Once the body was dismembered it was carried to a special site near a river that was reserved for the transumption of deceased relatives. The portions of body were cooked with wild green vegetables, which were believed to hold fat from the body and stopped people from being ill. The cooked meat was placed in breadfruit leaves, which were later buried with the remaining bones or thrown away in the river. Once the food was cooked the women and children ate and what was not eaten on the first day was eaten during the night.

The bones, intestines and brain were eaten on the second day of the feast. The meat was stripped off the skull and eaten, and a hole was made in the skull and the brain scooped out using wild green vegetables wrapped around the fingers. The brain tissue was squeezed into wild ferns, cooked in bamboo and eaten by the women. Those who ate the body hoped to receive *himona* from the deceased's *hamea*. By eating the body the participants received the deceased person's abilities and protection from sorcerers. The deceased's little finger was sometimes cut off and kept in a small bilum so that the *hamea* would protect the wearer. The men sometimes ate the vagina to receive a blessing of *tokea* from the deceased's *hamea*, which would make them great warriors. The *himona*, *tokea* and *himanu* of a deceased man were recycled to the deceased's children. Women who attended the obsequies who were not related to the deceased were not allowed to participate in transumption.

As soon as they had finished eating the meat the family ate the bones. The widow received the tibias, which were ground into dust between stones placed on a breadfruit leaf. The bone dust was mixed with wild green vegetables and grease from the body, and

then cooked and eaten. The remaining hard bones were buried in a sepulture that became the home of the *hangro* and *hamea*. The bones were buried at a place requested by the deceased before he died and cordyline was planted around the grave to mark its position. Food and water were left at this site three times a day until the *hawamu* had successfully grown its own food in *apruřina*.

Possible parenteral inoculation of participants and cross-infection during mortuary feasts

Women rubbed blood on their bodies as a sign of mourning. After the feast the women cleaned their hands with grass and leaves and then threw the materials into the river.

Fat on the hands of the participants was rubbed on the body, as it was believed to give protection from sorcerers. Children also participated in this ritual, which was called *masavati*. A pregnant woman rubbed fluids from the cooked body onto her abdomen so that her unborn child would have physical or psychological similarities to the deceased. Occasionally a close male relative of the deceased might rub fat on his body and request the *hamea* and *hangro* to assist him in avenging the death of the deceased. This

practice was called *yagali tesi*. Traditional wooden plates were used during the obsequies.

Agifiyane

This was the mourning period during which wild green vegetables were eaten and the custom was the same as described for the Kamano. After 4-5 months a purification feast called *agifiyane* was held for all the women who had participated in eating the body. This also marked the end of mourning, and was the time that the *hangro* and *hamea* permanently departed for *aprufina*.

The history of kuru

As far back as the interviewees could remember those who died of kuru in Ulele were buried. During the kuru epidemic people feared eating the bodies of those who died of kuru, as they believed that kuru was contagious. One woman who developed kuru was chased back to her community in Uwami / Tarabo, as the inhabitants were frightened of going near kuru patients. Those who died of kuru were not given a proper burial: they were buried in a shallow grave as soon as they died. The villagers were often too

frightened to visit other villages because they feared becoming victims of kuru.

Summary of cultural practices that may have affected the transmission of kuru

Bodies could be disposed of in the ancestral cave, by burial, by being placed in a tree or in a cave or by transumption. It was estimated that 40% of male bodies were disposed of by transumption and 60% in other sepultures, and 10% of women were consumed and 90% placed in other sepultures. Children were nearly always placed in the ancestral cave except for the occasional boy aged 12 or more who might be consumed out of grief. Those who died of kuru were buried and people were frightened of travelling in the kuru-affected region.

Children started to participate in transumption in their own community from the age of 2 and boys ceased at the age of 6-8 when they underwent minor initiation. Girls continued until menarche, when they too stopped until they had one or two children. Children were not allowed to eat bone, internal organs, brain or spinal cord.

They were only allowed to eat muscle. It was the old women who ate the internal organs.

The body of a man was divided in half between the affines and agnates; the widow was given the intestines, internal organs and genitals, all of which she shared with her 'poromeri'. The head could go to any of the above groups: it depended on them reaching a decision. A woman's and boy's body were divided in half and the internal organs, intestines and genitals were taken by the affines, and the head by the agnates.

Blood was rubbed on the female family members' bodies during mourning. Hands were rubbed on pulpuls and bark capes to clean them and to remove grease. Fat was rubbed on the bodies of the participants in a ritual called *masavati*, and in another ritual pregnant women rubbed fluids from the cooked body onto their abdomens for magic purposes. Occasionally fat was rubbed on an avenging warrior in a ritual called *yagali tesi*. The fluids from decomposing bodies placed in trees were rubbed on the bodies of the wife and children if a man died, and on the sisters and daughters of a dead woman.

Summary of the mortuary feast participants exposure to central nervous system (CNS) tissue

Boys only participated in transumption between the ages of 3 and 6-8. When they participated they ate only muscle or fat. Girls participated from the age of 3 till menarche and during this time they consumed only muscle or fat. After menarche women stopped participating in transumption until they had two or more children. Only the old women ate the CNS tissue.

Traditional mortuary rites amongst the Auyana who border the kuru-affected region

Introduction

The Auyana inhabit 15 villages of which 6 have experienced a few cases of kuru. The area was first patrolled in the late 1950s from Kainantu. The Auyana are bordered by the Usurufa, Kamano, Oyana, Tairora, Awa and Fore (Gajdusek and Alpers, 1972).

The inhabitants of Asempa in the Auyana linguistic group stated that their language was similar to Usurufa and Osená, and there was a myth about the two linguistic groups' migration out of the Auyana. Until the 1940s there was little interaction with the North Fore and then during heavy fighting Fore refugees temporarily settled with Auyana clans. When this happened the Auyana realized that the North Fore ate their dead. A few elderly Auyana started to participate in the practice of transumption but it was not a widely accepted practice in the Auyana. The North Fore refugees also placed bodies on platforms and consumed the maggots and fluids from the decomposing bodies, and some of the Auyana

also copied this ritual. Afterwards the bones from the body were hung up in trees.

Sterling Robbins (1982) concentrates on warfare and adaptable kinship in his excellent book, and only makes brief mention of burial as the normal practice amongst the Auyana. There are many cultural similarities with other linguistic groups in the kuru-affected region: these include ancestors, sacred places, sorcery, warfare, kinship etc.

Auyana (Arora dialect) / English glossary

<i>Auyana</i>	<i>English</i>
<i>sama</i>	Soul
<i>simamba</i>	Simulacrum of the soul
<i>kaimba</i>	Person's abilities
<i>kwanta</i>	Ghost formed from the flesh
<i>ilawasi</i>	The way a person thinks

kwantava Home of the ancestors

manihe Sacred founder of a clan

Auyana (Sepuna dialect) / English glossary

<i>Auyana</i>	<i>English</i>
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<i>amavo</i>	Soul
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<i>amanamba</i>	Simulacrum of the soul
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<i>kwanta</i>	Ghost formed from the flesh
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<i>kwantafa</i>	Home of the ancestors
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Auyana cosmology

The creation story

The land created the *manihe* from whom the humans of all the clans are descended. The Arora and Sepuna Auyana told a version of the creation story as told by the Usurufa / Osenā Auyana; however, there was a moral to their version – girls should not fall

for a good-looking stranger too quickly. This referred to the girl in the story who married the wicked python.

Methods for disposing of a body

Traditionally, bodies were disposed of by burial, or placed under a tree between buttresses, on a platform or in a cave. Although the word 'cave' is used to describe the sepulture it was really a hole scraped into the earth in the side of a landslide or small cliff, similar to those seen along roads in the Eastern Highlands where young men have made a hole in a cutting that is used as a shelter from the rain.

History of transumption

Originally, the Auyana did not practise transumption, but during fighting just after the Second World War refugees from Awande and Kagu who fled to Arora introduced the practice of transumption, and a few Auyana started to adopt the practice. Many people were frightened of the new practice of transumption, and there were only a few old women who were the first and only Auyana to adopt it. The Auyana thought that cutting a body up was

disrespectful to the deceased, and believed that the *kwanta* would attack people for carrying out such an action.

Rules surrounding participation in transumption

Women's participation in transumption

If a woman married into the Auyana from the Fore, Kamano or another group that practised transumption she would help consume the body of deceased family members in her community of origin. If she did not participate, her patrilineal line criticized her. If an Auyana woman who married into the Fore died, her brothers would request that her body was buried and the family would respect their wishes.

Sepultures used in the Auyana

Traditionally, burial was the commonest method for disposing of bodies in the Auyana. A hole was dug about a metre deep and cordyline leaves were placed at the bottom. The body was interred in a sitting position, and covered with more cordyline leaves and then wood and soil.

Another traditional sepulture was a platform and this was only used for warriors or other important men. The body was allowed to rot into the ground. The bones were then collected and buried and later removed and hung up in pandanus trees, bamboo groves or pine trees. The practice of placing the bodies of dead warriors on platforms and allowing them to rot infuriated the warriors, who would then attack their enemy with renewed vigour to exact revenge. The souls of the deceased would also assist the warriors.

History of kuru

The inhabitants of Asempa had heard of kuru and knew that it affected the Fore. They believed that it made people go mad, and say strange things. Eventually the patient's body was covered in sores and they were unable to control their muscles. The people in Asempa were frightened by the stories of kuru and were scared of visiting relatives in Fore villages. There were only three cases of kuru in Arora: one was Mrs Pobo Kalawi who came from Kasogu in the North Fore and died before 1957, and the others were a young adult man and a woman born in Arora, who died in 1967-1968. In

Sepuna there was one case of kuru in a local woman before 1957 and she was buried when she died.

Summary of the cultural practices that may have affected the transmission of kuru

The Auyana bordering the kuru-affected region did not practise transumption nor did they consume fluids from decomposing bodies. There was not a lot of contact between the groups as they did not know much about each other until Fore refugees arrived in the 1940s. Although some elderly women adopted the practice of transumption from the Fore at this time it was only a small number of elderly women who participated for a short period of time. Fore women who married into the Auyana would participate in transumption when they returned to their village of birth for obsequies. Auyana women who married into groups that participated in transumption were buried when they died.

Chapter 8:

Genetics of the kuru-affected region

Introduction

The chapter starts with a brief outline of population migration studies in Papua New Guinea (PNG) and then focuses on the early genetic studies on kuru. Our more recent studies and their findings are then summarized and their results discussed in relation to the rest of the thesis. While the laboratory genetic studies were performed by others in the MRC Unit in London, my thesis work was crucial in both the collection of samples from the many linguistic groups affected by kuru and their immediate neighbours, and documenting their individual history of exposure to kuru as part of the wider studies reported here.

Population studies in Papua New Guinea

It is now generally accepted that there were two major waves of migration into Papua New Guinea before the end of the Pleistocene epoch (Wurm, 1983). The first occurred when Australia was still part of the Sahul land mass, and a second population arrived later speaking Proto-Papuan languages. Subsequently another wave of migrants arrived who spoke Austronesian and colonized coastal areas of Papua New Guinea. Initially, many people believed that those who spoke Austronesian and those who spoke Papuan (non-Austronesian) had different biological origins (Kirk, 1992). Attenborough (2005) has pointed out that researchers still use geographical or linguistic terms to refer to groups whose biology they are studying, even though the concept that a particular biological background entailed a particular linguistic and cultural background had collapsed earlier in the 20th century.

These terms are used by Kirk (1992), who refers to specific languages and language groups and interprets the biological evidence in parallel with Wurm's (1983) speculative interpretation of linguistic evidence (Attenborough, 2005). Kirk identified three

specific patterns in the geographical distribution of population-specific genetic markers. The first pattern was referred to as Australoid, and was used to refer to the first wave of migration into Sahul long before sea levels rose 8000-9000 years ago; their languages are assumed to be the forerunners of Australian Aboriginal languages (Attenborough, 2005).

Proto-Papuan was the second pattern, which consisted of genetic markers found in the interior of Papua New Guinea amongst the Papuan-speaking people. There was also a proportion of Papuan groups in coastal PNG and at even lower frequencies, they were also found in the Solomon Islands, but this pattern was not found in Australia. This migration possibly took place after the drowning of the Torres Strait land bridge. The third pattern is referred to as Austronesian and was not found in Australia or in the interior of PNG. It was common in northern and eastern coastal areas of PNG, the Solomon Islands and eastwards into the Pacific. Kirk believed that this corresponded well with the history of the Austronesian language family and with archaeological interpretations of the dispersal of Lapita pottery ware throughout Island Melanesia about 3500-3200 years ago. Kirk discusses if

Austronesian and Papuan linguistic groups are genetically identifiable by looking at a series of studies. By reviewing research conducted on Bougainville, Buka Islands, Karkar Island and in the Markham Valley he showed that the biological markers of the linguistic groups were not easily distinguished and were not the same in different areas, which called for care during analysis. The main reason for this is the result of social interactions between the different linguistic groups, which may take on another's cultural traits or might undergo language shift (Attenborough, 2005), which also indicated the likelihood of genetic interchange.

Kirk (1992) used multivariate statistical techniques to analyze kinship in 15 non-Austronesian populations and 5 Austronesian populations. The results show the clustering of Austronesian groups separate from the non-Austronesian populations. The non-Austronesian groups of the Eastern Highlands include the Asaro, Bena Bena, Gadsup and South Fore, which cluster close together. The Anga occupied a more remote position in the principal component analysis, which supports the distinctiveness of their language and culture (Gajdusek and Alpers, 1972).

Attenborough (2005) has also pointed out that the term Papuan is used to differentiate between Austronesian and all non-Austronesian languages. The question as to whether the Papuan group can be differentiated genetically has not been answered. This presents problems as there is no consensus amongst linguists as to comparable linguistic categories. Since this review by Kirk (1992) genetic research has moved firmly into the DNA era.

Friedlaender and colleagues (2005) have used mitochondrial DNA analysis to look at populations in eastern New Guinea, Island Melanesia and beyond. The distinctive genetic profile of the region shows isolation between the populations of the major islands and also accounts for linguistic differentiation. The patterns and diversity of the results support previous work. The idea that Island Melanesian populations showed high population diversity due to small founder size, isolation and random genetic drift is now less supported by new data, but the broad population structure, at the linguistic group level, shows little differentiation.

Simon Easteal and colleagues (2005) have looked at the genetic differences within the Papuan-speaking population. The

researchers used samples from Papuan groups in eastern mainland New Guinea and East New Britain, and two Austronesian groups from eastern New Guinea as a scale to the differences. They compared sequences nearly 400 base pairs long in the non-coding part of mitochondrial DNA on a world-wide scale. The results showed a large mean pair-wise difference among the sequences from PNG compared to the rest of the world except for East Africa. In the rest of the world the populations radiate from a single node referred to as a 'starburst' radiation, but in New Guinea Easteal and colleagues found two nodes which were the hubs of different radiations. One of these referred to as P has the same radiation pattern as other regions, but the other referred to as Q has a smaller radiation giving the overall pattern a unique 'dumb-bell' shape. It was estimated that the Q node has an ancestry of about 30,000 years. Both nodes were found in all Papuan populations on the PNG mainland used in the study, and were also found in the Ongac Austronesian-speaking people of the Upper Markham Valley.

The starbursts were considered in relation to the effects of a demographic bottleneck, and also to the possibility of selection affecting the entire mitochondrial genome via effects on the coding

genes. They also propose that the widespread distribution of the P and Q lineages suggests greater isolation from the Australian population than previously thought, and the possible re-peopling of New Guinea by an earlier much reduced population or peopling from a population source that is now extinct (Attenborough, 2005).

Harley and colleagues (2005) have looked at the variation in the Y-chromosome to see if there are differences in the genetics of the Papuan language groups. They have examined samples from 6 eastern mainland communities belonging to 5 different language families from two Papuan phyla. By examining short tandem repeats they found distinct linguistic and geographical patterning in the Y chromosome. 77% of the total variation in the Y chromosome was between populations. The data suggested a strong virilocal marriage pattern.

Main and colleagues (2005) have examined human leucocyte antigen (HLA) genes to infer aspects of origins, migration and inter-relationships between different Papuan-speaking groups and their differences from Austronesian-speaking groups. Their data suggest that HLA gene variants and haplotypes of the Goroka (Eastern

Highlands) population are similar to those of Aboriginal Australians. The Abelam (Sepik Basin) and to a lesser extent the Haruai (northern highlands fringe) have similar gene variants and haplotypes with some additional variants not seen in the highlands. The Pawaia (southern highlands fringe) have some unique haplotypes in significant linkage disequilibrium. The authors suggest that the non-typical haplotypes in the highlands may have been introduced by later migrations, and this idea is compatible with models of Kirk and Wurm.

Harding and Liu (2005) have used the β -globin gene to explore genetic diversity amongst Papuan speakers and their ancestors. Archaeological evidence suggests that humans have occupied New Guinea for at least 40,000 years and the genetic diversity supports this time frame. Although it has been suggested that the ancestors of the Papuans emerged from the east coast of Africa between 60,000 and 100,000 years ago, the findings of Harding and Liu have estimated that this happened over 100,000 years ago based on one of the lineages in the β -globin tree, which occurs in Melanesian and Australian populations, but not in African. They suggest that there is evidence for an into-Africa hypothesis, with the Papuan variants

being the ancestors of those found in Africa. It has been suggested that the β -globin diversity may be due to the loss of alleles in Africa due to malaria selection, but Harding and Liu have been unable to find evidence to support this. They have also acknowledged that genetic data can only give rough time scales in comparison to geochronological dating methods.

Introduction to early genetic research of kuru

Initially, kuru was regarded as belonging to the large group of chronic heredofamilial progressive degenerations of the central nervous system. Research into the disease focused on a genetic mechanism for the inheritance of the disease and on a possible genetic marker that would distinguish the kuru-affected population from the non-affected population. As early as 1957 Gajdusek and Zigas (Gajdusek and Zigas, 1957; Zigas and Gajdusek, 1957) raised the possibility of a genetic predisposition to kuru. Data collected by Bennett supported the hypothesis of a single gene model (Bennett et al., 1958). In 1959 Bennett suggested that the kuru-affected region should be quarantined to prevent the spread of the genetic trait. An advisory committee was established by the administration and it

disagreed with his idea as it infringed on the rights of the affected people and was also unfeasible. However, on 21 April 1960, the Australian Minister for Territories, Paul Hasluck, approved restrictions on the movements of the Fore out of their territory. Gadjusek and Zigas were appalled at this decision, and Dobzhansky (1960) wrote to Science about this 'eugenics experiment'. In practice the administration were unable to control people's movements, and besides exempting the Fore from the Highlands Labour Scheme no further action was taken. As the genetic hypothesis for kuru faded the administration ceased to consider any kind of genetic quarantine and in 1962 it was quietly discontinued (Anderson, 2008).

Evidence for the recent spread of kuru (Glasse, 1962b) and experimental transmission of the kuru agent (Gadjusek et al., 1966) put to rest the purely genetic hypothesis for kuru, and several of the genealogical findings of Bennett were shown to be artifacts arising from the epidemic. It was Alpers (1968), and Mathews, Glasse and Lindenbaum (1968), who pointed out that cannibalism was the means of transmission of the kuru infective agent, and that familial

aggregation of kuru was not due to genetic determination, but to kinship-based participation in cannibalism.

Gajdusek (1964) summarized many of the difficulties of explaining genetic selective advantages and disadvantages in small populations. In his view many of the genetic courses taken by isolated groups have been directed by chance events rather than being shaped by natural selection or genetic drift. He outlines a possible genetic hypothesis for kuru and discusses the resemblance of kuru to scrapie, first noted by Hadlow (1959).

Although an infectious agent had been proven to be responsible for the disease and cannibalism was recognized as the means of transmission, Gajdusek and Alpers (Alpers, 1968; Gajdusek and Alpers, 1972) still hypothesized that genetics had played a role in the expression of the disease. This led to a series of papers on the genetics of kuru using serology and electrophoresis. The first of these papers (Gajdusek and Alpers, 1972) gives a cultural, historical and demographic background to many of the linguistic groups in the Eastern Highlands, and some of this information has been incorporated into the ethnographic descriptions in previous

chapters. In the second paper (Simmons et al., 1972) the genetics of kuru victims, the kuru-affected population and kuru-free populations were compared using red cell blood groups. The data presented came from 3,982 individuals of the Eastern Highlands consisting of 300 kuru patients, 2,682 from the kuru-affected region and 1000 from non-affected populations. Variations were found amongst the linguistic groups and villages. However, after extensive statistical analysis no evidence of association between kuru and ABO, MNSs or Rh blood systems was found. Kitchin and colleagues (1972) examined the distribution of the inherited serum group-specific protein (Gc) in selected New Guinea populations. The Gc phenotypes of 2,016 New Guineans and 200 persons affected with kuru were analyzed. The highest frequency of Gc^{Ab} was found in the Fore, Keiagana and Gimi who comprised the majority of the kuru-affected populations. In a later paper (Wiesenfeld and Gajdusek, 1975) it was concluded that those of the Gc Ab-Ab phenotype were six more times likely to contract kuru as a baseline group. However, the authors' criticisms of their analysis included the difficulties in defining an adequate control group in the heterogeneous populations, errors in the determination of the Gc phenotype,

inclusion of persons incubating kuru in the control groups and questions regarding the validity of statistical tests in isolated inbred populations. The fourth paper (Plato and Gajdusek, 1972) compared the dermatoglyphics of the Fore with the kuru-free Anga population. The results were significantly different and were not unexpected – as explained earlier the Anga were from a different genetic, cultural and linguistic complex. Steinberg and colleagues (Steinberg et al., 1972) looked for any possible association between kuru susceptibility and human immunoglobulin G (IgG) allotypes and no association between kuru and Gm allotypes was found.

Recent genetic research on kuru

Research ethics

The recent clinical and laboratory studies and the field studies for sample collection that I conducted were approved by the Medical Research Advisory Committee of the Government of Papua New Guinea and by the Research Ethics Committee of the Institute of Neurology and National Hospital for Neurology and Neurosurgery in London.

Consent arrangements

Full participation of the communities involved was established and maintained through discussions with village leaders, communities, families and individuals. All the field staff were involved in this activity, and the community liaison officer's primary role was to inform communities, families and individuals about the project and its activities. In some cases only a small number of samples might be collected from a lineage or a clan, and in other cases all the clans of a community participated. The field studies followed the principals and practice of the Papua New Guinea Institute of Medical Research (PNGIMR), which included individual oral consent from all participants before any samples were obtained.

The sample archive from Papua New Guinea used for the study of kuru

Prior to colonial contact the kuru-affected linguistic groups were able to diagnose cases of kuru (Lindenbaum, 1975a; Alpers and Kuru Surveillance Team, 2005). Kuru has clearly defined signs, symptoms and clinical course which enabled both foreign and local field investigators to make diagnoses of kuru in the field (Gajdusek

and Zigas, 1957; Alpers, 1964; Collinge et al., 2006; Collinge et al., 2008). Initially, surveillance was conducted by a number of different investigators and their local assistants, but from 1987 to 1995 kuru surveillance was the responsibility of the Kuru Surveillance Team directed by Michael Alpers who was then Director of the Papua New Guinea Institute of Medical Research. In 1996 the surveillance was enhanced by a collaboration with the Prion Unit of the UK Medical Research Council.

Samples have been collected from all the kuru-affected groups, their neighbours and nearly all the other linguistic groups in the Eastern Highlands Province, and some have been supplied by the PNGIMR from archived collections of coastal groups in Papua New Guinea. In all, over 4000 samples have been collected for the study since 1996. This collection has been augmented by DNA samples collected from 1957 onwards by Carleton Gadjusek and colleagues, and stored at the National Institutes of Health, Bethesda, Maryland, USA. Though these samples were largely of serum and often degraded they have been successfully whole-genome amplified and archived for ongoing genetic research (Mead et al., 2008a).

Population structure

During the sample analysis the 127V codon variant was found in some of the modern samples, but the kuru patient samples did not contain this variant. To prove that the Fore population had not changed over time due to migration or random fluctuations an analysis of the population structure was conducted. This involved measuring hundreds of genetic variants spread out on the human chromosome and then using a statistical technique called principal component analysis to summarize the complex data.

The DNA sample collections from the kuru-affected region were not visually distinguishable using principal component analysis implemented by the EIGENSTRAT software package. The results can be seen in Figures 8.1 and 8.2. A study of 1039 single nucleotide polymorphisms (SNPs) from the same sample collections (kuru versus elderly women) showed no population structure amongst the populations of the kuru-affected region. However, the kuru-affected region contrasted with unexposed areas in the Eastern Highlands Province and this population structure is visible in Figure 8.3.

Individuals with the G127V genotype, a protective genotype against

kuru disease (Mead et al., 2009), appeared towards the centre of the kuru region cluster (Figure 8.2).

Codon 129

Heterozygosity at codon 129 in the human prion protein gene, where either methionine or valine can be encoded, is known to provide powerful resistance to sporadic and acquired forms of prion diseases and to affect age at onset in some inherited prion diseases.

Gene frequencies in the United Kingdom population are estimated as 37% methionine (M) homozygous, 12% valine (V) homozygous and 51% heterozygous (MV) at codon 129 (Palmer et al., 1991).

Homozygosity is known to predispose to iatrogenic (Collinge et al., 1991) and sporadic Creutzfeldt-Jakob disease (Palmer et al., 1991).

In cases of exposure to hormone treatments contaminated with infectious prions heterozygous recipients had longer mean incubation periods than homozygous recipients (Brown, 2000). In kuru, those patients homozygous at codon 129 have an earlier age of onset (Cervenakova et al., 1998) and all vCJD cases until 2009 (Kaski et al., 2009) have been methionine homozygous.

Heterozygosity inhibits homologous protein-protein interactions in

prion infections (Palmer et al., 1991) and thus makes replication of the 'protein-only' prion agent less efficient. In addition, this polymorphism is known to affect which prion strains propagate via conformational selection (Collinge and Clarke, 2007).

In a recent study in the Unit (Mead, 2008b) the *PRNP* coding region of the kuru-affected population was examined from paediatric and adult patients at the peak of the epidemic (Cervenakova et al., 1998), from recent elderly kuru patients (Collinge et al., 2006), from healthy young Fore, from neighbouring linguistic groups, and from elderly men and women who attended mortuary feasts but had not developed kuru. The mean incubation period was taken as approximately 12 years (Alpers, 2008). Children and adolescents with kuru had the shortest incubation periods, and elderly women with known exposure were the most resistant as they had the longest incubation periods or failed to develop the disease at all. Elderly men were exposed in early childhood to kuru, and were likely to be resistant; though less so than women who had more exposure.

Males had childhood exposure with females till the ages of 6-8 years when they started to follow the male rules of non-participation in transumption (Whitfield et al., 2008). This is supported by the above expected heterozygosity of males based on the analysis of 100 male codon 129 genotypes arranged by date of birth. An absence of an excess of heterozygosity in very elderly men suggested that they had not been exposed, which is in keeping with witness accounts in the early 20th century. Amongst the exposed males heterozygosity peaked in the mid-1950s, which was the peak of the epidemic, and then declined in incidence compatible with the cessation of transumption by 1960.

The evidence for the effect of 129MV has been strengthened in a more recent paper by Mead et al. (2009), which shows a cline in *PRNP* 129V allele frequency towards the kuru-affected region. There is little significance in the cline between the Fore and other kuru-affected groups, but the cline is more significant in populations not affected by kuru and those geographically more distant. This result was based on 10 recently obtained kuru samples, 142 archive samples from kuru patients and samples from 557 people from the kuru-affected region born before 1960; there

were also 2053 samples from unexposed areas in the Eastern Highlands Province and 313 from more distant areas.

The results were plotted showing increased codon 129 heterozygosity frequency in elderly female survivors of kuru on a map that distinguished areas with high, mid and low levels of exposure. The exposure index was based on the total number of deaths from kuru in each village divided by the population multiplied by 1000. This clearly shows the disequilibrium at codon 129 with an increase in heterozygosity in the kuru-affected region in comparison to other areas in Papua New Guinea, and even more heterozygosity in areas with a high exposure index.

Codon 127

Local oral history recorded by anthropologists traced the origin of kuru to Uwami in the Keiagana linguistic group, and from there it spread into the north and south Fore (Glasse, 1962b; Lindenbaum, 1975).

We started off testing the hypothesis that kuru may have originated from transumption of someone with an inherited prion

disease (Alpers, 1992) by looking for coding mutations in *PRNP* across the Fore. 127V was found and this amino acid is completely conserved in vertebrate evolution which might have suggested it was likely to be pathogenic. However, field studies showed no evidence of neurological disease in these families and indeed, little kuru.

In a recent study from the Unit (Mead et al., 2009) assessments were carried out on 3000 people from the Eastern Highlands Province, including 709 people who participated in transumption, of whom 152 later died of kuru. The assessments were primarily genetic but in some cases clinical and genealogical assessments were conducted. As well as reporting on resistance caused by heterozygosity at codon 129 of *PRNP* they also reported a novel *PRNP* variant – G127V. The variant is found only in the kuru-affected region and was present in half of the women from the area of highest exposure who were homozygous methionine at codon 129. Genealogical analysis showed that there was a lower incidence of kuru in pedigrees with the G127V variant.

The results of the findings for codon 129 have already been described. However, the results of the genotype analysis show that the 127V polymorphism was invariably linked to the 129M allele and was geographically centred on the Purosa Valley where the 127V variant is most commonly found.

36 samples of patients who died of kuru out of 48 who were under 20 years of age were found to be homozygous at codon 127GG and 129MM, or 127GG and 129VV. Out of 125 samples of elderly women exposed to kuru 36 showed homozygosity, and out of 104 kuru patients over 20 years of age 27 showed homozygosity. Codon 129MM and 129VV are associated with young people with kuru and codon 129MV with elderly survivors and older age at onset of kuru.

Nobody with the 127V polymorphism was found to have any neurodegenerative disease. The 127V samples were from 51 people from 32 families with an age range of 16-78 years and 11 people from different families who were aged over 50 years. Genealogies were collected prior to the analysis of the samples from 18 probands. At least one parent of the 127V probands carried the polymorphism and therefore it was likely that there would have

been a decrease or increase in the incidence of kuru amongst the parents of the 127V probands who would have lived through the epidemic. 127V pedigrees were compared with 127G pedigrees from villages in the Purosa Valley in which at least one person had the 127V polymorphism. In the area of highest exposure, Ai, Ivaki, Kalu, Kamira, Ketabi, Mugaia muti, Purosa-Takai, Takai, Waisa and Wanitabi had pedigrees. In the area of moderate exposure pedigrees were found in Ilesa and Agakamatasa. Only 1 parent out of 36 from the genealogies collected from families with the 127V polymorphism was recorded as having died of kuru. In the matching 127G genealogies 33 out of 218 parents died of kuru.

The restriction of the polymorphism to such a small area suggested a very recent common ancestor and after further investigation, which considered the degree to which a 127V-associated haplotype was preserved on chromosome 20, it was estimated that the common recent ancestor using ESTIAGE was 10 generations for 32 unrelated individuals; by the Risch method it was 12.8 generations with 51 samples and 15.3 generations with 32 samples from genealogically unrelated individuals (Mead et al., 2009).

The viability of persons with different *PRNP* genotypes in the kuru region can be expressed as relative fitness, which was defined as the number of surviving people of a particular genotype standardized to the most viable genotype. All heterozygous combinations of 127 and 129 were equally the most viable genotypes. The sample groups consisted of 480 persons born before 1960 in mid- and high-level areas of exposure. The homozygous groups were shown to have less viability, and elderly women from villages with high exposure to kuru were shown to have even less viability.

Amongst those elderly women born before 1960 127V alleles were more likely to be found in those susceptible 129MM homozygotes than in 129MV heterozygotes, but these genotypes were in balance in persons born after 1960. The results confirm that 127V provides resistance to disease in those who are 129MM homozygous.

The authors also considered the alternative possibility that 127V might be associated with late-onset, low-penetrance or recessive inherited prion disease that might have caused the kuru

epidemic. The possibility was considered as the average life expectancy in the highlands was between 40 and 45 years before colonial contact. However, they point out that this is unlikely as there are few examples of mutations that cause autosomal dominant neurodegenerative disease that obtain the frequency seen in the Purosa Valley. The inheritable prion diseases caused by point mutations are known to be poorly transmissible or non-transmissible to animals. They are also associated with a diseased molecular form of the prion protein which is distinct from that of kuru and Creutzfeldt-Jakob disease. According to oral sources the kuru epidemic started in the village of Uwami in the Keiagana linguistic group (Lindenbaum, 1979), which is inconsistent with the localization of a disease-enhancing 127V in the Purosa Valley.

Effects of non-prion genetic loci

Prion diseases are naturally transmissible neurodegenerative diseases. Transmission of a defined prion strain to different inbred lines of laboratory mice produces wide variations in incubation times between inbred lines. Genetic linkage studies have shown that much of this variation is due to genetic factors (Stephenson et

al., 2000; Lloyd et al., 2001; Lloyd et al., 2002). Further studies in the Unit demonstrated (Lloyd et al., 2009) that a mouse quantitative trait gene also influences susceptibility to human prion disease. A heterozygous stock of mice was used to identify HECTD2, an E3 ligase, as a quantitative trait gene for prion disease incubation time in mice. In a human association study HECTD2 haplotypes were also found to be associated with vCJD and kuru. This is the first finding of genetic risk outside of *PRNP* conferred in a mouse model and two human prion diseases. Several other mouse quantitative trait loci have been mapped but their causal genes remain elusive.

It is now possible to conduct human genome-wide genetic association studies (GWAS) using common genetic variants, and whole genome re-sequencing may take place in the near future. These techniques have already been used on a number of common diseases producing a large number of statistically robust gene associations (Simon-Sanchez and Singleton, 2008). One of the problems associated with this are the small sample sizes available for rare prion diseases where sample sizes have only just been large enough to detect moderately strong genetic effects (Mead et al., 2009). However, high diagnostic accuracy and well-defined

molecular pathogenesis should help detect modifiers in prion disease. The kuru samples will be important in helping in their detection and understanding their impact.

Evidence for balancing selection in the Fore

Mead et al, (2003) showed that heterozygosity at codon 129 of *PRNP* conferred resistance to kuru in elderly survivors of the kuru epidemic, in marked contrast to young unexposed Fore. The results showed that kuru had imposed strong balancing selection on the Fore eliminating homozygotes.

In this early study blood samples were obtained from women aged over 50 who had participated in multiple feasts. Out of 30 women, 23 were heterozygous at codon 129, which was a significant finding when compared with the genotypes of the unexposed population which are in Hardy-Weinberg equilibrium. Two large groups of elderly Europeans showed Hardy-Weinberg equilibrium in contrast to the Fore suggesting that the Fore result was local. The age of onset for kuru in homozygotes has been estimated at 19 years of age and in heterozygotes over 30 (Cervenakova et al., 1998). The results have been confirmed in a much larger study using 450

samples from the exposed population born before 1960 (Mead et al., 2009). In this study the results were stratified showing a clear deficit of homozygosity at codon 129 in elderly women with exposure to kuru. This result was not found in women born between 1950 and 1960 or in elderly men and unexposed women. Men born between 1950 and 1960 who had childhood exposure showed distortion of Hardy-Weinberg equilibrium. Men born in the 1940s or earlier showed Hardy-Weinberg equilibrium suggesting that they had little exposure to kuru. This is consistent with the reported increase of incidence of kuru through the early 20th century.

The genotypes of the young Fore population have also been compared to those of their neighbours in the Eastern Highlands Province to see if they had a higher frequency of resistant genotypes as a result of the kuru epidemic. It was expected to see 129V as a more frequent allele in the Fore population, which was the case; however, the difference was not large. It was found in the Fore that diversity of microsatellite alleles linked to codon 129V were not linked to a rapid increase in 129V frequency from a low level. This has led Mead and his colleagues to conclude that the 129V allele

occurred at high frequency before the kuru epidemic in the Eastern Highlands Province (Mead et al., 2008b).

Evidence for balancing selection globally

The evidence for balancing selection in the Fore (Mead et al., 2003) was used as a basis for a study to see if there was balancing selection at codon 129 or E219K of *PRNP* worldwide. Heterozygosity at *PRNP* polymorphism E219K is associated with resistance to sporadic CJD in Japan (Shibuya et al., 1998).

The primary sequence of prion protein is highly conserved between primates, and methionine is the ancestral amino acid at codon 129 (Shatzal et al., 1997). Two thousand chromosomes were genotyped in populations selected to represent worldwide genetic diversity to see which *PRNP* nucleotide changes were intermediate polymorphisms. M129V was polymorphic in all the populations studied with a reducing cline towards East Asia with the lowest frequency found in Japan. The E219K polymorphism was found in populations on the Indian subcontinent, East Asia and Japan. All the populations that were studied contained one of the disease-resistant polymorphisms. Although the reducing cline of incidence

of 129V worked eastwards it was a striking finding that the Fore population had the highest frequency of 129V in the world. In total 7 intermediate frequency polymorphisms were found: 5 coding changes, and 1 silent change, with 1 octapeptide repeat deletion. The McDonald and Kreitman test was then applied, which concluded that *PRNP* did not appear to be a rapidly evolving gene. Further testing suggested a significant departure from neutral evolution with an excess of human coding polymorphism.

It was also found that the European, African and Fore population have highly distinct divergent clades associated with different alleles at codon 129. This suggested that codon 129 is an ancient polymorphism. The age estimation for a common ancestor of both the V and M lineages was 500,000 years.

The results showed that the Fore were recently subjected to very strong balancing selection at the prion locus, and the results of the worldwide study indicated historical balancing selection. The authors proposed that acquired human prion disease might have provided the worldwide selective pressure. One possibility discussed is that a prehistoric endemic animal prion disease was able to cross

the species barrier to carnivorous humans. The other is that widespread cannibalistic practices in prehistoric populations might have been responsible for the transmission of a prion disease. Evidence for cannibalism in prehistoric populations has been found at several archaeological sites (Villa, 1992; Marlar, 2000). It has been suggested that the kuru epidemic was caused by a single case of CJD that was consumed, and the infectivity amplified through subsequent mortuary feasts where the infected corpses were consumed by relatives (Alpers, 1992). A similar event could have triggered human prion epidemics in prehistoric times. These epidemics in prehistoric human populations would have made heterozygosity at codon 129 of *PRNP* a selective advantage causing balancing selection.

Not everyone has agreed with the findings. Kreitman and Di Rienzo (2004) and Soldervila et al. (2006) have criticized the *PRNP* genealogy, saying that the same results might be seen as an artifact of the way the data were collected due to ascertainment bias. Their criticism was based on the idea that rare genetic changes might have been missed because of the methods used to genotype the samples. One of the analytical methods used, Tajima's D, critically

depended on the frequency of rare and common variants and the authors believed that biased primary data may have affected the conclusions. However, the most recent paper by Mead et al. (2009) provides further very strong evidence of balancing selection at codons 127 and 129 of *PRNP*.

Conclusions

The purpose of the investigation into the genetics of kuru was to understand, in a nearly completed epidemic, genetic susceptibility and resistance and the genetic effects on incubation period of relevance to the vCJD epidemic.

The investigations into population structure showed no structure amongst the Fore population. However, there was a contrast between the kuru-exposed and non-exposed populations in the Eastern Highlands (Mead et al., 2009).

Increased codon 129 heterozygosity frequency in elderly female survivors was found in the kuru-affected region in contrast to other non-affected areas in PNG. Codon 129MM and 129VV are associated with young people with kuru and codon 129MV with

elderly survivors and older age at onset of kuru. The absence of an excess of heterozygosity in males confirmed eyewitness accounts that elderly men had not been exposed to kuru (Mead et al., 2009). Elderly males exposed in childhood to kuru are also resistant, but less so than women who had more exposure (Mead et al., 2008b).

The discovery of the G127V protective variant in some families was relevant to how the epidemic would have evolved if transumption had continued. The G127V variant is only found in the kuru-affected region and genealogical analysis showed a lower incidence of kuru in pedigrees with the G127V. The G127V variant was shown to be linked to the 129M allele (Mead et al., 2009).

It was found that heterozygosity at codon 129 of *PRNP* conferred resistance to kuru in elderly survivors of the epidemic in marked contrast to the younger non-exposed Fore population. The results showed strong balancing selection on the Fore (Mead et al., 2003; Mead et al., 2009). In a global investigation of balancing selection at codon 129 and E219K it was found that M129V was polymorphic in all populations with a decreasing cline towards East Asia. The E219K polymorphism was found in East Asia, Japan and

the Indian subcontinent. Testing suggested a significant departure from neutral evolution with an excess of human coding polymorphism. It has been hypothesized that kuru-like epidemics in prehistoric human populations may have caused this strong balancing selection (Mead et al., 2003; Mead et al., 2009).

The results support previous investigations into kuru which did not establish genetic explanations for spatial and temporal epidemiological differences (Kitchin et al., 1972; Simmons et al., 1972; Steinberg et al., 1972; Wiesenfeld and Gajdusek, 1975). The early work of Kirk (1992) showing the clustering of the Asaro, Bena Bena, Gadsup and South Fore populations was supported by recent investigations (Mead et al., 2009). The kuru-unaffected Anga were shown to be culturally, linguistically and genetically different from the kuru-affected populations (Gajdusek and Alpers, 1972; Kirk, 1992). The work of Easteal et al., (2005), Harley et al., (2005), Main et al., (2005) and Harding and Liu (2005) generally supported the hypothesis that Papuan-speaking populations of the highlands of New Guinea have common ancestors. The findings of Harley et al. (2005) suggest a strong virilocal marriage pattern, which is

supported by our own ethnographic investigations in the Eastern Highlands.

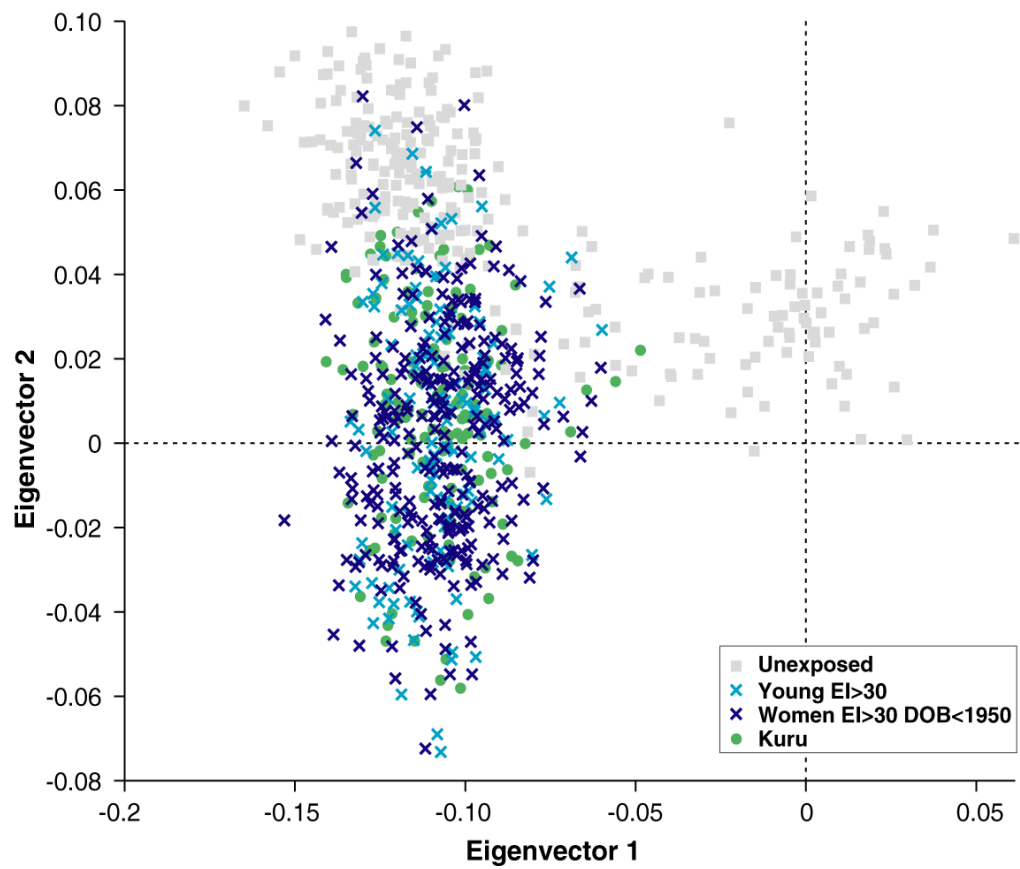


Figure 8.1. Plot of two eigenvectors from analysis of 820 kuru patients, elderly women, young individuals from the kuru region and unexposed populations, showing no population structure in the kuru region. Figure taken from Mead et al. (2009) with permission.

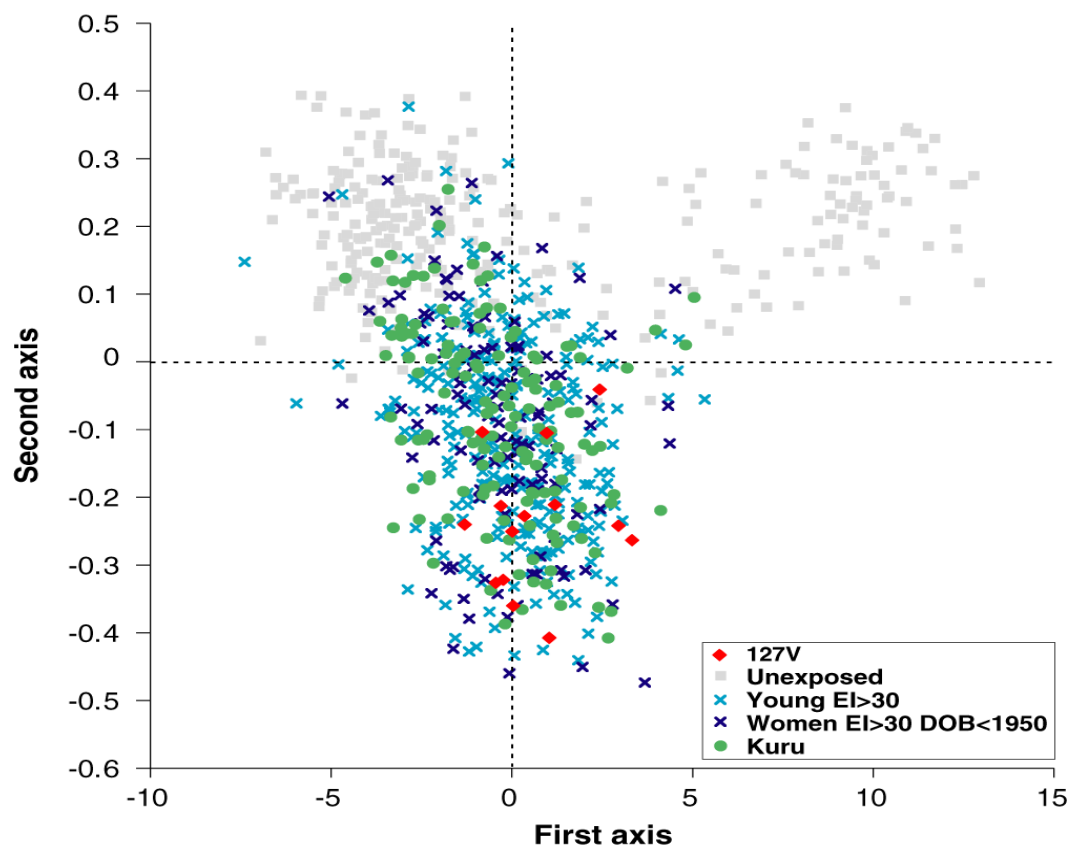


Figure 8.2. Plot of the first two axes from the analysis of 826 kuru patients, elderly women, young individuals from the kuru region and unexposed populations with identity-by-state clustering and multidimensional scaling (PLINK), which shows no population structure in the kuru region. Figure taken from Mead et al. (2009) with permission.

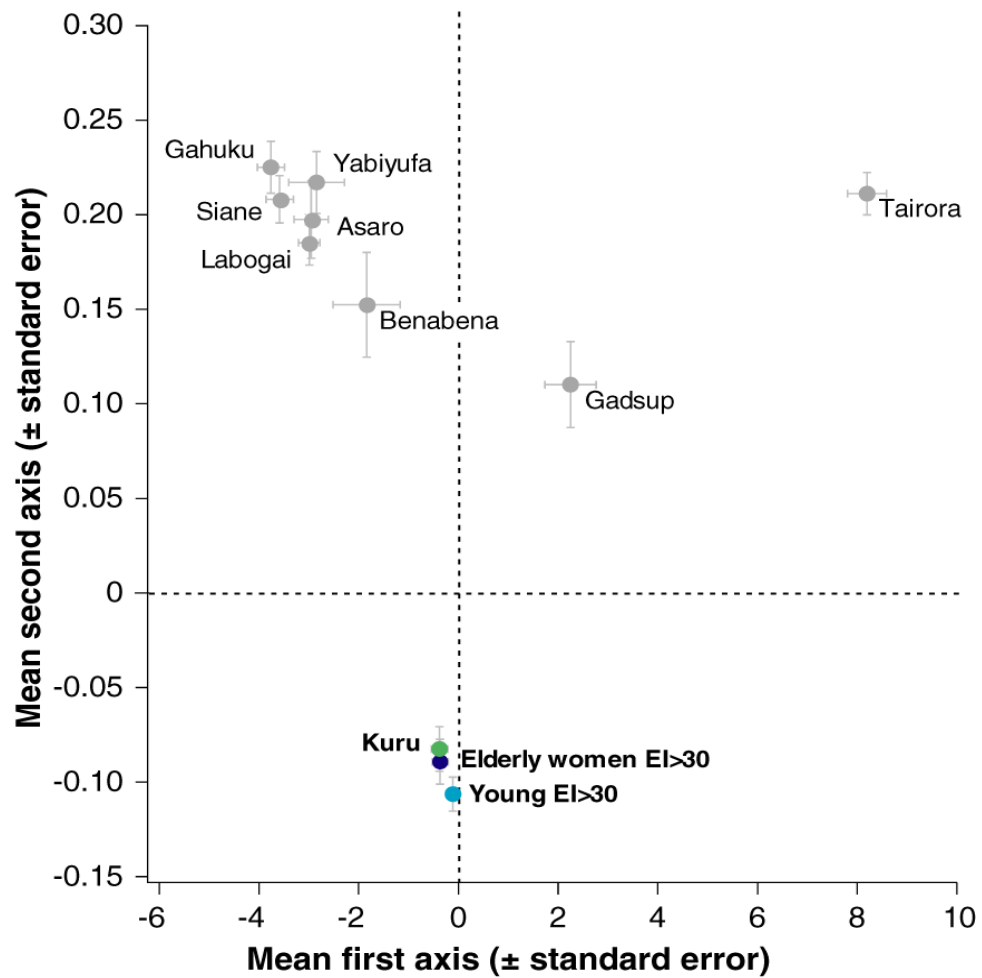


Figure 8.3 Means (\pm standard errors) subdividing the unexposed populations by linguistic group (refer to Supplementary Appendix A figure 8 for locations of the linguistic groups). Overall these data demonstrate population structure among the linguistic groups of the Eastern Highlands Province that are beyond the kuru-affected region., Figure taken from Mead et al. (2009) with permission.

Chapter 9:

Conclusions

Introduction

In the first section of the chapter historical aspects of the aetiology of kuru are briefly reviewed. Based on the differences in detail between the mortuary rites of the cultural groups in the kuru-affected region, the results of the investigation into mortuary rites are examined for their epidemiological relevance. The conclusions of the genetics chapter are revisited and the results of previous studies on nutrition and trace metals reviewed. An explanation is given for the origin and decline of the disease incorporating the new results from the mortuary practices. Finally, the main route of transmission of kuru is established.

Historical aspects of the aetiology of kuru

The neurodegenerative nature of kuru, with no evidence of an immune or autoimmune response, the failure to find an infectious agent and the unusually high familial incidence in women and children challenged the early investigations into the disease. These findings gave weight to the genetic hypothesis of a single gene dominant in females and recessive in males that produced fatal disease in homozygous children and in heterozygous adult females. However, the hypothesis was eventually considered untenable because of the high incidence and recent origin of kuru and its unconvincing explanation of the widely ranging age of onset in kuru. The analysis of familial and genetic relationships of kuru patients by Robert Glasse and Shirley Lindenbaum also strongly indicated that kuru did not have a genetic origin. It was Hadlow's observation of the similarity of kuru to scrapie (Hadlow, 1959), a prion disease of sheep and goats, and the subsequent transmission of kuru (Gajdusek et al., 1966) that confirmed the infectious nature of kuru.

Once the infectious nature of kuru was proven, the means of its transmission was determined to be the mortuary practice of transumption (Alpers, 1968; Mathews et al., 1968). This explained the changing epidemiological patterns of the disease (Alpers, 1965; Alpers and Gajdusek, 1965). The incidence of kuru in women and children was explained, as they were the major participants in transumption; with the cessation of transumption kuru ceased to appear in the youngest cohorts, and vertical transmission of kuru was disproved (Alpers, 1968). Although it was generally accepted that the infectious agent of kuru was transmitted orally through transumption, Gajdusek emphasized parenteral inoculation over oral consumption as the means of transmission during the traditional mortuary feasts (Gajdusek, 1971).

Mortuary practices that affected the spatial and temporal epidemiology of kuru

In Chapter 3, it was noted that there were North Fore villages in the area of residual high incidence although most were in the area where kuru had already ended. This raised the question as to what were the principal factors that determined cultural practices, in particular mortuary practices, in a village. Language was a critical

factor and within a linguistic group we found a general consistency of practice, with only the occasional exception. These exceptions were often carried out by refugees from elsewhere. Importantly, cultural practices were more flexible, or more diverse, in border communities, either between languages or between dialects; for example, a village in a border area might speak one language, but their mortuary practices might be those of a different linguistic group. The North Fore villages in the area of high incidence of kuru had the same mortuary practices as those of the South Fore, rather than those of the majority of North Fore communities. This situation also occurred in the Hepavina region of the Gimi.

In the South Fore those who died of kuru were disposed of by transumption. In the North Fore and Gimi there was some ambiguity surrounding the bodies of those who died of kuru and many were not consumed. Early in the kuru epidemic those who died of kuru were possibly consumed in the Keiagana, Kanite, Usurufa, Yagaria, Yate and Kamano, but this quickly changed when they decided that kuru was contagious, and they ceased to eat the corpses of those who died of kuru. In the Awa those who died of kuru were never disposed of by transumption. Transumption was

not an accepted cultural practice among the Auyana adjacent to the kuru-affected region. Thus the differences in mortuary practices provide a sufficient explanation for the way kuru spread from its initial focus, and why the epidemic faded out in the Keiagana and other linguistic groups to the north and west but amplified and expanded in the Fore.

In practice, all the women in the North and South Fore took part in transumption, except for the occasional one who was prohibited by her husband. The women and children ate brain, spinal cord and internal organs in almost every community. In the Gimi, Keiagana, Kanite, Kamano, Yagaria, Yate and Usurufa only older women (with 2-4 children) participated in the transumption of the brain, spinal cord and internal organs. Children were not allowed to consume brain, spinal cord or internal organs. In the Awa the older women (those with at least 2 children) were allowed to consume the brain, spinal cord and internal organs. Children were not allowed to eat the spinal cord and internal organs, although male children were fed brain in a special ritual so they would become great warriors (girls did not take part in this ritual). Thus nearly all the women and children in the Fore had the chance

of being exposed to the infective agent, in contrast to the other linguistic groups, where in the main only older women were exposed.

To conclude, the South Fore had the most exposure, as they ate those who died of kuru, followed by the North Fore and Gimi, who ate some of those who died of kuru; the other linguistic groups initially consumed those who died of kuru, but soon stopped when they began to suspect that kuru was contagious. Among the Awa boys were fed brain but those who died of kuru were never eaten. In the North and South Fore women and children were exposed to infective tissue; in the other linguistic groups it was mainly older women who were exposed. The mortuary practices now described in detail in this thesis are therefore sufficient to explain the major spatial and temporal differences of the kuru epidemic.

Genetics of kuru

The purpose of the investigation into the genetics of kuru was to understand, in a nearly completed epidemic, genetic

susceptibility and resistance and the genetic effects on incubation period of relevance to the vCJD epidemic.

In general it is accepted that those who are homozygous for *PRNP* (prion protein gene) codon 129 are susceptible to prion infection, and heterozygotes are susceptible with some protection. The homozygous genotypes 129MM and 129VV also show differential susceptibility. All vCJD patients, except the most recent one, have been 129MM but early iatrogenic CJD patients were 129VV (Collinge et al., 1991).

Amongst the stratified kuru groups the most susceptible were children, who were 129MM homozygous and to a lesser degree 129VV. Groups with low susceptibility had a greater proportion of 129MV genotypes and a lack of 129MM genotypes. This was the case with the elderly female survivors of the epidemic and with recent cases of kuru with long incubation periods, who showed a significant increase in heterozygosity at codon 129. The data supported the idea of strong balancing selection on the *PRNP* caused by the kuru epidemic (Mead et al., 2003).

Results have shown that heterozygous elderly women are most resistant to the infection and have the longest incubation periods or fail to develop the disease. Elderly males exposed in childhood to kuru are also resistant, but less so than women who had more exposure (Mead et al., 2008b).

The length of the incubation periods of kuru, some of which are at least 50 years, has important implications for our understanding of the variant CJD epidemic. vCJD patients have all been 129MM except the most recent one and the epidemic is likely to be staggered as it affects different genetic groups (Collinge et al., 2006; Mead et al., 2008b).

Mead and colleagues (2009) have clearly shown that there is no population structure amongst the different linguistic groups of the kuru-affected region. This confirms that genetics was not responsible for the temporal and spatial epidemiological differences of kuru. The dramatic finding of the protective variant G127V in some families is relevant to the way the epidemic would have evolved if it had been unchecked, but does not contribute any

explanation for the established spatiotemporal epidemiological changes.

The Prion Unit studies suggested that strong balancing selection has influenced the prion protein gene in all populations worldwide, and a rough estimate of the age of the codon 129 polymorphism is 500,000 years. The most likely explanation for this balancing selection put forward by the Unit is that heterozygosity at the prion protein gene gives resistance to human prion infections, which populations were exposed to during the regular consumption of humans in prehistoric times (Mead et al., 2003).

Conclusions from the nutritional and environmental study of the kuru-affected region

Early researchers considered the possibility of heavy metal poisoning as the cause of kuru. Carleton Gajdusek with Lucy Hamilton Reid and, later, Richard Sorenson made extensive studies of the Fore diet, and composition of soil, food and ashes from cooking fires. Over 400 zoological and botanical specimens used by the Fore, such as foods, traditionally made salt, body paints and

traditional medicines, were investigated (Reid and Gajdusek, 1969; Sorenson and Gajdusek, 1969).

The investigation found that the Fore diet was superior to that of their kuru-free neighbours, and men were found to eat more frequently with women and children, although they still practised sex segregation like other New Guinea highland societies. The consistency of use of specific dietary items by the Fore and their non-affected neighbours was noted. The results showed no excessive use in those who developed kuru and all items were used by at least one of their kuru-free neighbours. It was also noted that some individuals who had left the kuru region still developed the disease, with the same clinical features and course. Trace metal analysis of tissues of kuru patients, garden soils, drinking water, stones used for cooking and salt preparations were conducted without detecting any abnormally high concentrations or deficiencies. There were also many cases of Fore women marrying into other linguistic groups and then developing the disease later, which argued against an immediate environmental cause of kuru (Zigas and Gajdusek, 1959; Gajdusek, 1963).

We can conclude that there is no evidence to support any nutritional deficiency or toxic cause of kuru, or any association between nutritional factors or trace metals and genetic susceptibility to kuru prions.

Explanation for the origin and decline of kuru

Robert Glasse and Shirley Lindenbaum used local oral history to trace the origin of kuru to Uwami in the Keiagana linguistic group around the turn of the 20th century (Glasse, 1962b; Lindenbaum, 1975a). They also recorded its subsequent spread to Awande, Kasokana and throughout the South Fore (see Figure 2.1). Kuru was present in most North Fore villages by the 1940s, and only reached Paiti in the southwest corner of the South Fore at the start of the 1950s.

Considering the worldwide incidence of sporadic CJD, 1-2 cases per million (Zerr and Poser, 2007), it was likely that a case would occur in the area where transumption was practised and cause an outbreak of a transmissible prion disease, if the practice continued for long enough. When the members of this patrilineage developed

kuru they were consumed in turn by their affines from Kasokana and the spread of kuru continued in the same way throughout the North Fore and into the South Fore. The participation in transumption by the affines and other guests allowed kuru to spread throughout the Fore region.

It is likely that the practice of transumption was modified in kuru-affected groups to the north of the line of residual high incidence (see Figure 3.1) before the effects of the axis of social change brought about a subsequent decline in the incidence of kuru. This was the result of the northern communities ceasing to consume the bodies of those who died of kuru, as they feared kuru was contagious. In the South Fore those who died of kuru were nearly always eaten, and the cessation of transumption took place over a decade, with no transmission of kuru taking place after the early 1960s. Those North Fore villages in the area of high incidence (including Awande and Kasokana) were in the habit of consuming those who died of kuru, as in the South Fore villages. In the Gimi also, those who died of kuru were in general not eaten; however, amongst the border communities of the Hepavina region of the Gimi, where both the Gimi and Fore languages were spoken,

communities consumed those who died of kuru. The mortality from kuru was much higher in the Hepavina region than elsewhere in the Gimi (Gajdusek, 1963). Although the Gimi ceased transumption later than the South Fore, they had less exposure to the infective agent over a shorter period of time. As it was mainly the older women who took part in the transumption of infective tissue in the non-Fore affected linguistic groups there was little childhood or adolescent transmission, which accounts for the earlier cessation of kuru in these linguistic groups.

Even before investigations began into kuru the axis of social change from the northeast across the kuru-affected region (see Figure 3.1) brought changes that affected the spatial and temporal distribution of kuru. The first government patrols entered the northernmost affected areas in 1947 and soon after police posts were established and village officials appointed. North Fore men were working in agricultural stations in Kainantu and Aiyura as early as 1952 and Papua New Guinean missionaries were already living in the South Fore in the same year. The Lutheran Mission was established at Tarabo in the Keiagana in 1949. A police post was established in Moke in 1951 and a government station in 1954.

The government officials and missionaries admonished the local people for practising transumption and they quickly conformed to the intruders' wishes. Because of this axis of social change, it is likely that kuru was already on the decline in the North Fore, Kamano, Usurufa, Kanite, Yate, Yagaria and Keiagana before investigations began in 1957.

The South Fore population had the most exposure to the infective agent since they consumed nearly all of those who died of kuru. They also had the largest number of people exposed, as women of all age groups and children participated in the transumption of infective tissue. The North Fore consumed some of those who died of kuru, and like the South Fore the women and children were exposed. Finally, the other kuru-affected linguistic groups (with the exception of the Hepavina region in the Gimi) had the least exposure as they did not consume those who died of kuru (except initially) and only the older women ate the infective tissues. The effects of the axis of social change meant that by 1950 the northernmost areas were already starting to bury their dead, and had started to comply with the Administration's wishes to cease transumption, several years ahead of the South Fore. However, the

most powerful factor reducing the transmission of kuru had been the decision taken by the people of these cultural groups not to eat their kuru dead.

Parenteral and oral transmission

Gajdusek (1971) emphasized parenteral inoculation over oral consumption in the participants of transumption and implied that participants rubbed infective brain tissue over their bodies during the ceremonies. The titre and route of inoculation affect the transmissibility and incubation period of prion diseases and therefore, in view of this controversy, it was important to establish the primary route of transmission of kuru.

All the participants in all the linguistic groups of the kuru-affected region had open sores and cuts on their bodies as described in the South Fore section. The women cleaned their hands with the natural materials that were available to remove the pollution and wiped them on their bark capes and 'pulpuls'. Among the *atigina* of the South Fore the women might sometimes rub blood on their bodies during mourning but this was not done among the

pamusagina. Importantly, brain tissue was not intentionally rubbed on the bodies of mourners in any of the linguistic groups affected by kuru. This was specifically denied in all groups.

In all the linguistic groups pregnant women rubbed fluids from the cooked bodies on their abdomens so the unborn child would have a similar appearance or character to the deceased. In the North Fore, Keiagana, Kanite, Yagaria, Yate and Gimi all participants of transumption would rub fluids from the cooked body on their bodies to receive blessings from the deceased. Also, in these groups, when a body was placed on a platform sepulture the female agnates and their children rubbed fluids from the decomposing corpse on their bodies to receive their anticipated blessings. In the Usurufa and Awa this ritual was not practised as they feared the ghost would harm them. In the South Fore these rituals were not performed since the main principal adhered to was the complete consumption of every part of the body.

We can conclude that, though the possibility of parenteral inoculation certainly existed, and no doubt occasionally occurred, throughout the kuru-affected region infective material from the

brain, spinal cord and internal organs was never intentionally rubbed on the bodies of mourners, as had been claimed. This confirms that kuru was primarily transmitted orally.

Glossary of anthropological and 'Tok Pisin' words

Affines: persons related by marriage

Agnate: person related through the male line

'Bilum': traditional string bag used throughout Melanesia

Bullroarer: shaped piece of wood attached to a piece of string,
which produces a noise when whirled around the user.

Endocannibalism: consumption within a community of bodies of
relatives who have died

Eschatology: part of theology related to death, judgement and
the afterlife

Exocannibalism: consumption of the bodies of humans from
outside the community who have first been killed

‘Head pay’: mortuary payment to the affines for the flesh and
blood of the deceased

Hermeneutics: the interpretation of texts

‘Kiap’: patrol officer of the Australian Administration

‘Kibung’: a meeting.

‘Kul’: to remove anger

‘Luluai’: a village chief appointed by the Administration.

‘Masalai’: guardian spirit of the founding ancestor

Palisade: defensive wall made of wood

Phenomenology: the science of phenomena distinct from the
nature of being

Phratry: clans who have a common founding ancestor

‘Poroman’: males of the same age set

‘Poromeri’: females of the same age set

‘Pulpul’: traditional grass skirt

Sepulture: burial site

Simulacrum: an image of someone or something

Snowball sampling: where initial respondents provide access to
other informants

Tapa cloth: cloth made of beaten tree bark

Transumption: the mortuary practice of the consumption of the
dead and incorporation of the body of the dead person
into the bodies of living relatives, thus helping to free
the spirit of the dead.

Trope: metaphorical use of a word

‘Tultul’: assistant village chief appointed by the Administration

Notes:

Some commonly used Tok Pisin words are construed as English and used in the text without inverted commas.

The English orthography in the text of this thesis follows that of the Shorter Oxford English Dictionary.

Appendix A:

An introduction to the geography, historical linguistics, archaeology and social anthropology of Papua New Guinea and of the kuru-affected region

Introduction

This chapter summarizes background information on Papua New Guinea (PNG) and the kuru-affected region that will orientate the reader to the country, and more specifically to the kuru-affected region and kuru.

The independent state of Papua New Guinea comprises the eastern half of the island of New Guinea and its many neighbouring islands, principally New Britain, New Ireland, Manus and Bougainville.

The opening sections describe the geography of PNG and of the kuru-affected region. They are followed by similar dual sections on historical linguistics, archaeology and social anthropology. The history of the kuru-affected region and of kuru research have been briefly described in Chapter 2.

The geography of Papua New Guinea

Geology

Papua New Guinea is positioned at the meeting point of two global crustal plates, the Australian land mass to the south and the Pacific Plate to the north. Mountains in the island of New Guinea (the mainland) reach 4000 metres above sea level and cover half of the land. They are formed from metamorphic and intrusive rocks running from the west of the island in Indonesian Papua to the islands of Milne Bay in the east. The highest point is Mt Wilhelm (4509m). There are also large highland intramontane valleys, lowlands made up of alluvial wash, large swamps, extinct volcanoes and active ones in island arcs off the north coast.

The highland valley floors are between 1500m and 1600m above sea level and contain either lacustrine deposits and alluvium, or volcanic ash and mudflows or both. The highlands are drained by a number of rivers that flow to the north or south of the country (Figure 1). The rivers cut deep gorges through the mountains and then form large wide rivers in the lowlands. To the north of the highlands the mountains fall away sharply to a geological trough that contains the Sepik, Ramu and Markham rivers. North of the trough lie the Bewani-Torricelli-Prince Alexander ranges reaching up to 1500m and, further south the Adelbert, Finisterre and Saruwaged mountains extending through the Huon Peninsula. The central highland range continues eastwards to form the Owen Stanley Range, which includes Mt Lamington and the Hydrographers Range in the west, and the Cape Nelson volcanoes to the east and maintains the highlands backbone to the eastern tip of Papua at Milne Bay (Allen, 1992).

The first island arc off the coast consists of island volcanoes including Manam, Karkar and Long Island. The last eruption of Long Island had considerable effects in the highlands of New Guinea as well as in its immediate proximity (Blong, 1982). The arc

then continues through the island of New Britain which contains a number of active volcanoes. The second arc extends from Manus, to New Ireland and then to Bougainville (see Figure 1) (Naval Intelligence Division, 1945).

Climate

Papua New Guinea is located in the tropics and mean temperatures are similar all over the country except where they are influenced by altitude. Above 2600m there are occasional ground frosts. Humidity is high throughout the country and only drops below 70% in areas with long dry spells. There are significant differences in rainfall throughout PNG and it is possible to distinguish 'wet' and 'dry' areas. Parts of the Papuan coast receive less than 1000mm of rain per annum, the Goroka and Aiyura valleys in the Eastern Highlands receive 2000mm and the northern and southern highland fringe areas receive more than 4000mm of rain per annum. Finally, the Star Mountains and the mountains between Mt Bosavi and Mt Karimui receive over 8000mm per annum (Figure 2). There are distinct rainfall patterns with most of the country receiving its rain between January and April; however,

some areas receive the majority of their rain between May and August. This is caused by backing mountain ranges which lie across the south-east trade winds. Those areas with lower rainfall such as the Eastern Highlands valleys have an extended dry period from May to October.

Climatic conditions are affected by the El Niño/Southern Oscillation (ENSO) phenomenon. When this occurs it causes a reduction in rainfall which can be severe, and has caused drought and famine in the past. A reversal of this phenomenon is responsible for increased rainfall in Papua New Guinea though this can be hard to detect in a country that naturally has high rainfall (Allen, 1992).

Vegetation

Vegetation patterns are largely determined by altitude and human activity. In the lowlands there are rainforests, mangroves and swamp vegetation, over 1000m there is montane rainforest turning into upper montane forest over 3000m and finally alpine shrubs, grasses, lichens and moss over altitudes of 3500m (Naval Intelligence Division, 1945; Allen, 1992). In the Markham Valley

and Sepik plains there are large areas of *Themeda* and *Imperata* grasslands caused by human activity. In the highland valleys *Miscanthus* cane grass grows between scrubby regrowth and gardens. In the highlands forest clearing for sweet potatoes, long cultivation, short fallow periods, loss of topsoil and frequent burning have led to the establishment of grasslands. The majority of the country is still covered in forest though up to a quarter shows marked reduction in species diversity (Allen, 1992).

Systems of production

Before the 1880s, when Europeans first established trading posts in PNG, there were two main systems of production. One centred on shifting cultivation of different intensities, which are termed forest or grassland fallow systems. The forest fallow systems are created by the cutting and burning of trees and the removal of other vegetation. Up to 40 different food plants are then grown over a period of 18 months, although this can be extended up to 2 years, and then the land is left fallow for 25 years or longer. Declining yields, increased labour input and insect infestations make it difficult to extend the growing time beyond this period. If the fallow

is left undisturbed for long enough trees will grow back, and when this occurs the shade they create kills off the *Imperata* grass growing underneath. The success of the trees growing back is dependent on altitude, rainfall and the soil fertility, which is dependent on the length of the fallow period.

Most of PNG had a low population density, and people lived in small scattered settlements and moved regularly. Taro made up the staple diet and was grown in secondary forest. Semi-domesticated sows were allowed to mate with feral pigs which were trapped or killed. Young cassowaries were captured and raised. The forest provided all the necessary building materials, and various nuts, fruits and wild animals as food resources.

In the central highland valleys, the Maprik foothills, the Gazelle Peninsula, parts of Bougainville and some coastal areas population densities were higher and more food was required, which led to more extensive cultivation of land and shorter fallow periods. There were also cultural reasons for increases in production such as food exchanges, bride price, mortuary payments and offerings to the ancestors. As fallow periods were shorter, woody regrowth had less

time to establish itself and in areas of low rainfall such as the highland valleys grasslands became established. In the Maprik foothills, the Gazelle Peninsula and Bougainville tall grass and forest fallows became established (Allen, 1992).

The second system of production was found in the highland valleys and involved the near permanent cultivation of grassland for the sweet potato (*Ipomoea batatas*). Other crops were grown in forest fallow gardens on steeper slopes. To make cultivation possible people used composting, mounding and mulching and in some cases drained swamps were used (Allen, 1992). These techniques allowed populations of up to 150 people per km² to exist in the highland valleys. Up to half of the sweet potatoes produced were used to feed pigs and much of the production was used in exchanges (Salisbury, 1965; Strathern, 1971).

Trade routes

The whole of the mainland was connected via trade routes as were the offshore islands. Within the highlands those areas with large populations acted as hubs for trade. In most of the highlands goods moved from group to group, but Huli traders travelled down

onto the Bosavi Plateau and on to the west of the Rentoul River and east to Lake Kutubu, and Enga traders travelled into the Sepik valley (Allen, 1992). Traditionally highlanders did not move more than 20-25km from their home except for traders in some areas. Well-established trade routes throughout the highlands linked to the Markham and Ramu valleys and to coastal areas in the north and south of the mainland. Shells from the coast, axe blades from the Western Highlands and pottery from the Markham Valley found their way into the Upper Ramu. Trade, seasonal trade and ceremonial exchanges enabled a regular flow of material goods (Radford, 1987). The most famous trading system was the Kula Ring in Milne Bay (Malinowski, 1999), but there were also other long-distance trading routes between the mainland coast and the Schouten Islands, between the Madang coast and the Vitiaz Straits and from the Port Moresby area along the Gulf of Papua to conduct their voyages (Figure 3).

Over a third of the population of PNG used sago as a staple or supplementary food. It was the staple in the Sepik plains, Fly River valley, and along the Gulf of Papua. Inhabitants along the Sepik River traded fish for sago from those who inhabited the grasslands.

Along these large rivers sago supported communities of up to 1000 people (Allen, 1992).

The geography of the kuru-affected region

Geology

To the north of the kuru-affected region lies the Kratke Mountain Range, which has a south-west inclination and in the west enters the Okapa District. Just to the south of the range lies the Orlowai River which flows westwards towards the Purari River system. The river valley is mainly grassland and is inhabited by people speaking Kamano, Yate and Usurufa, who make up 10% of the kuru-affected population. Further south are a series of ridges and hills bordered on the west and east by the Yani and Lamari rivers, which flow from the Kratke Range and meet south of the inhabited kuru region. The terrain has a general southward inclined trend from the Kratke Range towards the junction of the Lamari and Yani rivers (Figure 4) (Bouchard, 1975).

Climate

There is a north-south gradient of increasing rainfall with decreasing altitude. The climate is very much localized with the slopes of Mt Michael along the Yani River receiving more rainfall than Okapa Station, and the grasslands of the Puburampa Valley extending from Okapa to the Lamari River being even drier.

Rainfall at Okapa Station totals about 2100mm per annum but this will vary throughout the District (Bouchard, 1975). During a normal year around 25% of the annual rainfall still falls during the 4 months of the dry season between May and August. This can be significantly affected by the El Niño/Southern Oscillation and periods of drought occasionally occur. Lower areas are markedly warmer and the Fore people differentiate between warm and cold places within the kuru-affected region.

Vegetation

Originally the whole region was covered in forest but deforestation has created areas of permanent grassland consisting of *Miscanthus* ('pitpit') and *Imperata* ('kunai'), which are found on the valley floors and lower slopes. Gardens are dispersed due to the

long garden fallow cycle and are found in grasslands and in cleared forest. The staple crop is sweet potato supplemented with yams, bananas, taro, sugar cane and different vegetable greens and herbs. Casuarinas, pandanus and bamboo are also important plants and are often found around villages (Bouchard, 1975).

The rainforest contains oaks, beech, ficus, nut-bearing castanopsis and many other species, many of which are used by the human population (S.Glasse, 1963a). At ground level there are edible shrubs, tree ferns, fungi and creepers (Lindenbaum, 1979).

Systems of production

Fore systems of production were based on slash and burn of local forest. The garden food was supplemented with hunting and gathering. As garden yields decreased with time, old gardens were left fallow and new gardens prepared at the edge of the forest. In areas with larger populations, such as the North Fore, gardens were recultivated more often, as explained earlier.

If the gardens were constructed in forest or in secondary growth bush land the slash and burn method was applied. Trees were

ringed and branches removed in the dry season and the foliage and wood piled at one end of the new garden. Fences were constructed by the men and drainage ditches dug. The women cleared all the weeds and smaller trees and then planted the new crops at the start of the rainy season. When trees became dry they were cut down and left in the gardens. Some were used for firewood, others burnt and some just rotted where they fell. Before the 1950s clearing was done with stone axes and fire-hardened digging sticks. The introduction of steel tools in the late 1950s greatly reduced the workload of preparing new gardens. Sweet potato was the most common cultivated plant, and others included a range of green vegetables, edible 'pitpit' (*Saccharum edule*) and taro (*Colocasia esculenta* and *Xanthosoma*). Winged beans, bananas, sugar cane and yams were also grown, as well as newly introduced crops such as maize which had reached the kuru-affected region via trade routes.

Pigs were an important part of ceremonial and political life, and were used to celebrate rites of passage, to form alliances, as compensation, and as offering to spirits and ancestors. Due to large intervillage festivals the pig population in villages was cyclical. In a

large festival, occurring in a cycle of 5-15 years, up to 100 pigs might be killed.

Other food sources included cassowaries, which were raised when young and remained attached to their owners until adulthood, when they were kept in pens. Hunting and gathering provided other sources of food. Males hunted wild pigs, cassowaries, brush turkeys, scrub hens, tree kangaroos, wallabies, eels, snakes and fish. Uninitiated boys hunted rats, beetles, grasshoppers and lizards. Wild foods included mushrooms, pandanus nuts, honeycomb, larvae of the longicorn beetle and wild fruits.

Traditionally people made their own salt in an elaborate process that was possibly copied from the Anga salt makers. The method used was similar to that used by other salt makers in inland New Guinea. The salt was made by burning tree ferns or an indigenous tall grass (*Coix gigantea*), which grows on well-watered flatlands, and then extracting water-soluble salts from the ash (Sorenson, 1976).

Boyd has described agriculture in Ilakia in the Awa, which is a grassland area (Boyd, 1985). Modes of production similar to those of the Fore are found in the Auyana, Tairora and Gadsup (Watson, 1967; Du Toit, 1975; Robbins, 1982; Watson, 1983).

Trade routes

Throughout the highlands extensive trade routes allowed trade to take place between adjacent communities that were not hostile. Axe heads were traded from the west and north into the kuru-affected region and bows and arrows from the Awa eastwards into the region, and onwards to the west and north. From the south, Pawaian groups traded pearl shells and Amelia shells with the southernmost Fore and Gimi communities in exchange for tobacco and woven bags. The Fore traded with home-produced salt, animal furs, betel nut, cane and other forest materials. Centres of trade with higher population densities, such as those found in the central highland valleys, received luxury items from fringe groups like the Fore, and exported items produced by intensive labour and superior technology (Gajdusek and Alpers, 1972; Lindenbaum, 1979).

The communities of the kuru-affected region shared a similar environment and modes of production with their neighbours in the highlands. They were linked to other linguistic groups further afield via trade routes that allowed goods, technology, diseases and genes to move between different groups.

The history of linguistics in Papua New Guinea

“Near Oceania” is the region of Oceania that contains the island of New Guinea, the Bismarck Archipelago and the Solomon Islands. The region contains over 1100 languages, which equates to 20% of the world’s languages (Figure 5). Recent research by Ross (2005) suggests that the Papuan (non-Austronesian) languages of the New Guinea area are members of 23 unrelated families, and 9 or 10 languages are single isolates. Papuan was a term adopted for the name of all the indigenous languages of the region which were non-Austronesian, and does not imply that the Papuan languages constitute a single language family.

Missionary scholars conducted research up until the end of the Second World War, and then in 1956 the Summer Institute of

Linguistics (SIL) established themselves in Papua New Guinea and in Irian Jaya (Indonesian Papua) in 1970. They have conducted descriptive work on over 200 languages in the region. In 1958 the Australian National University began investigating the histories of Papuan languages. Preliminary classifications suggested there were 60 or more distinct Papuan language families. In the late 1960s and early 1970s a number of researchers proposed a number of large family groups (Laycock and Z'graggen, 1975; Wurm and Shirô, 1981-83; Wurm, 1983).

Wurm and contributors (1975) used typology and lexicostatistics to reduce the Papuan languages into 11 phyla with 9 isolates. Using lexicostatistical nomenclature the highest linguistic genetic group is called a phylum, and 'sub-phylum', 'stock' and 'family' are used to rank subgroups. In historical linguistics 'family' refers to the genealogical group and subgroups are referred to as first-order or second-order subgroups. Wurm (1975) and Wurm and Shirô (1981-83) put forward the hypothesis of a Trans New Guinea phylum (TNG) that contained nearly 500 Papuan languages (Figure 6). They also proposed an East Papuan phylum that contained all 25 Papuan languages of island PNG plus Yela Dne of the Louisiade

Archipelago. Laycock and Z'graggen (1975) assigned nearly 100 languages to a Sepik-Ramu phylum. Contemporary analysis suggests that the above works contained serious methodological weaknesses (Pawley, 2005b). The most reliable method of data analysis is the comparative method, which requires reliable descriptive data and time. Between 1950 and 1980 the comparative method was rarely used, and instead researchers used typology and lexicostatistics to classify languages into families and to establish subgroupings. However, the Trans New Guinea and Sepik-Ramu hypotheses are still considered feasible, although the East Papuan hypothesis is now thought unlikely (Pawley, 2005a).

In the 1990s research into Papuan linguistics and the Trans New Guinea hypothesis picked up again after a lull, and has produced a lot of new data (Pawley, 2005a; Pawley, 2005b; Ross, 2005). A significant contribution is the work of Ross (2005), who has reclassified Papuan languages using personal pronouns as a single set of criteria (Figure 7). In contrast to Wurm (1975) and Wurm and Shirô (1981-83) Ross (2005) identifies 23 unrelated families and 9 or 10 isolates. He also deconstructs the East Papuan phylum into 5 or 6 families and 3 isolates, and the Sepik-Ramu phylum into 3 or 4

families and 1 isolate. Foley (2005) believes that there is no evidence for a Sepik-Ramu phylum and he proposes two separate families, which he calls the Lower Sepik-Ramu family and the Sepik family. Ross (2005) thinks it is likely that most Papuan linguistic families have a remote common origin in New Guinea, but they diverged so long ago that it is hard to establish their relationship to each other.

The accepted explanation for the size and success of the TNG is as follows. During the late Pleistocene humans visited the central highland valleys which had a much lower tree line during this period. It is likely that hunter-gatherers exploited pandanus nuts and hunted the local megafauna on a seasonal basis. About 10,000 years ago humans started to alter the highlands landscape, and these changes increased significantly around 5000 years ago. Agriculture appeared in the Upper Wahgi Valley around 10,000 years ago. Evidence found in the Kuk swamp suggests it presented a favourable environment for habitation compared to other valleys. It is believed that the main plants grown at the Kuk site were taro and bananas. Between 6900 and 6400 BP mounding and draining of soils took place consistent with intensive cultivation. A sequential

network of drainage ditches connected to major drainage channels appear between 4350 and 3980 BP (Pawley, 2005b).

Once agriculture became established there would have been significant changes to the social organization and material culture of highland societies. It is likely that it led to an increased population size and a more hierarchical society and that larger and more complex artifacts were made (Pawley, 2005b).

Pawley (2005b) has looked at the TNG hypothesis, its variants and the low-order subgrouping within the TNG. The subgroups are uncontroversial and those showing close morphology and upwards of 30% cognation in basic vocabulary probably diverged from a common proto-language within the last 2000-2500 years. Pawley believes that the proto-TNG broke up between 10,000 and 6000 years ago in the region between the Strickland River and the Huon Peninsula, which still contains the greatest number of high- and middle-order subgroups.

There are data to suggest that taro domestication began as early as 9000 BP but the TNG expanded later along the cordillera

in both directions. Gradually the TNG speakers would have settled the lower regions south of the cordillera and encountered small groups of hunter-gatherers (Ross, 2005). In some New Guinea societies hunting and gathering continued to play an important role even after colonialization. Roscoe (2005) has recorded 30 lowland societies that relied on foraging to supplement their diet of wild sago. So although some groups adopted agriculture others remained primarily foragers. The hunter-gatherer groups would have had difficulty opposing the TNG expansion (Pawley, 2005b).

It is thought likely that the TNG expansion extinguished some Papuan linguistic families. However, some of the non-TNG language groups had knowledge of agriculture and this allowed them to survive the TNG expansion intact (Pawley, 2005b). These groups are found in the northern region from the Bird's Head to the Sepik-Ramu basin, an area containing 15 unrelated families, and in a southern region extending from the Digul River to the Gulf of Papua, which contains 4 families as well as the TNG (Pawley, 2005a).

The expansion of TNG speakers into the Sepik and Ramu was limited by inland seas that existed at that time and by malaria. Around 6000 years ago the Sepik and Ramu flood plains were inland seas. Several non-TNG families are found in the new low-lying lands created by Sepik and Ramu sediments. TNG speakers have established themselves in the lowlands of the Digul River basin and on the nearby coastal plains of South-West New Guinea in the last 3000 years (Pawley, 2005b)

In the islands the Papuan populations only adopted full-blown agriculture after the arrival of the Austronesians, and it is likely that some groups would have gradually adopted the local Austronesian language whilst others maintained their Papuan language.

There is good linguistic evidence to suggest that Proto-Austronesian, the ancestor of all Austronesian languages, was spoken on Taiwan. There is also good archaeological evidence that the Proto-Austronesians originally came from mainland China. Austronesian speakers spread into the Philippines and from there into Borneo, Sulawesi, Malaysia and western Indonesia and then

eastwards through east Nusantara into the Bismarck Archipelago around 3500 BP. From there they spread into the rest of Melanesia, Micronesia and Polynesia. In the Philippines and Nusantara they encountered small populations of foragers, but met well-established Papuan agricultural communities practising taro cultivation in New Guinea. They also faced malaria, dense rain forests and impregnable mountains, all of which presented formidable challenges to migrants trying to become established. The present Austronesian groups on the south-east of the mainland established themselves well after 3500 BP in lowland malarious areas. There is little evidence of occupation of this region before Austronesian settlement. The Austronesian speakers interacted with Papuans in New Guinea and the Bismarcks, which led to a number of innovations in Austronesian languages of north-west Melanesia, Micronesia and Polynesia. When the Austronesians arrived in the eastern Papuan region they encountered small populations (Ross, 2005). Groube (1993) states that malaria was already present in New Guinea during the Pleistocene and prevented populations without immunity from inhabiting areas near the coast, on flood plains or deltas. He proposes that cultural strategies such as living

in raised houses over salt water allowed people to live on the coast and to exploit its abundant resources (Ross, 2005).

Linguistics of the kuru-affected region

Wurm (1978) placed some of the languages of the kuru-affected region within the East New Guinea Highlands Stock of the Trans New Guinea Phylum. The Eastern Family contains Usurufa, Auyana and Awa from the kuru-affected region and to its east the unaffected Gadsup, Agarabi and Tairora linguistic groups (Figure 8). The East-Central Family contains Kamano, Yate, Yagaria, Kanite, Keiagana, Fore and Gimi (of the kuru-affected region), and to the north-west the Siane, Yabiyufa, Gahuku, Asaro and BenaBena linguistic groups. Ross (2005) rejected Wurm's (1978) classification of the East New Guinea Highlands Stock as a subgroup, but his data agree with Wurm's (1978) classifications of the East Central (Gorokan) family and the Eastern (Kainantu) family. The kuru-unaffected Simbari belong to the Angan stock-level family, and the unaffected Pawaian to the Pawaian stock-level family (or isolate). The distant Mikaru (Daribi) were confirmed by Ross (2005) as part of the Teberan stock-level family, but he

rejected the Teberan-Pawaian sub-phylum-level super-stock proposed by Wurm (1975).

Research has been conducted amongst the Eastern Family to distinguish subfamilies. It is suggested that the Tairora, which includes Binumarien and Waffa dialects, split off from the proto-language first. Awa, Auyana and Gadsup moved together until Awa split away from the subgroup. Then at a later date Auyana and Usurufa split from the Gadsup, Agarabi and Oyana subfamily. The Awa, Auyana, Gadsup and Tairora subfamilies consist of Awa; Auyana and Usurufa; Gadsup, Agarabi and possibly Oyana; and Tairora, Binumarien and Waffa (McKaughan, 1973).

The linguistic groups affected by kuru all belong to the Trans New Guinea Phylum with the majority belonging to the East-Central Family, and the Awa, Usurufa and Auyana to the Eastern Family. The unaffected Anga, Pawaia and Mikaru belonged to different stock-level families.

Archaeology in Papua New Guinea and its importance to the kuru-affected region

Archaeology in the south-west Pacific is about 50 years old and has been dominated by two themes. The first is the antiquity of human settlement in the area which was quickly dated back to 40,000 years. The second theme centres on Austronesian expansion throughout Oceania. Excavations in Fiji, Tonga and New Caledonia during the 1940s to the 1960s turned up distinct pottery, which was named Lapita after the New Caledonian site of Lapita. This pottery belonged to the Austronesian settlers who first colonized the area east of the Solomon Islands 3000 years ago.

The colonization of Near Oceania started with the arrival of the first migrants 40,000 years ago, who were followed by Austronesian migrants about 3000 years ago. These two cultures first came together on the Bismarck Archipelago, where there is evidence of human habitation thousands of years before the arrival of Lapita pottery. The theory of two waves of migration is seen as unsatisfactory by some researchers, and some reinterpretation of events has been proposed. Allen and Gosden (1996) have proposed that from the Pleistocene onwards there were a series of spheres of

interaction along the island chain of South-East Asia to the Solomon Islands. With time these spheres of activity brought the South-East Asians in the Bismarcks into contact with the inhabitants of the north coast of New Guinea. This hypothesis is partly based on the ideas of Irwin (1991) who proposed a 'voyaging corridor' between intervisible islands which stretched from South-East Asia to Near Oceania and occupied a position on the equator with predictable seasonal reversals of winds and currents. This allowed maritime technology to develop in an area of safe sailing. This hypothesis argued against long-term internal or external isolation in island communities in Near Oceania (Allen and Gosden, 1996). Archaeological evidence to support the hypothesis is more evident from the mid-Holocene onwards based upon Pleistocene behaviours. These behaviours are centred on the movement of resources rather than people. Around 23,000 years ago obsidian from New Britain was traded into New Ireland, and New Guinea mainland animals and plants were taken to Manus, New Ireland and the northern Solomons (Gosden, 1993). However, it was between 15,000 and 16,000 years ago that systematic voyaging

started to take place, such as the repeated movement of obsidian from Lou Island to Manus, a journey of 30km.

By the mid-Holocene obsidian was taken as far as Nissan Island in the east and as far as the Sepik in the west (Spriggs, 1997). In the eastern part of the Bismarcks it is now accepted that both pigs and pottery are associated with Lapita culture. Lapita pottery first appeared on the north coast of New Guinea less than 2000 years ago. Lilley (1999) believes that the archaeological sequence for the region based on pottery fits well with the dispersal of Austronesian groups along the north coast from the Vitiaz Strait.

The earliest sites on the Bismarck Archipelago date back 40,000 years and are found in caves and rock shelters in uplifted coral limestone reefs. The islands lacked the biotic diversity of the mainland and cases of infrequent plant and animal translocation have been proposed. *Phalanger orientalis* was introduced to New Ireland 22,000-24,000 years ago and this was followed by a gap of 10,000 years before any other species were introduced. The evidence presented by Specht suggests that there is little evidence for

precursors of later interaction spheres or an initial stage in their development (Specht, 2005).

The lower Sepik-Ramu basin was an inland sea during the height of the post-glacial rise in sea level about 6500-7500 years ago. This inland sea disappeared through infilling about 4000 years ago. Mortar and pestle artifacts found along the shore of this sea support evidence from the Central Highlands that these artifacts are aged between 8000 and 3000 years. They show an association with agricultural land use, especially with taro cultivation. Similar styles have been found amongst Sepik-Ramu and adjacent highland samples suggesting a close connection between these areas. From these areas where the artifacts are found in their greatest number they have spread to islands and elsewhere on the mainland.

Contemporary with the pestles and mortars is the spread of stemmed obsidian tools from West New Britain manufactured between 6000 and 3600 years ago. Disruption of these systems of interaction involving pestles and mortars and obsidian tools was due to environmental causes. Firstly the inland sea disappeared 4000 years ago disrupting the interaction between the Sepik and highland populations. The volcanic eruption of Witori devastated

West New Britain and the Willaumez Peninsula where stemmed obsidian tools had been produced for the last 3000 years. The Sissano coast is a region of significant tectonic activity causing major earthquakes and tsunamis. The coastline has risen 52m in the last 4500 years due to seismic activity. To the east, the Madang coastline has experienced half a dozen major eruptions in the last 10,000 years (Swadling and Hide, 2005).

Fieldwork started in the Central Highlands of New Guinea in 1959 and by 1964 highland prehistory had been divided into three stages, an initial hunter-gatherer stage, a period of change based on the establishment of agriculture in the region, with staples of taro, yam and banana, and finally a recent stage involving the introduction of the American sweet potato.

Denham (2005) has conducted work in the Wahgi Valley, including the Kuk swamp, and elsewhere. The first signs of agriculture date back 10,000 years with more definite agricultural practices established around 6500-7000 years ago. This work supports the linguistic work of Pawley (2005b), who also suggests that agriculture helped the TNG expansion.

The Nombe rock shelter is found at an elevation of 1720m in Simbu Province and has the longest occupation sequence in highland New Guinea. Occupation first started 30,000 years ago, through the last glacial period 17,500 years ago, into the improved climate of the late Pleistocene 9500 years ago and the subsequent appearance of agriculture. The faunal sequence found at the site reflects these major changes. The remains of large-bodied animals now extinct have been found dating back to the glacial maximum, and then followed by small and medium-sized animals of mid-montane forest that expanded during the late Pleistocene. Finally, there are the remains of animals that indicate a disturbed landscape and the loss of some species (Evans and Mountain, 2005).

Bulmer (2005) has identified two different types of axes in the highlands which predate agriculture and span its early phases 10,000 years ago. Her evidence is based on excavations at five different sites and three undated finds, and comparisons between five excavated axe production sites. The Type 1 axe was present 40,000 years ago on the Huon coast but disappeared from the Central Highlands by the mid-Holocene, 5000-6000 years ago. Twenty three samples were found at the Yuku rock shelter and

Bulmer sees these axes as tools for hunting and foraging and unsuitable for the woodcutting tasks of the new agricultural economy. The Type 2 axe was present during the Pleistocene and was capable of fulfilling the woodcutting duties of the expanding agriculture based economy.

In the New Guinea highlands forest was cleared using two types of hafting for blades, the simple adze with the blade lashed directly to a footed handle, and the simple axe with the blade set into the handle. The simple axe was found in the central mountains of Indonesian Papua and the coastal lowlands to the south and south-east. The simple adze was found between the Baliem and the Strickland, and between the Asaro and the Papuan tail. The area between the Strickland and the Asaro had variants of a more recent date. The adze was more effective at clearing scrub regrowth, which was common in areas of more sustained populations. It has been proposed that the adze is an archaeological marker of the TNG expansion (Denham, 2005).

Archaeology of the kuru-affected region

Archaeological data from the east of the Eastern Highlands Province suggest that there has been a long continuous period of growth and development from about 18,000 BP to 3000 BP. An adaptive system based primarily on hunting and collecting existed during this time, and the human population occupied low basins and river valleys.

After 3000 BP cultural innovations occurred and a significant ecological shift took place. Many cultural patterns continued into the historic period when western artifacts began to appear around 1920. These innovations included pottery, adzes, round houses with substantial walls, eaves supports, ditches around houses, square or rectangular hearths, earth ovens, earthworks and monoliths: all of these were present by 290-90 BP (Watson and Cole, 1977).

The archaeological evidence suggests that the peoples of the highlands have shared a common history in the past, and that the TNG expansion was caused by advances in agricultural technology.

Social anthropology in Papua New Guinea

Papua New Guinea has attracted much anthropological attention due to its cultural diversity. Malinowski based his classic ethnographic studies in PNG, but it was after the Second World War that PNG assumed more anthropological importance when social anthropologists started to conduct research in the highlands. Many studies looked at kinship in traditional societies and comparative theorizing with similar societies in Africa took place. However, it was not just kinship and descent that brought PNG to prominence in anthropology. The enormous diversity of cultures ensured that many anthropologists would conduct research in PNG. Studies on kinship, ecology, male-female relations, ritual and social exchange brought PNG to the forefront of anthropology (Read, 1965; Strathern, 1971; Barth, 1975; Rappaport, 1984).

Although there is much cultural and linguistic variation in PNG some general statements can be made about PNG societies. Exchange relationships are an important part of the social organization. Social differentiation is not dependent on hereditary principals; instead individuals achieve prominence through daily

competition. The effective social unit tends to be small, and falls within a larger, more complex social structure (Gardner and Weiner, 1992).

Even when population densities are high the effective social unit still tends to be small. In the Simbu Province population densities reach 260 persons per km² but people still live in small dispersed homesteads (Gardner and Weiner, 1992). In the Sepik, communities might reach up to 1000 members using extensive ritual classifications, and these large communities had a powerful military force available (Tuzin, 1976). There are also variations in residence with women and children living in houses surrounding a men's house in the highlands (Read, 1954), and in the fringe highlands there were large communal houses with women occupying a lower level (Wagner, 1967). The size of communities was limited by competition and face-to-face relationships of the inhabitants. Eventually if a community became too big part of it would break off and settle elsewhere (Lindenbaum, 1975b; Gardner and Weiner, 1992).

In PNG, leaders, known as 'bigmen', exercise their power through their ability to mobilize support and not through any hereditary principal. An adult man's support is primarily based upon his clan, but those skilled in oratory and in fighting and those with wealth are able to manipulate external support. The attributes of a 'bigman' depend on the cultural designations of particular groups. In the Western Highlands a leader was involved in competitive gift-giving of amassed valuables from his family and supporters. If the leader was successful then he and his clan gained status and the receivers had to make a counter presentation to protect their status (Strathern, 1971; Glasse and Lindenbaum, 1975; Gardner and Weiner, 1992).

Throughout the highlands men were involved in individual exchanges; these included affinal and consanguineal exchanges; others might be compensation payments or payments to allies. All men were involved in a web of exchanges that kept them under constant pressure to fulfil their obligations in order to avoid damaging their reputations. Ceremonial exchanges involved a multiplicity of exchanges and required a great deal of organization

on the part of leaders (Salisbury, 1965; Strathern, 1971; Glasse and Lindenbaum, 1975; Gardner and Weiner, 1992).

Women were involved in a range of exchanges involving affinal and consanguineal kin. Although in the highlands these were of lesser importance than men's, women's exchanges gain more importance in the matrilineal societies of New Ireland, New Britain and the Massim. Throughout PNG the child-rearing role of women was accorded great respect and men's ties to their matrilineal kin were nearly as important as those to their consanguines. However, many societies did not place primary value on the maternal role in child care over the paternal role (Gardner and Weiner, 1992).

The large ceremonial exchanges of the Enga and of the people around Mt Hagen had important effects on marriage patterns, labour and subsistence of the participants. It also involved complicated patterns of enmity and alliances which could determine the success or failure of a community (Strathern, 1971). In other areas the exchange systems did not reach the same scale, but they remained an important part of people's lives throughout PNG. Trade was also an important form of exchange, with goods such as

foodstuffs, axe blades, shells, stones, bows and animal products passing along chains which could stretch hundreds of kilometres. Trade also established avenues for cultural and genetic exchange and the transmission of disease (Allen, 1992).

In PNG the concept of exchange is not purely monetary but involves metaphysical practices that are essential to understanding the practice itself. The exchanges that take place during birth, initiation, marriage and death all involve reciprocal exchanges and obligations – exchange is not neutral.

Political systems in PNG proved to be very fluid and early African models when applied to PNG were found to be wanting. The multiplicity of obligations, flexibility of kinship systems and terminology, residence and exchange all interacted in complex ways with the individual at the centre (Read, 1959; Read, 1965; Berndt, 1971). Warfare was simply another way in which communities interacted and was not dependent upon resources.

Community-based activities required all the skills of a 'bigman' to bring about a consensus of opinion. In the Western Highlands,

'bigmen' coordinated activities whilst in the Eastern Highlands 'great men' were the main coordinators of community activity. Individuals sometimes found their individual loyalties in conflict with the communities (Read, 1959; Read, 1965; Berndt, 1971; Strathern, 1971).

Warfare was common in the pre-colonial period and was responsible for many deaths, population shifts and the destruction of resources. This constant threat meant that men's activities were frequently centred on military activities and that good fighters were held in high regard. It also made alliances very important, and made groups wary of their activities, in attempts to avoid conflict (Berndt, 1971; Lindenbaum, 1979).

Relationships within communities were also complex with intra- and inter-community relationships affecting each other. The individual's sometimes conflicting loyalties and the flexibility of the kinship system placed the individual at the centre of their own web of relationships. These conflicting loyalties often gave way to accusations of sorcery in areas where such beliefs were held (Berndt, 1971; Lindenbaum, 1979).

Over the last 50 years excellent ethnographic studies have been conducted in Papua New Guinea showing the relationships of rituals and beliefs to a particular world view of a culture (Read, 1965; Tuzin, 1976; Lindenbaum, 1979; Knaft, 1993).

Anthropology of the kuru-affected region

The linguistic groups affected by kuru share similar cultures but have their distinctive differences. The purpose of this section is to give a general introduction to the cultures of the kuru-affected region through a description of the South Fore culture. The data are presented to portray life in the Fore before Government control in the North Fore in 1951 and in the South Fore in 1958. Before these dates life in the kuru-affected region was already changing, with the arrival of trade goods, such as axes and beads, through trade routes. Life had also been significantly affected by kuru, and local responses to this disease are described in the next section. It is not possible to describe a synchronic moment in Fore culture as it was undergoing many changes just prior to European contact.

The South Fore inhabit villages between 1000m and 3500m above sea level and avoid the malarious valleys of lower elevations

(Figure 9). Changes in the environment suggest that the southern part of the South Fore has only been inhabited for about six to eight generations. This has been confirmed through interviews with elderly inhabitants who can name their patrilineage back to their sacred ancestor. The South Fore has relatively small areas of grassland in comparison to the larger highland valleys to the north, and there was little competition over resources. In 1968 the population of the South Fore numbered 6972, the North Fore 5029, the Keiagana 7409, the Yate 3576, the Kanite 2584, Usurufa 849, and the kuru-affected regions of the Gimi 4749, the Auyana 1349, Yagaria 907 and the Kamano 2267 (Alpers, 1965).

Before the arrival of the Australian Administration there were over 100 barricaded hamlets, and small huts in people's gardens which were used during extended stays in the gardens. The main dwellings consisted of one or two large men's houses and a number of smaller houses for women and children which were separated from the men's area of the village. The boys aged under 8 years remained with their mothers, but after 8 the boys underwent their first initiation rite and then remained with the men (Glasse and Lindenbaum, 1971).

The Fore region has three dialects, spoken by the Pamusagina, Atigina and Ibusagina, and these divisions do not form any political grouping (Scott, 1963). Smaller group names such as Ibusa distinguish people from a smaller area, made up of several villages, and the names used were in some way identified with that area. Languages often merged through dialect chains and members of a linguistic group did not traditionally have a name for themselves. The basic political unit was the local clan which consisted of related patrilineages. Clans made up villages which would unite in defence, but often had different obligations, and were allied with different groups in offence. All the members of a clan were related back to a founding ancestor, and women who married into a clan became members of that clan, both physically and spiritually (Glasse and Lindenbaum, 1971; Lindenbaum, 1979). This description is expanded in more detail in the ethnographic descriptions.

Villages were made up of clans, one of which was a senior clan on whose ground the village was built. Each clan tended to live in their own hamlet with its own men's house and stockade, but if some of the clans were small they might share a men's house. The subclans were normally refugees from conflicts who were welcomed

by their host clan, as communities in the South Fore needed numbers to increase their strength both politically and militarily. The newcomers also provided potential brides and exchange partners. Individuals and families were also absorbed into clans because of the flexible kinship system that was not solely focused on consanguinity. They would be sponsored by a 'great man' in the clan and provided with land and other necessities until they became established. The Fore had a number of terms to allow people to immediately establish new relationships. However, each individual maintained his or her original position within a web of social interactions, and loyalties might or might not be cancelled by a change of residence. The drawback to this was that suspicions over loyalty were always present and newcomers had to frequently prove their loyalty to their hosts. As the marriage system was virilocal women who married into a group were also suspect, and did not become full members of their husband's patrilineage until they had given birth to two or three children. It was feared that newly wed women might still be loyal to their brothers and father, and because of each person's web of affinity it was difficult to trust anyone. The underlying reason for this distrust was the Fore belief in sorcery as

a cause of misfortune and disease. If sorcery accusations were projected externally the mutual enmity that emerged during the course of the accusations consolidated the community, but if the accusations were internal it caused friction or the division of a community. The exogamous marriage system gave men a place of refuge as they often fled to their married sister's village, and could also flee to their wife's family (Glasse and Lindenbaum, 1971; Lindenbaum, 1979).

The Fore had extensive modes of affiliation that were used to extend kinship relations. They did distinguish between biological and fictive kinship, but the distinction was not decisive and therefore adoption was acceptable and widely practised during the kuru epidemic. If a child's parents died the children would be adopted by the father's family, but if the mother's bride price had not been paid they were adopted by her family. Adoption might also take place between agnates to consolidate relationships. It also increased the child's chances of survival as it had a larger support network with two families interested in the child rather than one. It also opened up exchanges between the biological and fictive parents (Lindenbaum, 1979).

Kagua relationships were formed by a gift of food being presented at midday (*kagine*) between an adult and a newborn or young person. It allowed the person who presented the gift to take an active part in the exchange relationships of the young person during rites of passage and in return cemented a reciprocal relationship of obligation. If the receiver was a male the young man might assist the gift maker in establishing new gardens or present the occasional food offering. If the receiver was a female she might tend the gift maker's pigs or assist with gardening or make gifts from her gardens when she became an adult.

Nagaiya was the term for people who were born at the same time or whose mothers shared the same birthing hut. It was also used for men who were initiated at the same time, and this was a very important social grouping for the men as it ranked seniority by age amongst them. Compensation was often paid to a man's age mates if he was offended, and they were entitled to marry an age mate's wife when he died or, if they did not, they had to be compensated.

Naukwa was the term used for people who used the same identity, so it was used where people shared the same name or similar appearance. *Wagoli* was a term for trade partners and people who also fulfilled social obligations for a person who was too distant to be able to do so (Lindenbaum, 1979).

Within a family brothers were very important and a lineage's strength was gauged by the number of men it contained. Cousins were also important in exchanges but if there were conflicts of interest a man relied more on his brothers and his age mates. A man continued to support his sister after marriage and she would assist him with gifts. This is expanded on in the ethnographic descriptions.

One of the most important relationships was with a man's mother's brothers and a man's wife's family, who are known as affines. When a man married he continued in a series of exchanges with his wife's brothers until his wife died. These exchanges and obligations continued with his sons until their deaths, and were intergenerational on both sides. Again this is expanded on in more detail later.

Before the arrival of the Australian Administration warfare was a normal part of life in the kuru-affected region and beyond. From about the ages of 8 boys entered the men's house and were trained how to fight and how to maintain their bodies and souls in optimum condition for combat. Conflicts were often of low intensity, flaring up until both sides were tired, and then peace negotiations and settlements followed. However, enmity and distrust often remained and conflict would start again following sorcery accusations or some other cause. As long as losses were equal on both sides or compensation was paid to the side with the highest losses a settlement could be found. As people had an extensive web of affinities someone could always be found to help start peace negotiations. Sometimes the defeated were totally routed and fled to relatives in other areas. The victors would sometimes pursue them and threaten the guardians of the defeated if they did not hand over the refugees. Warfare might be controlled with only a small number of casualties on each side after a day's fighting, but raids could be brutal with the intent of inflicting as many casualties on the enemy as possible, including women and children. This was rare, but happened in some cases where the attackers did not want the

children to avenge their dead family members when they became adults. Land was not seized as it was not in short supply and the victors did not have a connection with the spirit guardians of the land (Glasse and Lindenbaum, 1971; Lindenbaum, 1979).

To ensure that a clan was politically and militarily strong it had to ensure that it fulfilled its social obligations to other clans and maintained good relations with potential allies that it could call upon for political or military support. Bribes could be paid and loyalties subsumed by a clan's own interests, which made it all the more important that a clan's members always behaved well to their allies and did not antagonize potential enemies.

The strong sibling bond was revealed in infant betrothal where a newborn girl was betrothed to her father's sister's son. The arrangement was made soon after birth when the child was still in the birthing hut. The boy's parents brought a gift of food and asked the father to accept it. If the father chose not to accept it he would accuse his sister of not fulfilling her duties to him so as to avoid causing any offence. As with all gifts it had significance and obligations once accepted and these were ongoing and not isolated

events. Marriages were normally arranged by the patrilineage and strategic concerns overrode any wishes of the young couple's choice of partner. It was the duty of a son or daughter to marry whoever their parents chose. Many of the infant betrothals did not come to flower due to wars, refugee movements and political pressures. Most girls were married before puberty so there was little resistance on the part of the girls to arranged marriages (Glasse, 1969).

The Fore recognized various individual attributes that are important to a clan's survival. A man's fighting ability was highly valued, and this included archery skills, aggression and ability to lead. A community would do all it could to maintain an aggressive warrior as a resident as this was a major deterrent to potential enemies. Sorcerers were highly valued and those who had a dangerous reputation were greatly feared and acted as a deterrent to any aggressors. They were also able to counter the attacks of enemy sorcerers. There was always a need for aggressive orators who could stand up for the clan and ensure it received brides, the correct bride price for its women and compensation payments and could protect the group's interests during other disputes. Then

there was a need for orators with a more gentle approach who could persuade people and soothe those who had been offended. A 'great man' was a man with any number of the above abilities who could secure advantages for the clan, and also influence the opinions and activities of other clan members. The 'great man' protected his own interests as well as those of the clan. He ensured that the clan had allies and only engaged in warfare when it suited the clan; he also arranged festivals where pig exchanges took place, bride prices were paid and initiations completed. This ensured that both the group's obligations and those of individual members were fulfilled and the clan's strength was displayed publicly (Glasse and Lindenbaum, 1971; Lindenbaum, 1979).

Life was precarious and a clan or individual could suddenly fall victim to one of many kinds of misfortune. Ambush, war, sorcery, disease, crop infestations, loss of pigs or a dog were constant worries. The etiology of disease consisted of statements about why things happened the way they did (Lindenbaum, 1979).

Some misfortunes and diseases were caused by spirits called 'masalai', and some by ghosts of the dead, and these are described

in detail in the ethnographic descriptions. To rectify these misfortunes the family of the sick person would make an offering to the supposed offended spirit or ghost and ask them to release the curse from the affected person. Another form of misfortune could be caused by a curse from a person who had been wronged. Again the victim would have to compensate the offended person so that they would release the victim from the curse (Lindenbaum, 1979).

Minor illnesses were recognized as such and the dysentery epidemic of 1943 was also recognized as an illness. However, if a minor illness became serious the community blamed sorcery. Sorcery was always held initially to be the responsibility of enemy sorcerers continuing hostilities covertly. In other situations it might have been a jealous 'great man' who wanted to topple a rival 'great man'. A man might hire a sorcerer in revenge for a slight, or to kill a woman who refused his advances. There were many reasons as to why a person might be a victim of sorcery, but the reasons put forward by a patrilineage were really political statements about political tensions and enmity. They were also opportunities for people to avenge slights and to cause harm to any individual for any number of reasons by accusing them of sorcery. Sorcerers were

feared in Fore society and could earn a considerable amount of wealth through extortion based on their reputation and by accepting contract killings. In the village of Wanitabe in the South Fore 53% of deaths out of 473 were attributed to sorcery. Only 3% were caused by old age and 12% by war (Glasse and Lindenbaum, 1971; Lindenbaum, 1979).

There are many types of sorcery but all require some kind of material that is connected with the victim; this might be excrement, spit, waste food that the person was eating, part of a person's clothing or other item. The item is prepared with magical stones and leaves and a spell spoken. This belief was responsible for a major preoccupation of the Fore, which was to ensure that no personal material fell into the hands of sorcerers. People went to great lengths to dig deep latrines, and to carry their waste foods with them in their 'bilums' (netbags); and even excrement was sometimes wrapped up in leaves and taken home to be disposed of safely (Lindenbaum, 1975b).

Curers were called in by the family members of a sorcery victim and measures taken to counter the effects of sorcery. Divinations

were used to identify those responsible, and/or the sorcerer, so they could be confronted and asked to remove the sorcery. This could be dangerous and both sides would be armed during such a meeting. Another method involved spirit possession with the possessed person taking the family members to any number of locations connected with the attack. The aid of the ancestors and the founding clan ancestor would also be called upon. Even after death the hunt for those responsible continued until those responsible were identified and the death avenged.

Female pollution from childbirth and menstruation was greatly feared in these male dominated societies, as ingestion of female blood killed a man or seriously debilitated him. When women were menstruating or giving birth they remained in the menstrual hut which was at the back of the women's houses. They were not allowed to visit their gardens and would not prepare food for their husbands during this time. Men feared that their young wives might kill them with their menstrual blood, so they could later elope with their lovers. Men also feared that their young wives might give their semen to sorcerers to have them killed if they wanted to be with their lover. Men spent most of their time in the men's house

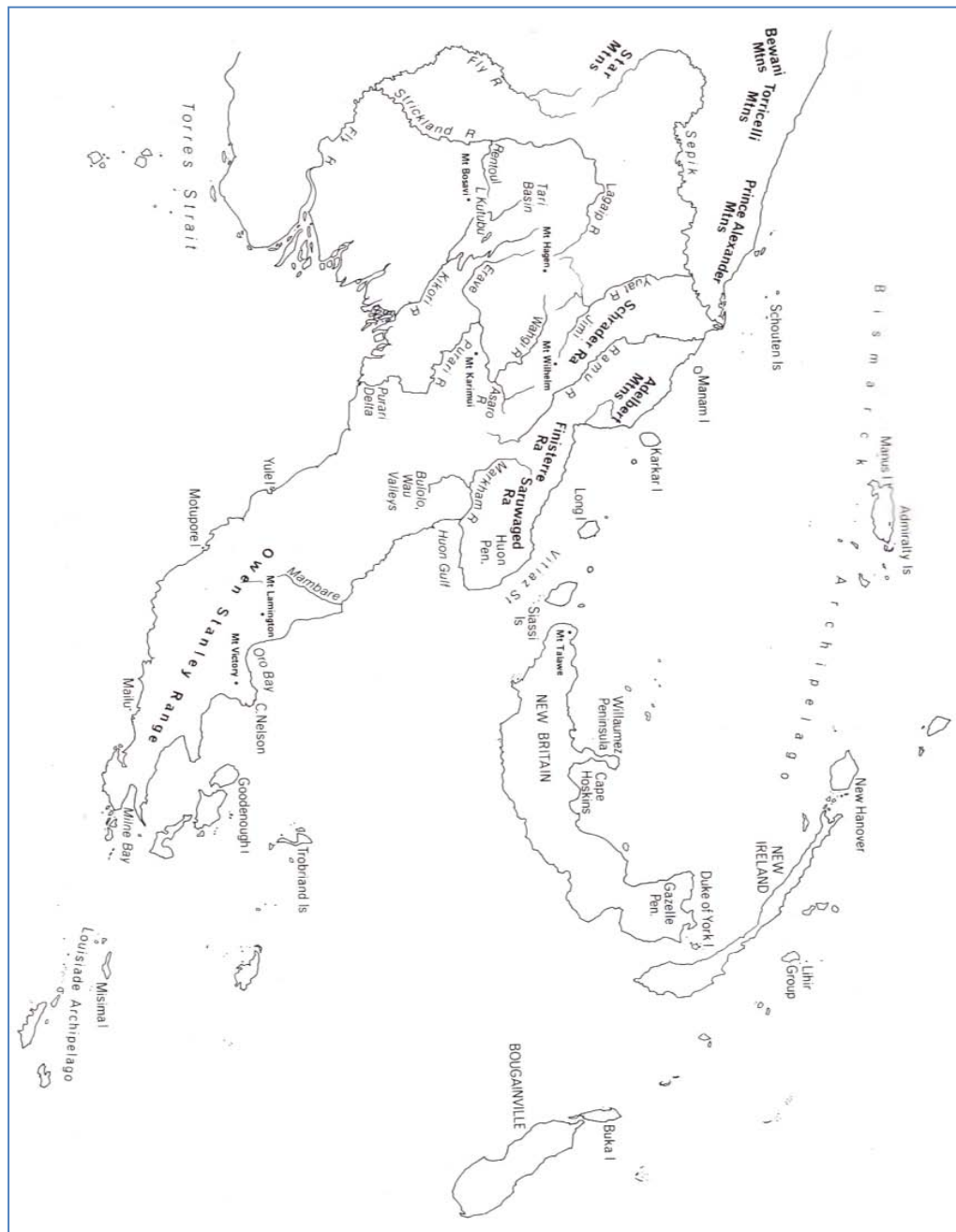
and sexual intercourse took place in the gardens. After sexual intercourse men would purify themselves before they entered the men's house so they did not pollute the initiates (Lindenbaum, 1975b).

Initiates from the age of 8 underwent a series of rigorous rituals to remove the female pollution from their bodies so that they would grow into adult warriors. This process involved food restrictions and bloodletting, and eventually after the final ritual the young men finished their rites of passage and were accepted as male adult warriors.

Girls stayed with their mothers and were socialized into the expected roles of women. Once they were betrothed they started to visit their future in-laws and stayed for longer periods assisting their mother-in-law with gardening chores. Once married, the new wife remained with her mother-in-law, who ensured she fulfilled her duties to her husband.

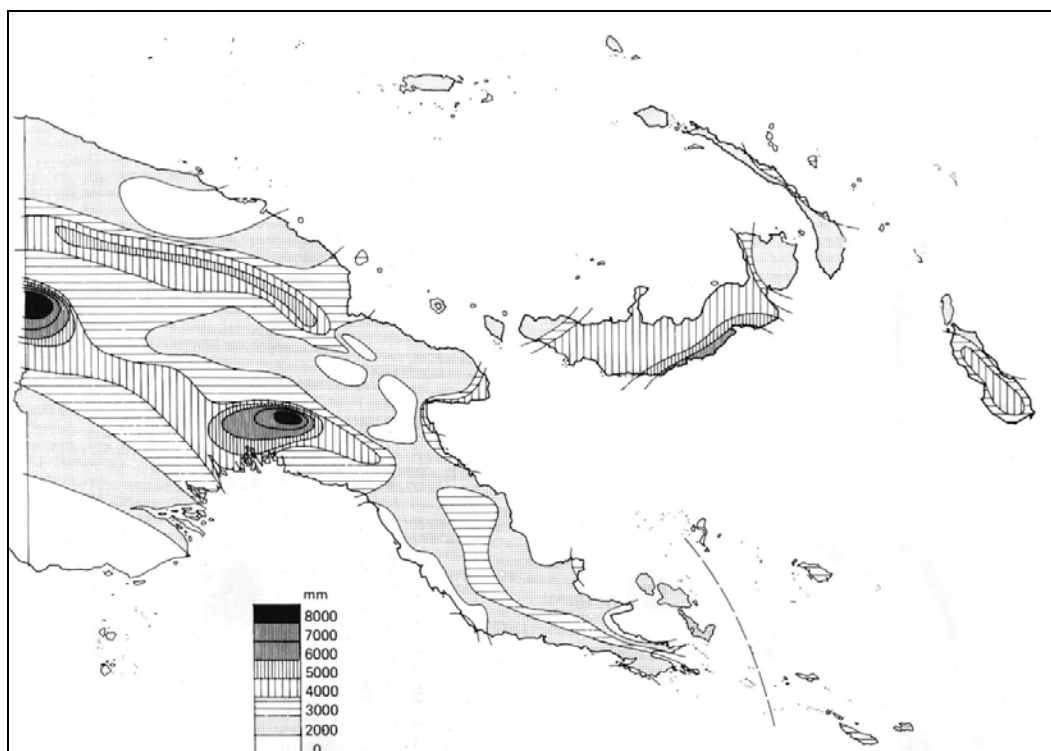
The linguistic groups of the kuru-affected region had similar cultures but there were some differences in detail and emphasis.

The linguistic groups of the Eastern-Central Family and the Eastern Family also shared many similarities (Read, 1954). The Anga stock and Pawaian stock-isolate were culturally more different but shared some of the common cultural themes found in other highland groups such as male-female antagonism, fear of female pollution, male initiation rites and gift exchanges (Wagner, 1967; Herdt, 1994).

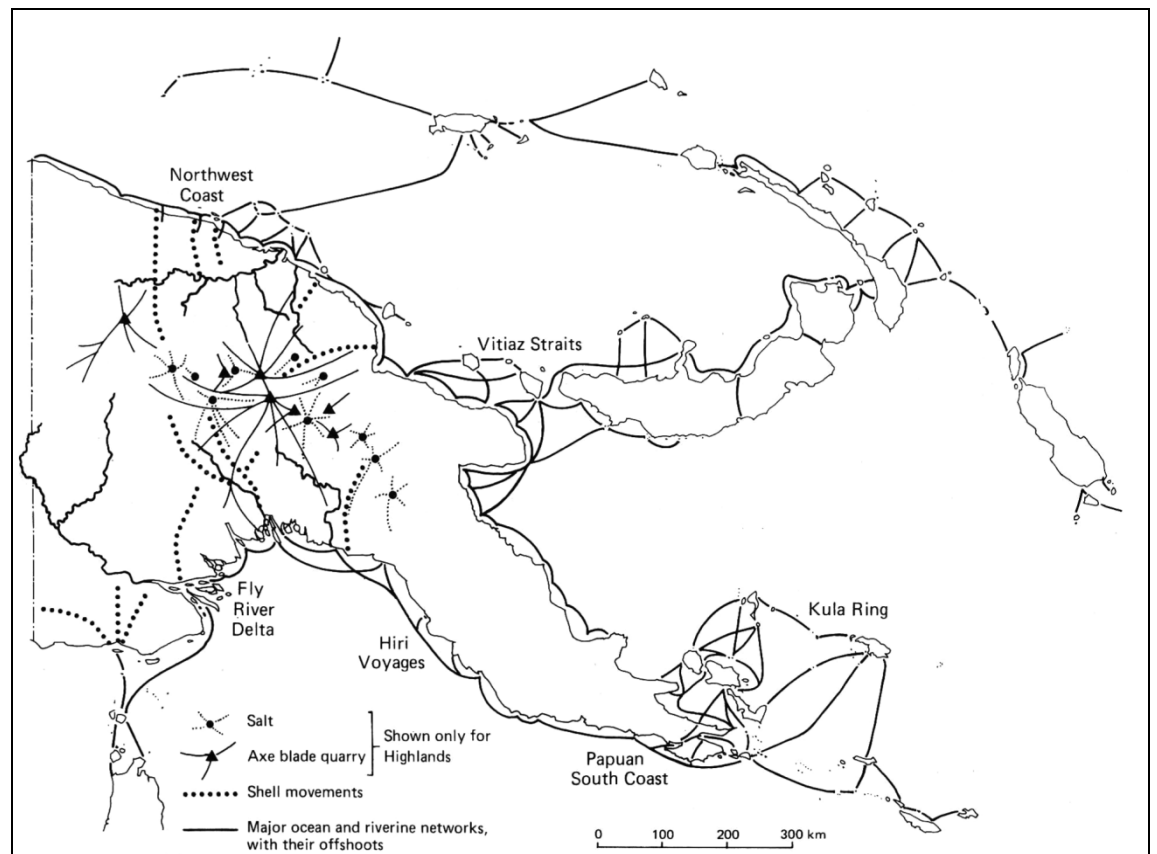


Appendix A Figure 1. Papua New Guinea showing physical

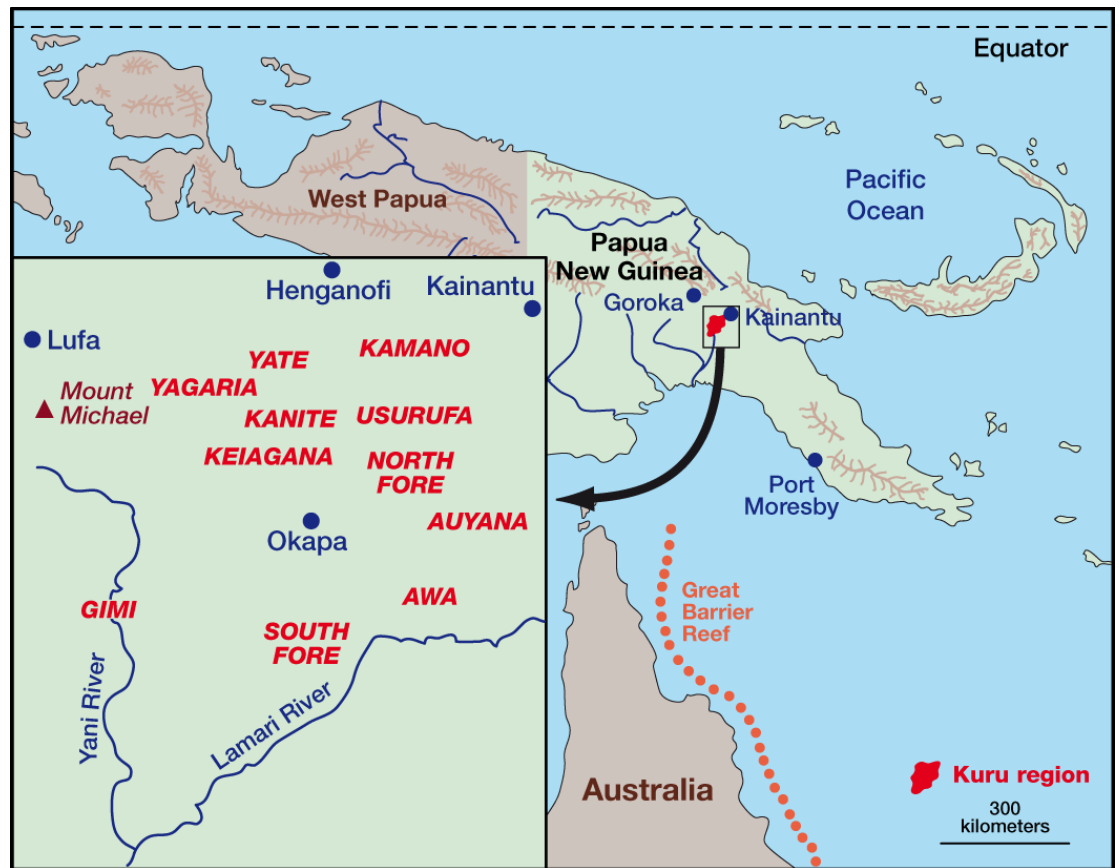
features. Figure taken from Alpers and Attenborough (1992) with permission.



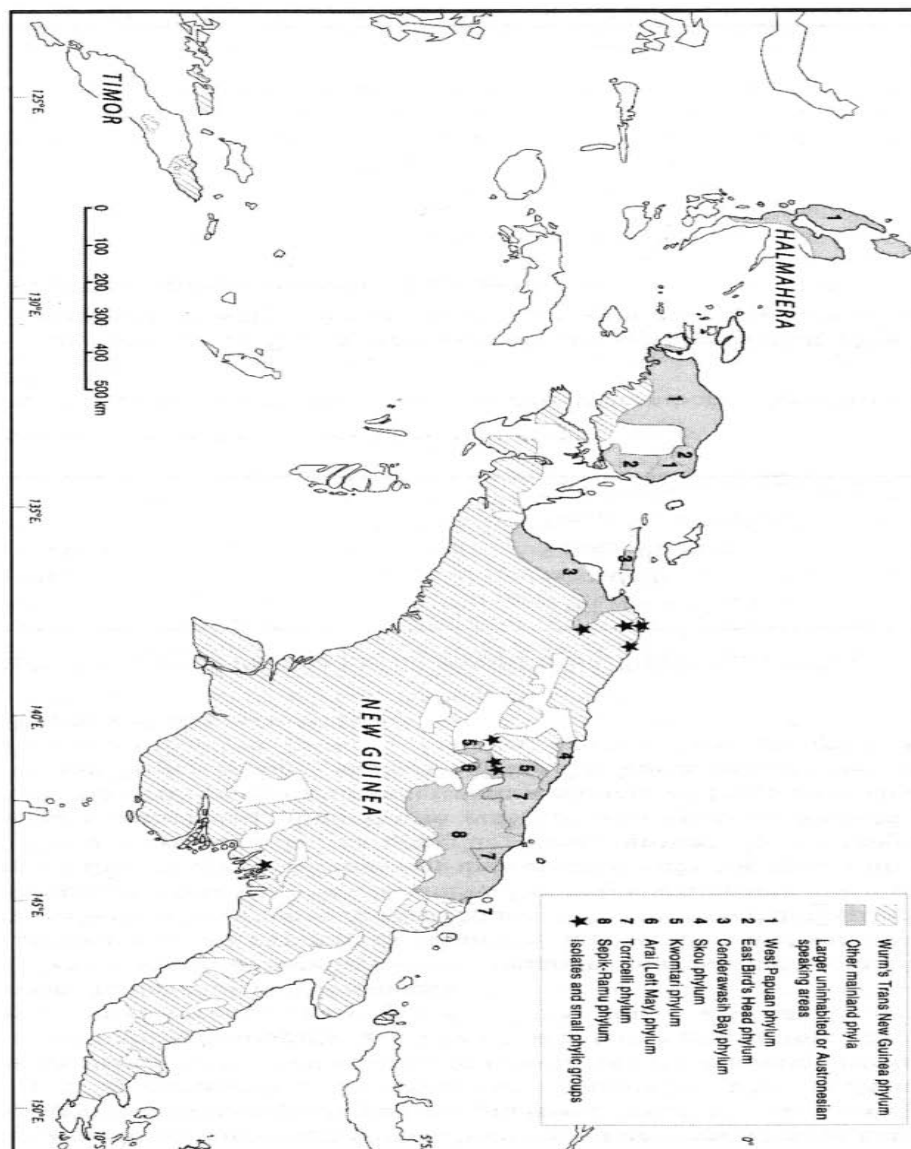
Appendix A Figure 2. Mean annual rainfall in Papua New Guinea. Figure taken from Allen (1992) with permission.



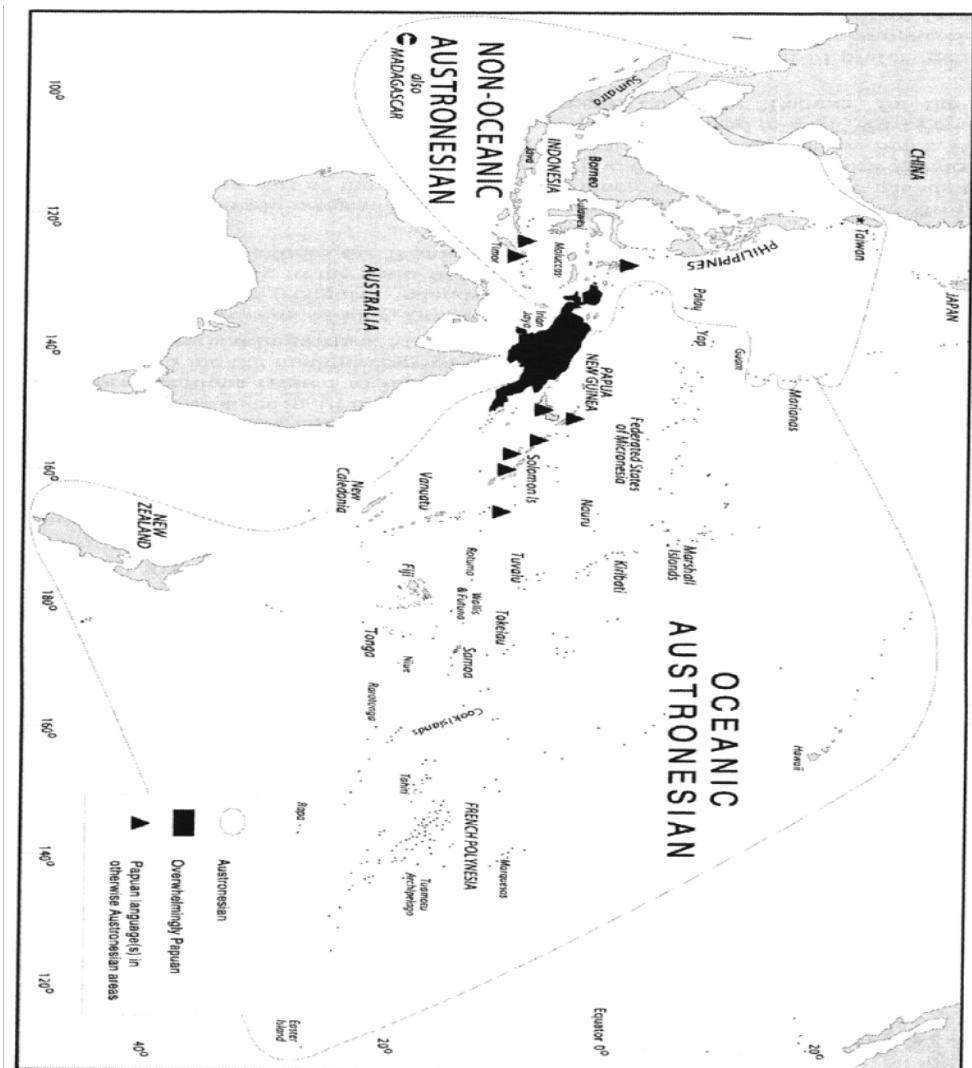
Appendix A Figure 3. Some of the major trade routes in Papua New Guinea. Figure taken from Allen (1992) with permission.



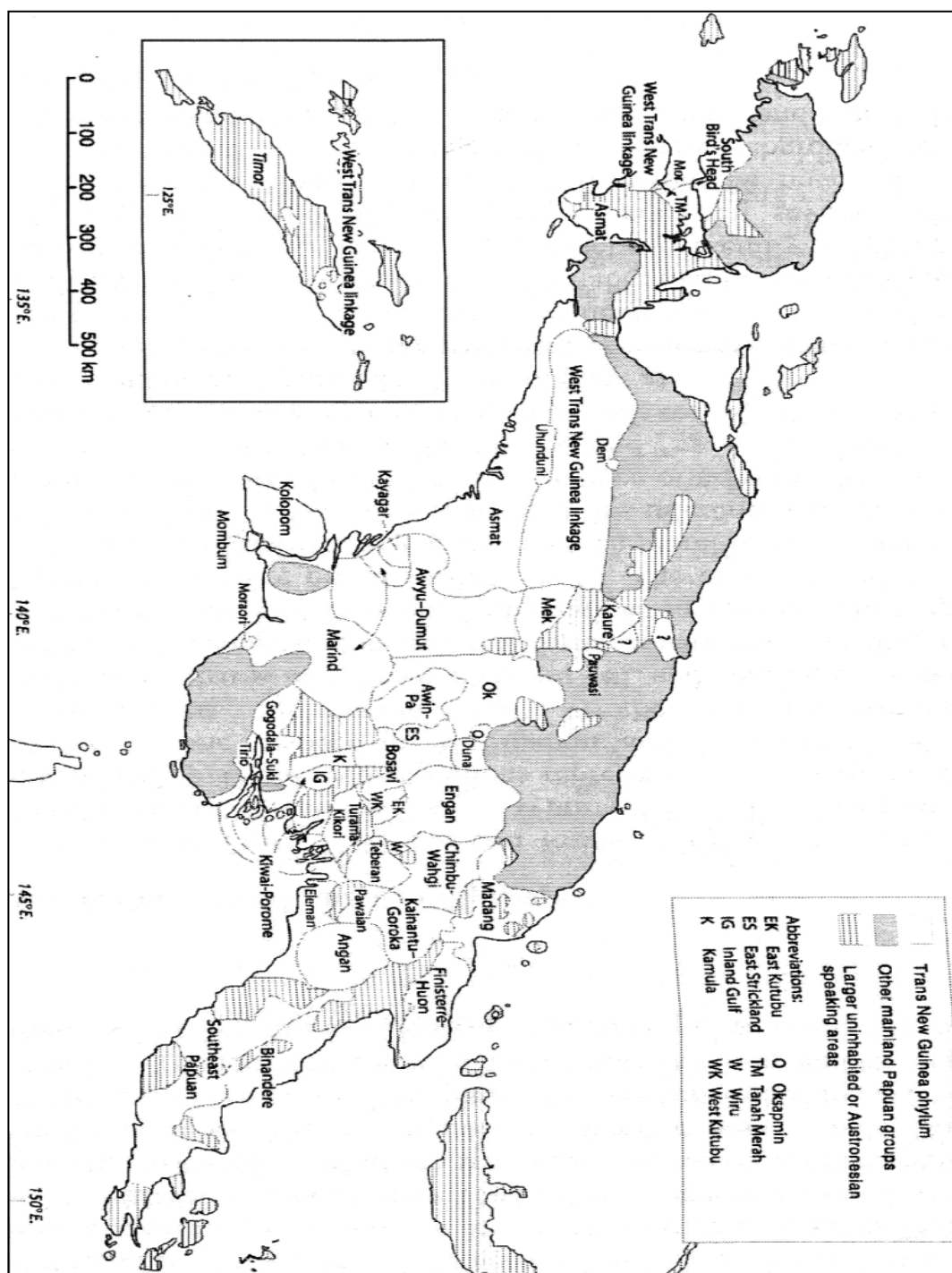
Appendix A Figure 4 . Map showing the location of the kuru-affected linguistic groups and the local physical relief. Figure modified from Collinge et al. (2006).



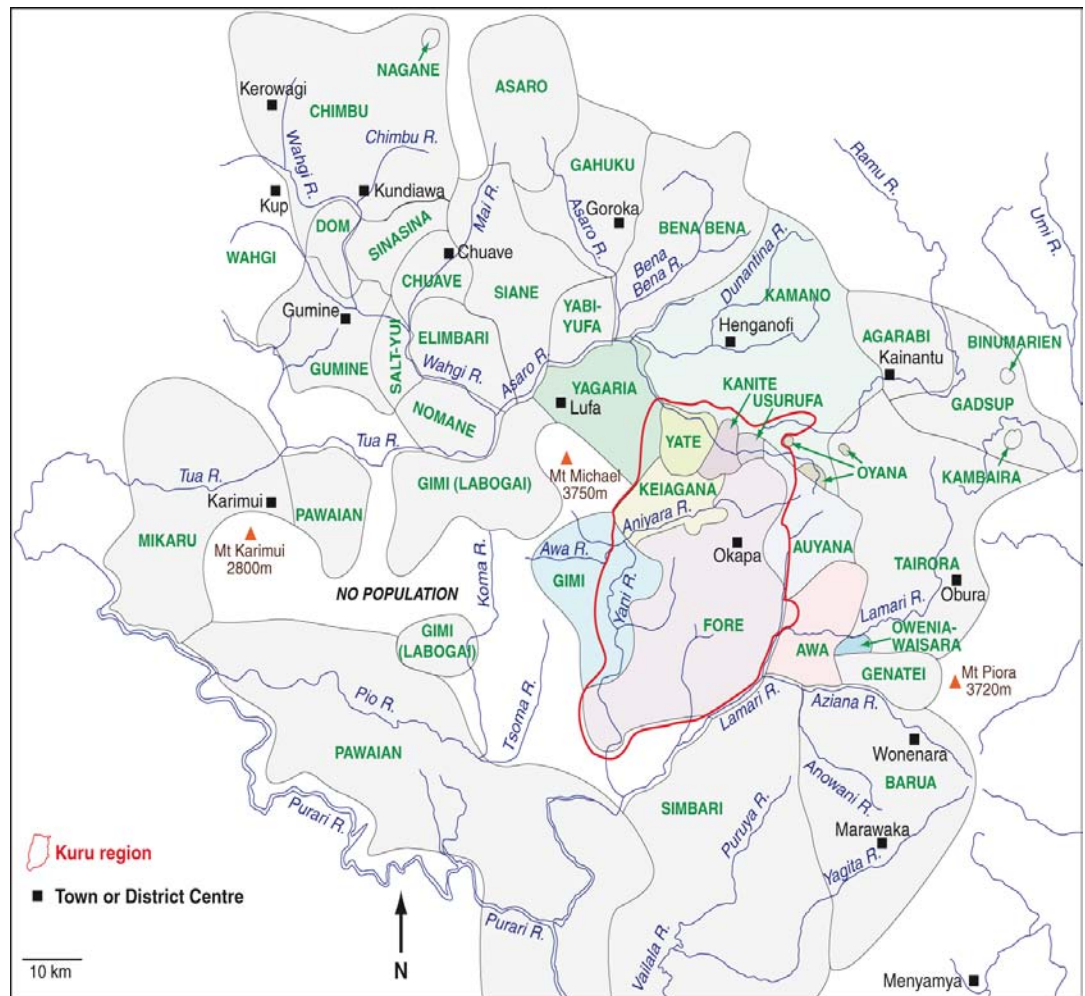
Appendix A Figure 5. Map showing the Austronesian and Papuan language areas. Figure taken from Ross (2005).



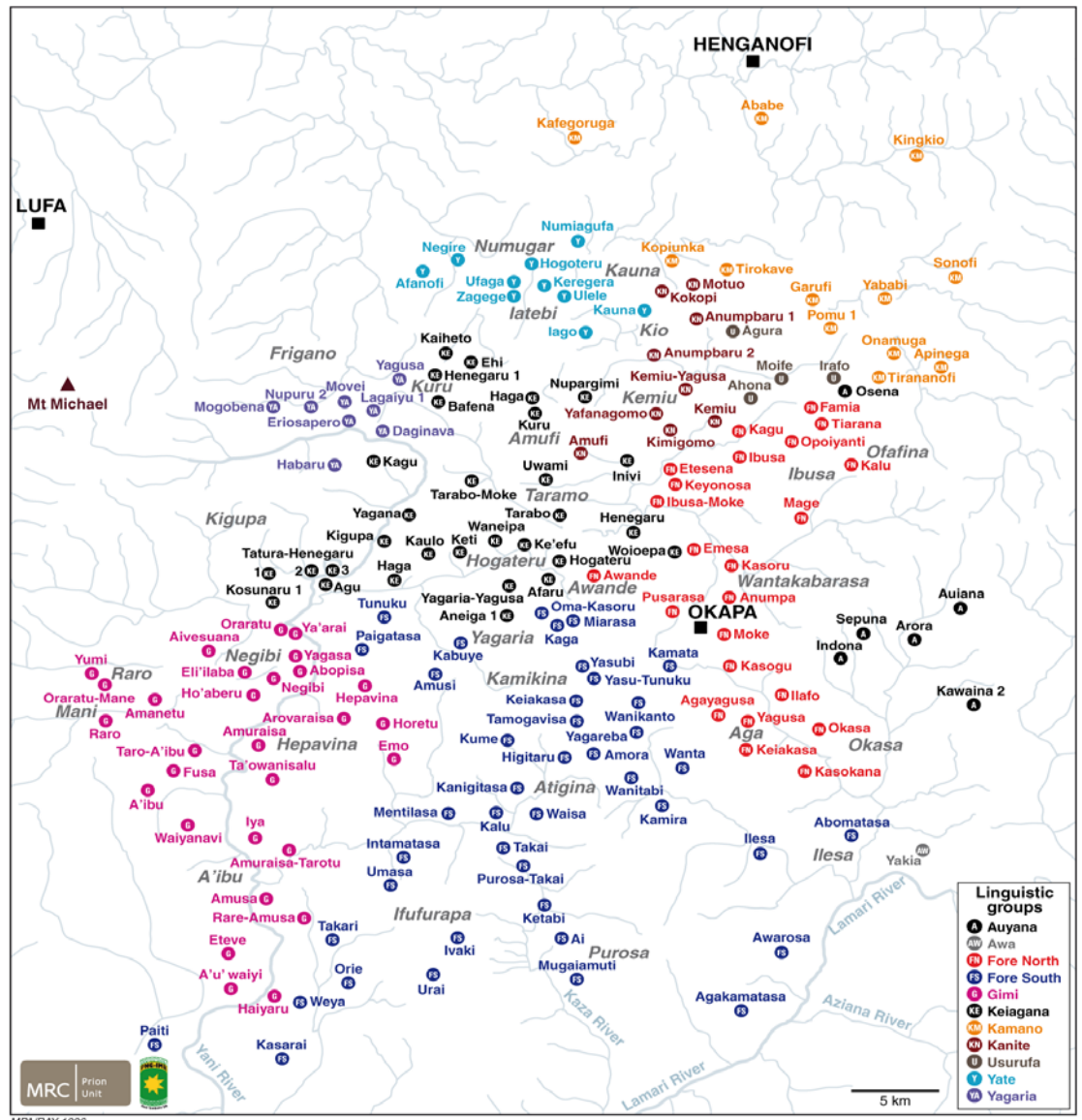
Appendix A Figure 6. Map showing Papuan language groups: a tentative set of proposals. Figure taken from Ross (2005).



Appendix A Figure 7. Map showing putative subgroups within the Trans New Guinea Family. Figure taken from Ross (2005).



Appendix A Figure 8. Map showing the boundaries of the kuru region and other areas of the Eastern Highlands of Papua New Guinea (including Eastern Highlands Province and parts of Simbu Province to the west, Gulf Province to the south and Morobe Province to the east). Figure taken from Alpers (2007) with permission.



Appendix A Figure 9. Map showing kuru-affected villages. Map derived from Gadjusek et al. (1961), Alpers (1965), Alpers and Kuru Surveillance Team (2005) and the kuru database (created by M.P. Alpers, Judith Farquhar, Steven Ono and D. Carleton Gajdusek and maintained by M. P. Alpers).

Appendix B:

A review of the history of exocannibalism and endocannibalism throughout the world

A historical perspective of exocannibalism and endocannibalism

There is evidence that humans ate humans in all the continents of the world (Kantner, 1999). The reasons that the dead were eaten varied enormously, but they can be divided under the following headings: transumption (endocannibalism), violent cannibalism as a form of intimidation (exocannibalism), sacrificial exocannibalism, medicinal and survival. These groupings ignore psychopathic or criminal behaviour, which is not socially or culturally sanctioned. Lindenbaum (2004) extends these categories by including psychopathology, autophagy, placentophagy and innocent anthropophagous practices.

The word cannibalism is regarded as a trope amongst social scientists and some have proposed alternative words and meanings. Hulme (1986) proposed the separation of cannibalism from anthropophagy, and Obeyesekere (2005) defined anthropophagy as the act of consumption of human flesh and cannibalism as a fantasy about the feared other. The controversy surrounding this word continues, and Whiteley (2008) has proposed the use of anthropophagous practices or incidents as alternatives to cannibalism. In this thesis the term transumption is used to mean the consumption of human flesh (anthropophagy) in the context of kinship obligations and spiritual content. The meaning of transumption connotes more than anthropophagy and is more restricted than cannibalism, which in the biological context covers the whole gamut of intraspecies bodily consumption (Rudolf and Antonovics, 2007). Though the discussion is more tortuous among social scientists, for the subset of cannibalism of the kind practised in the Eastern Highlands of PNG I believe that 'transumption' (Alpers, 2007) should be accepted as the appropriate term. A clear and comprehensive discussion of anthropophagy and the

anthropological arguments surrounding it can be found in Goldman (1999) and Lindenbaum (2004).

Archaeology requires a high standard of evidence to support claims of exocannibalism or endocannibalism (Villa, 1992; Pearson, 2000). Villa states that amongst European archaeological sites these standards are fully met at Fontbrégoua, whereas at other sites, including Krapina, there are insufficient data to support either secondary burial or exocannibalism (Villa, 1992).

There is strong evidence that exocannibalism was practised in the American Southwest (Turner and Turner, 1999) and recently these data have been strongly supported by the finding of human myoglobin in a coprolite and a cooking pot (Marlar, 2000). The controversy amongst archaeologists surrounding these remains has now been covered in detail (Nicols and Crown, 2008). Genetic evidence also supports a hypothesis that past epidemics of prion diseases occurred in humans in prehistoric times transmitted by cannibalism (Mead et al., 2003; Stoneking, 2003).

Hogg has sourced worldwide accounts of early European travellers and missionaries which refer to exocannibalism and endocannibalism (Hogg, 1961). Chong looked at the historical references to exocannibalism and endocannibalism in China, and links the practices to Confucian doctrine; the positive side expresses love and respect, and the negative hatred and revenge (Chong, 1990). More recent accounts of exocannibalism during the Cultural Revolution in China have also been recorded (Sutton, 1995; Yi, 1996; Yue, 1999).

In South America transumption is well documented amongst the Wari (Conklin, 2001), the Cashinahua (McCallum, 1999) and to a lesser extent among Guayaki Indians (Clastres, 1998), and exocannibalism amongst the Tupinampa (Viveiros de Castro, 1992; Whitehead and Harbsmeier, 2008). Fausto (2007) looks at multiple sources of data for the Amazon and provides a theoretical formulation for warfare and funerary anthropophagy.

In Africa, ritual killings in Sierra Leone by secret societies known as leopard cults have been documented (Beatty, 1915; Kalous, 1974; MacCormack, 1983). More recent killings involving

exocannibalism for magical purposes have also been recorded (Ellis, 2001). In 2003 Pygmy representatives from the Democratic Republic of the Congo requested that the United Nations investigate acts of exocannibalism against their people (BBC, 2003b; Bergner, 2003). These reports were later withdrawn against a background of the common confusion of anthropophagy as historical fact and metaphor (Pottier, 2007). Earlier, Evans-Pritchard (1960) confirmed the practice of exocannibalism among the Zande. Ritual killings involving consumption of the body have also been recorded in Lesotho (Murray and Sanders, 2005) and in Indonesia as part of headhunting practices (Lloyd Parry, 1998).

Consumption of the dead in survival situations is well documented in boats cast adrift and amongst shipwrecked crews (Simpson, 1984; McKee, 2000; Petrinovich, 2000; Philbrick, 2000). The eating of the dead also occurred during famines and sieges (Salisbury, 1969; Tuzin, 1983; Chong, 1990; Becker, 1998), among the Donner Party (McGlashan, 1880) and, more recently, among the survivors of an Andean plane crash in Chile (Read, 1975).

Accounts and explanations of sacrificial exocannibalism in the Aztec Empire are well documented (Reeves Sanday, 1995; Issac, 2002). The consumption of body parts in post-Renaissance Europe for medicinal purposes has been documented, and mummy, blood and other body parts were common ingredients in remedies until at least 1909 (Gordon-Grube, 1988).

In the Pacific, exocannibalism is documented in Fiji (Stringer Rowe, 1859; Sagan, 1974; Sahlins, 1983) and amongst the Maori (Bowden, 1984; Diamond, 1997). Brantlinger (2006) confirms the reliability of reports of exocannibalism from missionaries, non-missionaries and indigenous witnesses. Recently the people of the village of Nabutautau in Fiji held a ceremony to apologize to relatives of Thomas Baker, a missionary who was killed and eaten there on 21st July 1867 (BBC, 2003a).

The subject of anthropophagy in Europe in its different guises was discussed by members of the Anthropological Society of London in 1866, and controversy surrounding the subject is nothing new (Charnock, 1866).

Recorded incidents of exocannibalism and endocannibalism in Papua New Guinea and West Papua

Records of transumption and exocannibalism are found in the reports and works of early administrators, missionaries and anthropologists who worked in PNG.

Exocannibalism was documented amongst the Binandeli speakers of the Musa River when Sir William MacGregor encountered a raiding party there (MacGregor, 1896). Resident Magistrate Armit also reported finding the remains of people killed on a raid near the Opie River (Armit, 1900). Lieutenant-Governor Murray documented the practice amongst some of the inhabitants of what was then the North-Eastern Division of Papua (Murray, 1912, p. 110), and amongst the inhabitants of the Purari Delta (Murray, 1912, p. 172). Between 1909 and 1910, four people were charged with eating the dead under the Criminal Code, which was directed against body snatchers, and was punishable with a two-year sentence (Murray, 1912, p. 217). It was his opinion that consumption of dead enemies was largely gastronomic, based on the evidence of what the local people told him. The following quote from

Murray shows the Administration's ambivalent attitude to anthropophagy.

“Nothing it seems to me is more difficult than to explain to a cannibal why he should give up human flesh. He immediately asks, ‘Why musn’t I eat it?’ And I have never been able to find an answer to that question beyond the unsatisfactory one, ‘Because you musn’t.’” (Murray, 1912, p. 173).

The British anthropologist Seligman believed that exocannibalism in the Milne Bay area occurred primarily out of revenge and occasionally for gastronomic reasons. He also mentions a court case involving women who removed and ate a family member's body from a sepulture in Samarai, a practice he believed occurred throughout the D'Entrecasteaux Island Group (Seligman, 1910). Malinowski (2008) also witnessed it in New Guinea, and remarked that transumption was carried out in fear by the participants; yet it was also a supreme act of reverence, love and devotion. The missionary André Dupeyrat described exocannibalism

amongst the Papuans and mentions the absorption of the deceased's qualities by the participants (Dupeyrat, 1954).

In Papua the government anthropologist F. E. Williams recorded headhunting with exocannibalism amongst the Keraki of the Morehead District of the Western Division (Williams, 1936) and the Orokaiva of the Northern Division (Williams, 1930).

Knaft discusses headhunting and exocannibalism amongst the Kiwai of the Fly Delta, the Asmat in West Papua, and Kolopom, Marindanim and Purari inhabitants (Knaft, 1993). Headhunting and exocannibalism amongst the Asmat were originally documented by Trenkenschuh (1982) and the data further interpreted by Zubrinch (1999).

Gillian Gillison has written an ethnography about the Labogai-Gimi which covers traditional mortuary rites and the beliefs in the afterlife. The Gimi of the Lufa District practised transumption, and this is the first in-depth description of transumption and its epistemology from the highlands of Papua New Guinea (Gillison, 1993). Barth also gives a brief ethnographic account of Baktaman

exocannibalism (Barth, 1975). Patrol officer Mater describes in detail a Mianmin raid near the May River and the subsequent acts of exocannibalism (Mater, 1959). Gardner interviewed participants of the raid and conducted complementary fieldwork that confirmed that exocannibalism occurred amongst the Mianmin and other surrounding groups, including the Telefolmin, Atbalmin, Owininga and Abau (Gardner, 1999).

Ernst discusses Onabasulu consumption of witches/sorcerers who caused the death of others. In the Strickland-Bosavi region, the Kaluli, Etoro, Bendamini, Samo and Gebusi also had the same practice (Ernst, 1999).

The only European missionaries who were eaten in PNG were James Chalmers and his assistant Oliver Tomkins, who were killed by the Goaribari in 1901 in what was possibly a revenge killing (Langmore, 1974). More recently, in 2007, the Governor-General of PNG, Sir Paulias Matane, approved the apology of Tolai leaders for the killing and consumption of four Fijian missionaries, killed in 1878 by Tolai men in East New Britain (Telegraph News, 2007).

Transumption in the kuru-affected region as reported by early administrators, anthropologists and kuru investigators

The earliest report of transumption in the kuru-affected region is by Patrol Officer R. I. Skinner in 1947/48, which mentions his observance of transumption of fellow villagers who died in battle or from sorcery among the Moife people of the Usurufa linguistic group and the inhabitants of Kagu in the North Fore. Certain parts of the body were given to the deceased's father or brother. Skinner reported that enemies were not eaten (Skinner, 1948). G. W. Toogood (1950) reported that the flesh of kinsmen was never eaten, and finally G. Linsley reported that kinfolk were eaten, but not enemies (Linsley, 1951)

The first anthropologist to write about transumption in this region was Ronald Berndt, who conducted fieldwork in the North Fore with his wife Catherine Berndt: in Kagu between 1951 and 1952 and in Pugarasa between 1952 and 1953. Once they had established a field house, they invited between 20 and 30 men to participate in interviews using the Yate language. The men came from the Fore, Yate, Usurufa and Kamano linguistic groups as Ronald Berndt believed that the cultural differences between these

groups were minimal. The men came from different areas so that information could be cross-checked, and if past events were being reconstructed all the participants would have been represented. The interviews were later supplemented with additional private interviews (Berndt, 1962).

Berndt believed that the bodies of men and women, of kin and affines, were eaten as readily as those of enemies. Those who died of dysentery and *guzigli* (kuru) were not eaten and, in general, disposal of a body depended on personal or family preferences. Often the dying person would express their wish for their body to be eaten, but opposition to eating the body might come from parents who had lost a child or from affines. He also points out that a payment of a pig or at least vegetables would be made to those who ate the body. The mother's brother, or the mother's brother's son, had the rights to the body of the deceased. Arguments about the disposal of the corpse were not focused on transumption, but on the rights to the body, and these agnate-affine disputes were normally settled quickly, with some kind of compensatory payment being made to the aggrieved party. If the body was disposed of by transumption or burial, it would increase the fertility of the land.

There was also a connection between various body parts that were kept and the assistance they could give to the growth of children, pigs and gardens. No powers were absorbed through eating the body, nor were the bodies of those who ate weakened through transumption, nor was fear of the deceased's spirit a concern.

Berndt suggested that there was some preference for eating partially decomposed flesh, and corpses were removed after several days from sepulchres for this reason. He also mentions that the decomposing flesh, fluids and maggots were consumed. If the body of a man was consumed the faeces were given to his wife, who cooked them with wild green vegetables and then ate them. The wife also received the penis of her dead husband. Most of the bones were ground into dust, mixed with wild green vegetables, salt and spices, and eaten. There is also mention of a young male relative eating a woman's genitals. Sometimes the women would argue or fight over the dismembering and distribution of the body. Finally, Berndt suggests that transumption may have been practised because of protein deficiency due to the rarity of pigs in the region caused by constant warfare (Berndt, 1962).

Early kuru research was focused on finding the cause of kuru (Gajdusek, 1963), and transumption was accepted as having been a common practice in the Eastern Highlands of PNG based on the reports of early missionaries and patrol officers. Dr Carleton Gajdusek, the pioneer of kuru research, had also personally witnessed transumption in the kuru-affected region (Klitzman et al., 1984). Early anthropological studies were focused on kinship and genealogies that were collected to assist in establishing a possible genetic hypothesis as the cause of kuru (Lindenbaum, 2008a).

Gajdusek wrote that the Fore ate their dead out of love and respect during a rite of mourning. The rite allowed the living to remain close to the deceased and to preserve traces of the deceased inside the consumer. Bodies were eaten after two or three days, when decay had started, by dismembering the body and cooking it with wild green vegetables in bamboo tubes. Occasionally the bodies were dismembered and then cooked in earth ovens. In general, it was the older women and children who took part in transumption assisted by the occasional older male. Warriors did not take part, as they feared transumption would reduce their fighting abilities.

The dismemberment of the bodies involved repeated handling of infective tissue by the women. Small children also handled the infective tissue as they played with the meat while their mothers cooked. The handling of the infective material resulted in contamination of the hands, nails and other parts of the body, which made self-inoculation possible via oral, nasal or conjunctival routes, as well as through scratching the skin or open sores and cuts. Sorenson and Gajdusek pointed out that self-mutilation as part of the obsequies would also increase the chance of transmission. The following forms of self-mutilation occurred: amputation of fingers, scratching, and bruising of the forehead and chest (Sorenson and Gajdusek, 1969).

Robert Glasse and Shirley Glasse (Lindenbaum) conducted anthropological research on transumption in the kuru-affected region, which Robert Glasse wrote about in 1963. They collected narratives about the recent past, and to assess the reliability of their data they used three methods: asking the informants to repeat their accounts after a period of time; interviewing witnesses to the same event who had different ages, social status and sex; questioning a large number of people from many villages. They also

recognized the need for a close relationship between the researcher and the participants and that it was important to locate good informants (Glasse, 1963).

According to Glasse, the reason for eating the dead in the kuru-affected region was gastronomic and there was no ritual or supernatural role. In the north of the region the dead were eaten out of revenge; this did not occur in the south as it was believed that the eating of an enemy would bring magical harm to those who ate the body.

In the north, the bodies were sometimes left in the ground for several days to improve the flavour and so that the maggots could be eaten. The entire body was eaten after being dismembered and this included the viscera, genitals, brain, bones and intestines. In the north, the body was sometimes cooked in an earth oven once the intestines had been removed, and in the south the meat was normally cut up and cooked with vegetable greens, salt and ginger (Glasse, 1963).

The cause of death was the most important factor in deciding if the body was to be eaten or disposed of in a sepulture. Those who died of dysentery during the epidemics of 1943 and 1947 were not consumed. Those who died of leprosy were buried, except in the Gimi, and most of those who died of yaws were consumed (Glasse, 1963).

In the South Fore the women and children consumed the body and few chose not to take part. However, male participation in transumption was rare as it was believed that the practice would rob a man of his vitality. Those males who practised transumption rarely ate females (Glasse, 1963).

Glasse (1963) points out that the enemy dead were eaten as well as kin in the Gimi and the North Fore, and that the eating of the enemy dead was vengeful and involved abuse of the body. The last comment was taken from Ronald Berndt's account of his fieldwork in the North Fore (Berndt, 1962). Enemy corpses were also stolen and eaten.

The role of kinship was difficult to ascertain as there were a number of different kinship systems in the kuru-affected region and these had local variations. The eating of the dead was also not subject to fixed norms and there was room for much individual behaviour. However, Glasse does state that maternal kin possessed the main rights to the body; these were the mother's brothers and their wives. A mother never ate her own child nor grandparents their grandchildren. An adult woman might eat part of her mother or grandmother. Children were not meant to eat part of their parents. Men never ate their wives but in the western part of the South Fore men were allowed to eat their sisters (Glasse, 1963).

Glasse (1963) provides a table on kin rights to a body in the South Fore: the female affines and agnates had various rights to parts of a man's body and the mother's brother occasionally participated; if a woman died there was little indication as to which of the women had rights to specific parts of the body.

The rights to the brain are of special interest as this contained the majority of the infective agent. In the South Fore, if a man died, the brain was eaten by his sister, and if a woman died, it was eaten

by her son's or brother's wife. The table also covers the consumption of the brain in other linguistic groups and there are clear variations (Glasse, 1963).

Shirley Lindenbaum pointed out that young boys participated in the feasts with their mothers until they were aged about 10 when they took up residence in the men's house and left the world of immaturity, femininity and transumption. This age may often have been younger since in each community the boys were taken in batches to begin their period of initiation.

Traditionally, pork was in short supply in Fore communities due to constant warfare and men claimed the available meat. Women and children were left with the least desirable parts of the pigs, as well as insects, frogs and humans, as their sources of protein (Lindenbaum, 1979).

Lindenbaum pointed out that the corpse was divided amongst those who had rights to other mortuary payments and these were primarily the maternal kin. A man's sister had the rights to his brain in the South Fore and in the North Fore it was his sister,

son's wife, and maternal aunts and uncles (Lindenbaum, 1979).

This was supported by the finding that the wives of the brothers of kuru victims were three to four times more likely to develop kuru than women who were not related to the kuru victim genetically or by marriage. The risk of kuru in those related by marriage (41%) and those related genetically (51%) to a kuru victim were similar (Mathews et al., 1968). There was no belief about inheriting power or the deceased's personality. Transumption was believed to have an effect on fertilization and regeneration (Lindenbaum, 1979).

A later paper by Klitzman et al. (1984) identified the last kuru victims in three communities whose bodies were disposed of by transumption. Lists of participants were constructed from genealogies collected from elderly participants, and from epidemiological records. It was established that close kin participated in the feasts, and in the case of the village of Ketabi a large number of participants came from surrounding communities. The brother's wife was given the brain to eat, a daughter-in-law a hand and a co-wife of the deceased was not allowed to participate. The paper established that there could be similar incubation periods amongst individuals exposed at the same mortuary feast

and that the incubation periods could be as long as 25-30 years
(Klitzman et al., 1984).

Appendix C:

The methodology used for the gathering, assessment and analysis of data

Ethnographic narrative methodology

This was a qualitative research study to collect and analyze subjective narratives. Ethnography was the research method of choice for this study, as it provided a suitable framework for collecting in-depth narratives and for studying their meanings.

Ethnography is the description of a culture, of a community or of other forms of social grouping. The word is derived from Greek and literally means 'writing of culture'. Culture is socially constructed behaviour that is transmitted through shared communication. Ethnography uses culture as the means of interpreting the phenomena under study, which can be done by

observation, interviews and the examination of documents, and then writing about it, as culture is not tangible or visible. For this to happen the ethnographer must immerse himself in the culture being studied and try to see the emic perspective, that is, the perception of the world from within the culture itself. He might attempt to discover tacit knowledge that the informants had not been aware of in their own culture. Fieldwork allows for the collection of data by participant observation and through interviews with informants, which enables the ethnographer to describe, analyze and write about culture from the emic perspective. The main evaluative criteria is that the study presents the culture as experienced by its members (Holloway and Wheeler, 2002; Polit and Beck, 2006).

Ethnographic research should be scientific and investigative, and use the researcher as the primary tool. It requires rigorous methods of data collection, builds on the emic perspective and should be inductive in order to allow the development of local theories. For these principals to be possible ethnography is carried out in the local setting where possible. It involves close interaction with gatekeepers and informants, which often creates obligations. It

requires inductive, interactive and recursive data collection and analysis to build local theories of culture from multiple data sources if necessary. The data need to be framed within a historical and socio-political context, and, finally, culture should be the medium for interpretation. Local culture is taken as the context for the research and there is a requirement for the researcher to understand what people do and why, before beginning to interpret their actions. Where possible the research should be repeatable though it is accepted that in changing circumstances this is not always possible (Le Compte and Schensul, 1999).

Very few primary data were available about transumption and exocannibalism in the literature review and ethnographic enquiry was chosen as the most appropriate research method to pursue primary data about mortuary rites, so that eventually the specific questions related to kuru could be answered. Ethnography is an approach to learning about cultural practices in a community – in this case specifically about mortuary practices. The beliefs about mortuary rites were likely to be embedded in multiple cultural beliefs and would require extensive fieldwork to elucidate the tacit knowledge required to understand these practices. The

ethnographic approach relies on discovery and recognizes that knowledge is locally specific.

The ethnographic method was open and allowed flexibility in the approach to gathering data and to analysis through induction, reduction and recursive analysis. At the start of the research the team was unaware of the study group's reaction to this field of enquiry, who would be the best informants, what might impede the field research, or what range of activities might have been relevant to the transmission of kuru. The flexibility of the ethnographic approach allowed the research to develop over time and to take a novel approach to the initial data collection, which consisted of educated young Fore collecting narratives from their own family members. This allowed the researchers to elucidate what the informants' behaviour meant to them rather than imposing irrelevant interpretations on those behaviours. It also allowed an approach that was not constrained by preexisting assumptions.

Narrative research is a broad term and may include ethnographic and phenomenological research methods. Narrative is seen as a useful tool in psychology, anthropology and sociology and

is a useful way to gain information about people's thoughts, feelings and experiences (Holloway and Wheeler, 2002). Narrative has been used in anthropology for a long time using key informants to create a picture of the beliefs and practices of a community. Although the stories are told by individuals the focus in anthropology is to use the narratives to typify the behaviour of the community. Although narrative research is often used as a separate qualitative research tradition, in this study narrative was used as an instrument of ethnographic study. Cultural narratives were the principal data collected. The narratives were later analyzed using culture as a medium for interpretation, which then allowed the results to be typified and used in a comparative analysis of spatial and temporal epidemiological differences of kuru.

Once the ethnographic method incorporating narrative as a data-gathering instrument had been chosen for the study it then allowed the research design to be constructed and implemented.

Population selection

Logistical criteria were taken into account when considering the population for the study, and in this case the project had

adequate resources from the MRC and support from the PNGIMR. Initially a member of staff would discuss the aim of the interviews with a relation or friend of the community where the team sought access to participants. The staff member and his relation or friend would then discuss the project's aims with the village leader and other senior community leaders. This allowed the community to decide if they wanted to participate in the research and ensured the community's cooperation if they chose to participate.

Two members of the team interviewed their own extended South Fore families, which reduced the logistical burden on the project as staff were accommodated by their own families, and they were able to arrange transport to a place near the field site. This was also important because the field staff were happier staying with their own families or in communities where they had a relation; in this case the term 'relation' could mean an agnate, affine or another form of social relationship (Lindenbaum, 1979). This allowed the staff to gauge the receptiveness of the community to the project and to see if people were willing to tell narratives about mortuary rites. It also created an opportunity to locate those who were informed about the subject and those who enjoyed telling their narratives as

they would become key informants in future interviews. If a person was unwell or occupied with social obligations the team were able to interview other elderly relatives in the same vicinity so no time was lost.

The South Fore and Gimi were the last populations of the kuru-affected region to cease the practice of transumption, so they had the youngest population of people who had participated in or knew about the practice. This meant that they had participated in transumption for longer than other groups, and more recently, and were therefore likely to make better informants. The South Fore was also the region where kuru research had been based over the years, and the staff had a good network of contacts to enable the team to interview as many people as possible who fitted the study criteria. For these reasons the initial interviews were conducted in the South Fore.

By conducting multiple interviews in the South Fore at the start of the study, followed by focus group interviews, a template for interviews in other linguistic groups was created, and this allowed in-depth interviews to be conducted over 5 days in other linguistic

groups. It was a technique that greatly reduced the logistics and cost of the study. In some cases the team had then to travel long distances to collect data, but this was an accepted part of the work, and was often met with enthusiasm by the staff for the chance to see other parts of the country that they had not seen before

The study criteria were based on the population of interest, which were individuals who had participated in, observed, or were informed about the practice of transumption in the kuru-affected region and the contiguous communities.

An important consideration was whether the proposed community contained enough participants who fitted the study criteria to make the study possible. This choice was also very much dependent on the social connections of the field staff who were obliged to contact people they knew to arrange informants who fitted the study criteria for participation in the interviews. In the South Fore some villages had no old people who fitted the study criteria. This was partly due to the older population being exposed to kuru but also due to relatively short life spans in PNG (United Nations Development Program, 2005).

In communities that came under Australian Government control earlier the population that fitted the study criteria were even older and harder to locate, as there were few people of this age. Lutheran missionaries first reached the Gadsup linguistic group in 1919, and by 1927 they had built a mission in the Agarabi linguistic group. The first European mission was built at Kaimbaidam in 1931, and by 1934 there were 19 native evangelist outposts in the highlands. The Lutheran missionaries Johann Flierl and Wilhelm Bergmann reached the junction of the Asaro and Bena Bena Rivers in 1930. Lapumpa airstrip was built near Kainantu in 1932 and the Upper Ramu Patrol Post was based there. The primary aims of the missionaries were to stop warfare, cannibalism and sorcery, so these aspects of highland culture were undergoing change to various degrees in areas influenced by the missionaries and government (Radford, 1987). Cannibalism was proscribed by the patrol officers and native police on the grounds of hygiene. A former native policeman explained how he assisted Jim Taylor in carrying out his duty to eradicate cannibalism in the Eastern Highlands Province (interview 115, see Appendix H).

The first post-war patrols in the kuru-affected region started in the late 1940s and in 1949 a native mission was established in Tarabo in the Keiagana. In the same year parts of the Usurufa and the North Fore were declared unrestricted. By 1951, the North Fore was declared unrestricted and a police post was established in Okapa, and in 1958 the southern Keiagana, South Fore and Gimi were declared unrestricted (Alpers, 1965). In the 2005 United Nations Development Program report on PNG, the life expectancy at birth for that year was 56.9 (United Nations Development Program, 2005). Those areas that came under mission influence or government control first have few old people still alive who might be able to recall the practice of transumption, or have knowledge about the practice. In the northern linguistic groups affected by kuru it was harder to find informants than in the North Fore, South Fore, Gimi and Keiagana. In the Agarabi, Tairora and Gadsup linguistic groups the team were unable to locate informants with first hand knowledge of transumption. It was also difficult to locate informants in the Kamano, Bena Bena, Asaro, Siane and Yabiyufa as people needed to be nearly 80 to recollect traditional mortuary rituals. Even when informants were located it was rare to find

someone who was knowledgeable or able to recall accurately events that occurred 60 years or more ago.

The sampling relied on a network of acquaintances of the field staff, which might be seen as a weakness in the study. However, the study was conducted in the 11 linguistic groups affected by kuru and many of the informants came from different patrilineages, clans and ancestral groups. The diversity of practices recorded in the narratives showed that the snowball sampling (rapidly expanding sampling) had not removed this diversity. After the initial snowball sampling the sampling instrument became purposive sampling, which allowed the staff to select informants who fitted the interview requirements at that time. In this case criterion sampling was used as informants were chosen who were informed about specific aspects of the mortuary rites. The sample size was limited by many factors including the number of informants who fitted the study criteria, logistics, time and resources. The ethnographic study relied on a number of key informants who were informed about their culture. This approach was taken as the study was retrospective and observation was no longer possible.

The most important aspects of the qualitative sample were its adequacy and appropriateness (Polit and Beck, 2006). Adequacy refers to the sufficiency and quality of the data when saturation is reached. Adequacy was reached in the South Fore, North Fore, Keiagana, Gimi, Yate and Yagaria and to a lesser extent in the Kamano, Awa, Usurufa and Auyana. Evidence for this can be seen in the ethnographic descriptions in the next chapter.

Appropriateness refers to the use of an appropriate sample of informants who best supply an understanding of the phenomenon under study. The study criteria of the informants were appropriate but as explained it was difficult to find informants in the areas that came under mission and government influence early in the contact period. The number of informants from the Kamano, Awa, Auyana and Usurufa was less than ideal, but was the best that could be achieved under the circumstances.

Another important aspect was the fittingness of the data, which refers to the degree of transferability of the study results to another area and the congruence between the two groups. Transferability of

data was found to be appropriate, and this is covered in the section on assessment of data.

Resource logistics

The project was financed by the MRC and supported by the PNGIMR. The two educated young Fore who collected the initial interviews were employed as technical officers and based in Goroka. They made field trips to conduct interviews with their own relatives in the South Fore and occasionally in the North Fore. The rest of the field staff were employed locally and lived in their own homes. The community liaison officer and field coordinator were based in Waisa, the village that also contained the PNGIMR field house. The field house was set up with solar power for charging batteries and powering computers and many of the translations were completed by two technical officers employed in the village who conducted their work in the field house.

The PNGIMR assisted with transport, field staff, administrative support, laboratory support and shipping of samples. The responsibilities were agreed upon by the Directors of the MRC

Prion Unit (John Collinge) and the PNGIMR (initially Michael Alpers, followed by John Reeder and then Peter Siba) and this cleared the way for a successful collaboration.

Data-collection instruments

The primary approach to data collection was for educated young Fore members of the team to conduct unstructured interviews in a sample group made up of their elderly male and female family members who had witnessed, taken part in, or were informed about traditional mortuary feasts. These initial interviews were normally conducted on a one-to-one basis in the homes of the interviewees, though occasionally two or more persons were interviewed together. The investigators had the primary role of interviewing elderly members of their own extended families, in their own language, in their own environment, in order to obtain data free of ethnocentric bias and a priori assumptions based on the published literature (Holloway and Wheeler, 2002). The younger generation is largely unaware of the eschatological reasons for transumption and under mission influence have little interest in these aspects of traditional culture. The team members initially conducted unstructured

interviews, and were encouraged to ask open-ended questions and questions that arose from their own curiosity.

Many elderly people in the Fore, but not all, are reserved about talking about transumption to outsiders. This has been caused by the condemnation of the practice by missionaries and early government officials who banned it. They also fear that by talking about kuru they too might develop the disease. Traditionally, the mortuary rites were believed to play a central part in both an individual's and a community's survival during a time of frequent warfare. This knowledge was kept secret to protect a community's members from enemy sorcerers. This approach tested the willingness of the elderly population to talk about their cosmology and eschatology, which were subjects normally discussed amongst initiated males of the same or closely allied patrilineages, though older women also had knowledge of these subjects. If foreigners raised the subject of transumption the participants would say that they ate the dead because the meat tasted good, which is true as there was a gastronomic element to the feasts, but this was not the primary reason for transumption. The team was also able to locate informants who were willing to tell narratives to a foreign

anthropologist, and to locate those who were most informed about the mortuary rites.

Some Fore perceptions on discussing mortuary rites

The following quotes show that the practice of transumption, though it involved public feasting, incorporated secret rituals that were thought to ensure the survival of the community and the individual during war and peace. When the practice of transumption was banned after the imposition of government control of the kuru-affected region, members of the indigenous community were reluctant to discuss their mortuary practices with the newly arrived foreigners. The absence of eschatological detail in early descriptions of transumption is probably due to the secrecy of these rites. The following selections from narratives explain the Fore perspective on this topic.

“We would refuse to talk if a European or coastal person came to collect these stories from us. You are our own children and so we feel free to talk. Our

ancestors ate their dead so we could survive.”

(interview 23)

“The people never want to say anything, because these practices helped them survive during wars and normal life.” (interview 16)

The younger generation was not always aware of these traditional practices, as the older generation often kept them secret. The older Fore had undergone initiation and, even today, many do not like to disclose their beliefs and practices to the younger male generation who have not undergone the ordeal of initiation.

“Some beliefs about why the practices were performed are not known today.” (interview 16)

“Many people here are asking what we are discussing. This is because some of our youths do not know we ate our dead. It was kept quiet when the kiaps and Europeans came. We never talked about it.” (interview 24)

However, the team found that most of the informants were delighted to talk about their childhood and early youth. They

acknowledged that times had changed and their powers and beliefs were no longer as important as they were to their survival. The participants did not want the younger members of the community to hear their narratives so they were conducted in private. The willingness of the informants to tell narratives is made clear from the detailed ethnographic descriptions that were obtained.

The interviews were recorded using audio or video cassettes. They were then translated into English and, by recursive analysis, lists of follow-up questions were created and taken back to the field. Gradually stable cultural patterns about some aspects of the mortuary rites began to appear but other aspects were confusing with contradictory statements from the same interviewees.

The second stage involved the use of structured interviews which were conducted by several members of the field staff. These interviews were constructed to elicit comparative data as to what happened to the body of the deceased. Interviews were conducted throughout the North and South Fore among different dialects, ancestral groups and clans to discover any obvious differences in the cultural aspects of mortuary rites involving the body.

After initial assessment and analysis the team conducted in-depth interviews with focus groups in the South Fore. These interviews were conducted over several weeks and were complemented by follow-up interviews after recursive analysis. The research team, led by myself, were able to conduct interviews in Tok Pisin and in the Atigina and Pamusagina dialects of South Fore, and were able to present questions in different ways to facilitate understanding and to clarify parts of the narratives. The follow-up interviews used the divisions of mortuary rites suggested by Hertz (1960), who divided the rites into events surrounding the souls, the body and the mourners. By using a chronology of events and Hertz's divisions the interviews were swift and clear and provided rich data sets.

Following assessment and analysis of the data the definitions of the souls were clearly formulated, and a list of events surrounding the body and mourners was created in a chronological sequence that was then used when conducting interviews in the other linguistic groups affected by kuru.

Assessment of qualitative data

The criteria for assessment were based on how closely the data reflect the truth. There is some debate about what criteria should be used to validate truth. In this case the trustworthiness of the data was based on credibility, dependability, confirmability and transferability (Polit and Beck, 2006). One of the criteria mentioned by Polit and Beck (2006) is prolonged engagement that helps give credibility to the data. In this case the project has taken place over 12 years and the collection of ethnographic data over 6 years. This investment in sufficient time has allowed the team to collect credible data.

The use of triangulation gave credibility to the data and gave a more complete and contextualized understanding of the phenomenon under study. In this case there was data source triangulation by interviewing multiple informants. There was also investigator triangulation as more than one member of the team collected data. These two forms of triangulation provided a basis for truth. There was no disconfirming evidence found in the narratives. Researcher credibility was maintained throughout the study as

there were no personal or professional conflicts that might have affected the data collection.

Data dependability is data stability over time, and this was found to be valid as the content of the narratives collected several years apart from different informants revealed similar data.

Confirmability has been created by the use of an audit trail that records all the raw data in its recorded format and this is supported by an archive of the transcriptions that were analyzed. The decision trail is also discussed in this chapter allowing an outside person to assess the confirmability of the data.

Transferability is confirmed when findings from the data can be transferred to another area and confirmed. This occurred throughout the study starting with the interviews collected by the young Fore, and continued through the focus groups and finally into the narratives collected in the other linguistic groups.

Assessment of data collected in unstructured interviews

Credibility

The data collected by the young educated Fore were from unstructured interviews conducted over 3 years. Data were triangulated using multiple informants and multiple investigators. The following examples are answers from multiple informants collected by the two young Fore investigators to the question, “Were those who died of kuru eaten?”

Answers given to the first investigator:

“Yes, they ate those and those who died of *tukabu*.” (interview 9)

“Yes, they were eaten just the same as the ones who died of sorcery, cough and *tukabu*.” (interview 8)

“We ate those who died of kuru.” (interview 5)

“Yes, they even ate the ones who died of kuru.”
(interview 4)

Answers given to the second investigator:

“Her daughter died of kuru; she is my sister; I remember dismembering her to be cooked and eaten”.
(interview 42)

“Yes, they ate the bodies of relatives who died of kuru as well.” (interview 55)

“At first they ate them, but later when they realized that it took a great toll on the people they decided to bury them.” (interview 69)

“When the first cases of kuru appeared in the village they started eating those who died of kuru, but when it got worse they started to bury them.”
(interview 68)

In the above examples there is credibility of data as similar answers were given by 8 different informants to two different investigators. During the assessment of the narratives there were multiple examples of credibility.

Dependability

The above examples used in the assessment of credibility were collected between 2002 and 2005 showing stability of data over time. Again, there are multiple examples of stability of the data in the narratives collected over a period of 6 years.

Confirmability

The tapes used to record the narratives were placed in an archive and backed up electronically. The narratives were translated into English and stored in electronic format and hard copy. This process is part of the audit trail to make independent confirmability possible.

Transferability

Transferability was confirmed after the analysis of the primary data. The data were used as the basis for the focus group interviews conducted in two communities in the South Fore by a team lead by myself. The data from the narratives were quickly shown to be transferable when compared to each other, to the data collected

from the focus group interviews, and later to the data collected from narratives in other linguistic groups.

Assessment of the data collected in the structured interviews

The data from the structured interviews were collected in 2005 by 3 members of the team. One of the team members was one of the educated young Fore who had collected the earlier interviews; another was highly resourceful and had worked for a number of years in Port Moresby where he had been successful. One had a degree, another had completed high school and the third had only a community school education as he was much older. This instrument was introduced by myself in an attempt to see if it would be possible to quickly locate any variations in mortuary practices in the South Fore if they existed, by conducting structured interviews in different villages, clans and ancestral groups. The quality of the data collected varied and there was validity on assessment of the data. However, there was a lot of contradiction and confusion surrounding the ownership and distribution of the body. On assessment it was an instrument that could be used to collect data, but it was not as effective as the unstructured interviews followed

by the focus groups. For certain questions where there were variations in behaviour it was not an effective instrument, nor was it effective when there were differences between the ideal practice and the actual behaviour during mortuary practices. The structured interviews did not allow the interviewers to use their initiative to discover tacit knowledge through further questioning.

Credibility

Credibility was apparent in answers to questions with a single answer and for those where the expected and actual behaviours conformed. Credibility was not found in the answers for questions that did not fit the above descriptions. There were multiple investigators and multiple informants allowing triangulation of the data.

The following answers show credibility in the structured interviews when the question asked was “What were the babies of women with kuru like?”

“When a baby was born to a mother with kuru it was very beautiful and she breastfed it until she was

no longer able to do so and then someone else would
care for the baby....” (interview 80)

“The babies were born normally and were
attractive....” (interview 79)

“The relatives would take care of the child.”
(interview 78)

Further results are shown tabulated in Table 1, and these
results show clear evidence of credibility.

Table 2 shows tabulated answers to the questions about female
exposure to kuru and their contradictions. Different clans in the
same village gave the same and different answers, as did some
members of the same clan in different villages. Although the
answers were interesting it was not possible to assess their
credibility without first understanding the beliefs and practices of
mortuary rites in the South Fore. In other words, without first
understanding the details of the belief system that justified and
explained the mortuary practices it was not possible to use
structured interviews as an effective instrument. The reason for the
confusion was that females up until they had two or more children

were not meant to participate in transumption, but in practice this rule was very rarely enforced. This was very revealing and is explained in detail in the ethnographic descriptions.

Dependability

The data were collected over a period of one year and when the analysis was completed they could be interpreted and their dependability validated.

Confirmability

The interviews were recorded on a tape medium and backed up on an electronic format. The interviews were translated and hard and electronic copies stored.

Transferability

Most of the data could be transferred within the South Fore but this was complicated by the issues discussed under the credibility of the data. The discrepancies could be resolved after the assessment and analysis of the focus group interviews.

Once the focus group interviews in the South Fore were analyzed it was possible to make more sense of the data that had been collected during the structured interviews.

Assessment of the data collected during the focus group interviews in the South Fore

Credibility

These interviews revealed very rich data sets over several weeks. Two members of the team from the South Fore and I conducted the interviews. Both Tok Pisin and Fore were used to conduct the interviews and discussions also took place between the team members in English and Tok Pisin allowing triangulation of data through the use of multiple investigators. Triangulation was also confirmed through the use of multiple informants in the focus groups, which comprised both men and women where possible. This was important, as it was the women who were the main participants in transumption, but the men who were in general more knowledgeable about rituals and beliefs.

Dependability

There were several focus group interviews up to a year apart. These interviews were complementary, and the data collected supported and consolidated the previous data through recursive analysis, thus confirming the dependability of the data.

Confirmability

The interviews were recorded on tape, copied onto an electronic format and translated into English. After analysis there were follow-up interviews which were processed the same way. The interviews were translated into English and stored in hard copy and electronic format.

Transferability

Once the data from the first focus group had been analyzed their transferability was validated during a second focus group interview in another village, when the contents of the two interviews were found to be consistent and similar though showing interesting variations.

Assessment of the data collected in other linguistic groups affected by kuru

Credibility

This was confirmed through triangulation of multiple investigators and where possible through the use of multiple informants.

Dependability

The dependability of the data was confirmed through the use of follow-up interviews after recursive analysis which confirmed that the data had dependability over time. Some of the follow-up interviews also contained different informants. The data collected were supported by the initial data collection and thus allowed the data to be integrated during recursive analysis.

Confirmability

The interviews were recorded, copied onto an electronic format and then translated into English. I took notes and the data were written up after analysis.

Transferability

It was not possible to check all the interviews in all the linguistic groups for transferability as time did not allow this. However, in some cases follow-up interviews contained different informants and occasionally they came from a different village and this validated transferability. The linguistic groups affected by kuru merged through dialects and there was intermarriage across their borders. As previously mentioned the people had no name for themselves based on their linguistic group and their cultures were broadly similar. It is not surprising that all 11 linguistic groups shared the same concepts for the 5 souls of the deceased and had similar mortuary practices and eschatology (Table 3).

Analyzing qualitative data

The purpose of analyzing the qualitative data was to give it meaning. There were some challenges in analyzing this type of data, as there were no universal rules and, secondly, the analysis required extensive work to reduce the data into a reportable format. The qualitative analysis process started with comprehending the phenomenon by editing analysis and only then were the data

synthesized into order by inductively putting the data together from the narratives. During the theorizing stage the data were put into final order and during the recontextualizing stage the ethnography was further developed and applied to other settings, in this case linguistic groups.

Comprehending

By editing analysis the narratives were read and meaningful segments identified and reviewed. At this stage of the research the phenomenon was not fully comprehended and it was only in retrospect that the contents of the early narratives were understood. This also applied to the data collected from the structured interviews. However, without this early work the team would never have been able to gain the tacit understanding of the mortuary rites that was achieved. By analyzing the early narratives through recursive analysis I was able to find key segments and using the divisions of Hertz (1960) was able to prepare lists of questions in a chronological sequence to be used in focus group interviews. For example, the souls of the deceased were mentioned in the narratives, as well as the land of the dead and the many

different reasons for practising transumption. These were some of the examples of key segments identified during the analysis of the unstructured interviews conducted by the educated young Fore.

“...*auma* is your breath, your soul...” (interview 14)

“...*milivai*, that is where the dead go. That is where the *auma* resides after death.” (interview 14)

Transumption in the kuru-affected region was not practised for a single reason, and the following segments of narratives are examples of the reasons why the Fore ate their loved ones. The first examples show the Fore concern with the decomposition of the bodies of loved ones.

“It is something of me and I would rather eat him than throw him to the worms of the earth.” (interview 5)

“It was bad to see your brother or sister decay. The mother would almost hang herself and so she ate her dead child. She would take it and cook it in

bamboo and eat it. Her husband understood this and made no comment.” (interview 5)

“It would be bad if I put him in the ground, and it would be bad if I put him up in the trees on a bed. I would rather eat him for I loved this cousin. That was the thought towards eating our dead. It was out of love and compassion for them.” (interview 24)

These descriptions clearly show the Fore concern with the decomposition of the bodies of their loved ones. If the body was buried, it was eaten by worms, and if it was placed on a bed in a tree it was consumed by maggots. The Fore believed that worms or maggots should not eat their relatives’ bodies, as it was unfitting, so they ate the bodies themselves. Decomposition of the body has been a major concern in mortuary rites since ancient times and continues today (Pearson, 2000). Among the South Fore particular attention was paid to the need to consume the uncorrupted body so as to ease the passage of the souls of the deceased to the land of the ancestors (Whitfield et al., 2008).

The following quote confirms the gastronomic element mentioned by earlier researchers (Berndt, 1962; Glasse, 1963).

“We would collect all kinds of bugs and beetles and gather them to cook as a means of getting protein and it was very difficult during that time. Therefore, when it came to eating our own dead it was with respect that it was given to our affines. His or her body was not spoilt but eaten.” (interview 24)

The body was eaten out of love, but it was also recognized as a source of meat for women and children, who used it to supplement their protein-poor diet of insects and rats. Due to frequent warfare pigs were in short supply and the consumption of pork was dominated by initiated males as it was regarded as unpolluted food (Lindenbaum, 1975a).

Fear of the ghost of the deceased had not been mentioned in earlier works but it was clearly a matter of concern for the Fore.

“His ghost will come back to spoil things if the body of the dead person is not treated properly. This

is true for it happens all the time when the ghost is unhappy with something regarding his funeral rites.”
(interview 23)

They were concerned that if the body was not treated with respect, or the mortuary rites were not performed properly, then the ghost would be angry and become disruptive. If the deceased had requested that their body be eaten the relatives would eat it partly out of fear, as the ghost might harm them if the deceased’s wishes were not followed.

The following examples explain some of the Fore eschatological beliefs behind their occult rituals during transumption.

“... we believed that he would appear in us if we cut him and cooked him and ate him. It was to get the likeness of that person into himself.” (interview 23)

“It was eaten by a young woman without power and when she had a child, and the child had the same distinct kind of mark as the dead person had, then it was said it was him. At initiation they called the child after the dead person.” (interview 23)

“...whatever power you attained from eating your own dead gave you an addition to what you already were.” (interview 23)

“They ate to attain some of his character or his archery or his gardening and hunting skills into themselves. They knew he was dead but some of those things could be inherited.” (interview 23)

It was thought that the deceased's appearance could be passed on to an unborn child and if an identifiable mark or feature of the deceased were seen on a child, this was clear evidence, and the name of the deceased would be given to the child at initiation. It was also thought that the deceased's abilities were passed on to the living who took part in transumption, and these included gardening, fighting and hunting abilities. These inherited aspects of the deceased helped the living to survive and prosper.

The human body was classified as unsuitable for consumption by the Fore. It was a polluted meat, and to ensure that the participants of transumption did not pollute their husbands or gardens they were purified after they had consumed the body.

“They ate us or our dead because we belonged to them. It was something to be done because we belonged to them. They gave us a responsibility by doing so. We had to cleanse them by giving them a big feast full of pig meat and other wild beasts. We gave them a big feast because they ate our dead.”

(interview 5)

The body of a deceased man belonged to his affines as he was born from one of their women and he had their blood in his body. The agnate-affine relationship was an important part of Fore culture. Mortuary payments were made to the affines when a man or woman died since the body belonged to them.

“...if I had an in-law (like my wife’s uncle) who was always kind to me and I had died, it would be he who watched over his wife to cut my body. And my family made him that feast for the fond memories he had of me and an apology to him for my death.”

(interview 5)

The entire body of the deceased was consumed.

“All parts of the body would be eaten. Not a single part of the human flesh and bones would be spared. They would go to the extreme of eating the hair, and the things that he/she saw while alive.”
(interview 54)

“They wanted to get power from the deceased and that is why they had to eat any piece of clothing and anything that the deceased saw and touched.”
(interview 54)

Not only was the whole body consumed, including the bones and nails, but also the deceased's possessions, and this clearly shows that, although there was a gastronomic element to transumption, it had far deeper meaning for the participants.

Those who were killed in warfare were also consumed by the mourners, who in this case had an additional purpose for transumption beside the ones already mentioned.

“They would say we have cooked and eaten him: now go and kill one of the enemies just like him. You got angry and did what they asked.” (interview 3)

The body of a slain family member was eaten with the additional reason of revenge. When the men saw a family member being consumed by their women they became angry and, taunted by their women, set out to avenge the death.

The examples just given were just some of the narrative segments that allowed the data collection, assessment and analysis to progress quickly.

Synthesizing

During the synthesizing process the data were inductively put together and typical and non-typical behaviour identified. The purpose of this process is to identify typical behaviour so that the outcome of induction was valid. For example, there were a handful of Fore women who did not participate in transumption. It is an interesting piece of data but only relevant to about one female per community. The following are some examples of synthesizing and include the reasons why certain bodies were not disposed of by transumption, the alternative sepultures to the bodies of living relatives, and the incidence of supposed exocannibalism in the North Fore.

Not all the dead were eaten; disposal of the corpse also depended on the cause of death, as explained in the following narratives.

“... after most of the deaths that occurred from kuru, accidental deaths, or arrows, to name a few, the maternal side consumed the body, as a means of respect to the deceased and the family members...”
(interview 79)

“There were bodies that were not for consumption: enemy bodies, the body which had already gone bad, and the body of a person who died from a strange disease, which they thought might infect them...” (interview 79)

The Fore had a notion that some diseases were infectious and they avoided, for example, eating the bodies of those who died in the 1943 dysentery epidemic (Alpers, 1965). They also feared the bodies of those who died of unrecognizable conditions and these were buried. Some communities did not eat the bodies of those who died of yaws and leprosy, whilst others did.

There were also other means of disposal of a body in the Fore besides transumption, and these included burial and placing the body on a raised platform in a bamboo or sugar cane grove. However, transumption was the normal means of disposal of a corpse.

“...there would be two options, one, to go and bury him or her, and two, to be consumed by the affines. Most of the time, they used to take option two: they would not want the body to be buried, but rather consumed, so that it eased their pain of losing their loved one.” (interview 79)

“...by making a platform and leaving the body to decay in the deceased’s favorite area, by burying the deceased and, finally, by eating the deceased.”
(interview 24)

In the North Fore the following reason was given for placing a body on a raised platform.

“The main reason for making a bed and letting it rot or decompose was out of respect for the good that

that particular person did and how his kindness was extended within the community. When he was placed there the body decomposed, and the women of the community went out and found highlands breadfruit tree leaves and placed them under the bed. When the maggots formed and fell on the leaves they would pick up the maggots and the breadfruit leaves and take them back to their respective areas and cook them in bamboo tubes and eat the maggots.” (interview 24)

Sometimes the deceased were not eaten because they were highly respected, so the body was placed on a platform instead. However, the living wanted to inherit the deceased’s abilities so the maggots that fell from the body were consumed in order that the deceased’s talents would remain to assist the living. The transumption of decomposing bodies and maggots was not motivated by gastronomic satisfaction but purely as a ritual of respect and love for the deceased.

Exocannibalism was reported in earlier works as having occurred in the North Fore and Gimi (Berndt, 1962; Glasse, 1963).

Though some narratives that have been collected clearly state that the Fore did not eat their dead enemies, these are contradicted by other narratives explaining that exocannibalism did occur in the North Fore.

“...it was not a practice to kill and eat our enemy.” (interview 24)

“Peace was done between us after we had eaten and sent back the head and intestines to his family and people. No arrow flew from our village toward them neither has there come any in our direction. It was complete peace between the two villages.”
(interview 23)

“We had eaten and made him part of us. Every arrow that they shot at us would be seen as killing one of their own for we had eaten one of their dead.”
(interview 24)

Although the North Fore did not kill their enemies for food, there were certain circumstances when the women would eat their enemies: not for revenge, but to bring about peace between warring

factions. This is not therefore exocannibalism in the usual sense. Moreover in the warfare being discussed here, there was often intermarriage with the enemy group, so that the consumption of dead enemies could be conducted by female relatives according to proper, if summarily conducted, practices of transumption.

Theorizing

The analysis of the narratives started with a search for recurring regular themes. This led to identification of concepts which were then defined and negative instances of the concept also sought in the data to confirm the concept definition and to avoid premature judgements. Through structural level analysis the concepts were put together so a picture was created and this was then analyzed. Hertz's divisions were used to systematically sort the data and explanations were tested against the data where necessary. This was not a common requirement as the data were largely self explanatory and once placed in a chronological order required little further interpretation.

Van Gennep first put forward the idea of three stages of transition from one social state to another in his universal theory.

Rites of passage were effected by preliminary rites where the person was separated from the old world, a liminal stage or transition stage followed by a post liminal stage during which the person was incorporated into the new world (Van Gennep, 1960).

Hertz's (1960) work was cross-cultural and largely based on material about Borneo even though he never visited the island. He even went as far as to learn the language to help in his studies. He divides mortuary rites into three groups: body, mourners and souls which undergo parallel transitions throughout the mortuary rituals. He also looked at double burial and how the pollution of the flesh was separated from the bones and then the purified bones reburied in another ritual. The decomposition of the flesh was equated with the journey of the souls to the land of the dead. There have been criticisms of Hertz's work (Metcalf and Huntington, 1991) but his theory provided an ideal approach to systematically sort the data collected in the narratives. His divisions were also used during the focus group interviews in the South Fore to guide the interviews and to ensure that important questions were not missed. The logic of this approach can be seen in the chapters where the ethnographic

descriptions of mortuary rites in the kuru-affected region are written.

Recontextualizing

The purpose of the ethnographic research was to produce comparative data about mortuary rites in the kuru-affected region. In this case the analysis style was based on template analysis. The initial template for the analysis was based on the divisions of what happened to the body, souls and mourners during mortuary rites in the South Fore (Hertz, 1960). This template was set in a chronological sequence to make sense of the narratives collected and was constantly updated and modified through recursive analysis.

It was never the intention of the research to develop theory that could be applied universally, but it was possible to use the initial ethnographic description developed in the South Fore as a template for focus group interviews in other linguistic groups affected by kuru. As discussed in the assessment section of this chapter it was not surprising in an area where linguistic groups were closely related or merged through dialects that similar practices and beliefs were found throughout the region. Although

there were slight differences in mortuary rites the general beliefs in the souls (Table 3), the afterlife, eschatology, sepultures, and the chronology of mortuary rites were the same.

Interview number	Linguistic group	Village	Clan	What happened to babies whose mothers died of kuru?	What were newborns of mothers with kuru like?
104	South Fore	Umasa	Takai	adopted	normal
79	South Fore	Paiti	Ai	adopted	normal
80	South Fore	Takari	Ai	adopted	normal
102	South Fore	Ketabi	Ai	adopted	normal
77	South Fore	Ketabi	Baivisa	adopted	-
78	South Fore	Purosa-Takai	Takai	adopted	normal
68	South Fore	Paigatasa	Kimisapa	adopted	normal
69	South Fore	Paigatasa	Uwanosa	adopted	-
76	South Fore	Kamira	Kigarubamesa	adopted	-
105	South Fore	Yagareba	Takai	adopted	normal
74	South Fore	Awarosa	Ai	adopted	normal
75	South Fore	Awarosa	Mbisosa	adopted	normal
29	South Fore	Awarosa	Takai	adopted	normal
73	South Fore	Ilesa	Manivisa	adopted	normal
100	South Fore	Waisa	Kasoru	adopted	normal
103	South Fore	Ivaki	Karu	adopted	normal

Appendix C Table 1. Tabulated answers to questions taken from the structured interviews.

Interview number	Age groups of females exposed to kuru			Girls living with their mothers	Girls living with their in-laws	Women living with their new husband	Women with more than 2 children	Old women
	Linguistic group	Village	Clan					
29	South Fore	Umasa	Takai	yes	yes	yes	yes	yes
27	South Fore	Paiti	Ai	yes	yes	no	yes	yes
38	South Fore	Takari	Ai	yes	yes	no	yes	yes
28	South Fore	Ketabi	Ai	yes	yes	yes	yes	yes
32	South Fore	Ketabi	Baivisa	yes	yes	yes	yes	yes
33	South Fore	Purosa-Takai	Takai	yes	yes	yes	yes	yes
30	South Fore	Paigatasa	Kimisapa	yes	yes	yes	yes	yes
31	South Fore	Paigatasa	Uwanosa	yes	yes	yes	yes	yes
34	South Fore	Kamira	Kigarubamesa	yes	yes	yes	yes	yes
39	South Fore	Yagareba	Takai	yes	yes	yes	yes	yes
35	South Fore	Awarosa	Ai	yes	yes	yes	yes	yes
36	South Fore	Awarosa	Mbisosa	yes	yes	yes	yes	yes
40	South Fore	Awarosa	Takai	no	no	no	yes	yes
37	South Fore	Ilesa	Manivisa	no	yes	yes	yes	yes
44	South Fore	Waisa	Kasoru	yes	yes	yes	yes	yes
62	South Fore	Ivaki	Karu	yes	yes	yes	yes	yes

Appendix C Table 2. Tabulated results of questions asking if females in specific age groups were exposed to kuru

Linguistic group	Soul	Simulacrum	Abilities	Harmful ghost	Occult abilities and aggression
South Fore	<i>auma</i>	<i>ama</i>	<i>aona</i>	<i>kwela</i>	<i>yesegi</i>
North Fore	<i>auma</i>	<i>ama</i>	<i>aona</i>	<i>kegina</i>	<i>yesegi</i>
Gimi	<i>auwasi</i>	<i>ama</i>	<i>aona</i>	<i>ole</i>	<i>nahedaena</i>
Keiagana	<i>tutumopa</i>	<i>ame</i>	<i>awamu</i>	<i>afe</i>	<i>imamu</i>
Yate	<i>hawamu</i>	<i>hamea</i>	<i>himona</i>	<i>hangro</i>	<i>tokea</i>
Yagaria	<i>tutumopa</i>	<i>aune vha</i>	<i>amu</i>	<i>haiyane</i>	<i>leyane</i>
Kanite	<i>haimu</i>	<i>hawamu</i>	<i>manu</i>	<i>haiyane</i>	<i>tokea</i>
Usurufa	<i>auyananei</i>	<i>tima</i>	<i>ama</i>	<i>kwata</i>	<i>akona</i>
Kamano	<i>asimu</i>	<i>amemaha</i>	<i>avimaha</i>	<i>hangro</i>	<i>asan kovo</i>
Awa	<i>iya</i>	<i>waukainave</i>	<i>auwana</i>	<i>wanta</i>	<i>ayantane</i>
Auyana	<i>sama</i>	<i>simamba</i>	<i>kaimba</i>	<i>kwanta</i>	<i>ilawasi</i>
Soul: similar to the western concept Simulacrum: a copy of the deceased but more powerful Abilities: these are passed on to the children of the deceased Harmful ghost: from the flesh and blood of the deceased Occult abilities and aggression: passed on to the children of the deceased					

Appendix C Table 3. Names of the five souls of the dead in the languages of the kuru-affected region.

Appendix D:

Alternative sepultures to transumption used in the kuru-affected region

Alternative sepultures to transumption used in the South Fore

In the South Fore bodies were put in baskets, on platforms, buried or eaten. The custom of baskets and platforms extended as far as Wanikanto in the Atigina region and south of this village the bodies were either buried or consumed. All four sepultures were used in the Pamusagina region. Nearly all the dead were eaten in the South Fore and other forms of disposal of the body were nothing more than a temporary sepulture to please the souls of the deceased before transumption.

Burial

Burial was an old tradition and was chosen by people who loved their land and wanted to be eaten by it. Burial was not a common way to dispose of the body; it was sometimes used for adults but children were never buried. The *pamusagina* recognized that a buried body would be eaten by worms and then distributed throughout the land. The family would tell the affines where the body was to be buried and it was the responsibility of the male affines to prepare the grave pit. The pit could be dug near houses or gardens as the pollution from the decomposing corpse was contained in the grave. A narrow round pit was dug, like a toilet hole, using wooden digging sticks made from *ou*, *asivo* or *anou* (these are all local hard woods in *pamusakamana*). The sides of the hole were reinforced by a basket-like construction of woven sticks and cordyline leaves, and the bottom of the pit was covered in cordyline leaves and a piece of tapa cloth placed over them. Before the body was put inside the tapa cloth used to carry the body the ornaments on the body were removed. The body was placed in a sitting position in the pit. If the joints were stiff with rigor mortis the *ama* was asked to loosen them so the body could be placed in the

sepulture. The back of the body was leant against a piece of wood that supported it. The head was supported so it looked directly in front by a piece of wood under the jaw that was supported by two sticks. The body faced whatever the dying person or family requested. It might face towards the sunrise, towards his favourite creek or another place that was important to the deceased. The hole was then filled with cordyline leaves to cushion the body; wood was placed over the hole, then a piece of tapa cloth and finally soil to cover up the grave. Occasionally pieces of casuarina wood were placed on the grave to mark it. A fence was built around the sepulture so it was not disturbed by pigs or dogs.

The old headdress and ornaments removed from the corpse were hung up near the grave and their shadows taken by the *auma* to *kwelanamandi*. Food and water were left next to the grave for three days after the burial so the *auma* could eat their shadows on its journey to *kwelanamandi* and a fire was also made to keep the *auma* warm. Other informants said the offerings were for the *ama* and *kwela* as they were hungry, thirsty and cold. After 3 days the *kwela* became stronger and the sepulture was then avoided until it was time to perform *isakava galo*.

Children were warned not to go near the grave pit as they might suffer from *ukava*, which was an accident thought to be caused by the *kwela*. If a child became lost in the forest for a few days he was believed to have been possessed by the *kwela* of a recently deceased family member who was punishing the family for some transgression of their duties during the mortuary rites.

When the body was buried before the death was avenged the men told the *ama* not to worry as the *bagina* would help avenge the death. Later when the death had been avenged the warrior responsible would present red cordyline to the family; this was planted on the sepulture and symbolized that the death had been avenged.

Isakava galo

This ritual was performed after the burial pit had collapsed and its purpose was to release the *kwela* and *ama* from the burial pit and to allow them to depart to *kwelanamandi*. Normally the family waited 5-6 years before this ceremony was performed, so that the body had decomposed and only the bones remained. If they waited too long the *kwela* became angry and harmed the family's children.

It was important that the ground (*bagina*) ate the flesh, and welcomed the *kwela* and *ama* so they were happy before the obsequy was performed.

Once the grave had collapsed the family killed a pig and collected its blood in a bamboo tube. If a pig was unavailable the family would use a bamboo tube of pig grease. Firstly, a wicker basket construction about 1.5 metres high was made, orchid leaves were then placed at the top to hold the bones and a fence was built around the secondary sepulture to protect it from animals. The deceased's son accompanied by the maternal uncle or another close relative from the affines opened the grave and poured in the blood to make the *kwela* and *ama* happy so the relatives could remove the bones from the grave; otherwise the *kwela* would punish the family for not showing respect. The male affine then entered the grave and placed the bones on a tapa cloth close to the sepulture. They were then rubbed with grease or blood and the *kwela* and *ama* told they were being released from darkness and let out into the sun. After this ritual was performed the *kwela* no longer presented a danger to the agnates. The *kwela* and *ama* remained at the new sepulture and

were able to see the land for a last time before they departed to *kwelanamandi*.

If the ritual was delayed the *kwela* might cause problems for family members, such as illnesses in children or knee problems in adults. If a child became ill the *kwela* was often held responsible if *isakava galo* had not yet been performed. As the body rotted it was believed that the bloated corpse no longer had air in the burial pit; so a stick was poked into the grave allowing air in and fat poured onto the corpse as a libation, and the *kwela* asked to remove the illness from the child. The fat 'cooled' the *kwela* so it was happy to remove the curse from the child.

Eventually the secondary sepulture collapsed and the bones were either left on the ground or placed in trees to mark ownership of the land. This symbolized the departure of the *ama* and *kwela* to *kwelanamandi* as long as *agona* had been performed. Some people would not enter land that had been marked with the bones of the dead as they feared the *kwela* was still present. Eventually the bones, with time, disappeared. Crops could then be planted near the sepulture and a banana tree was often planted in the hole to mark

the site. The bones were not kept by the family to be used as talismans as they were in very poor condition when they were removed from the grave. When the body was buried the family kept the hair of the deceased so they could request assistance from the *ama*. If the family did not possess any hair they would go to the sepulture and make a direct request to the *ama* for assistance when required.

At the end of *isakava galo*, if a pig had been killed, the meat was eaten by the family and affines, and a payment made to the man who removed the bones, as he had faced the deceased's *kwela*. The man was protected from the *kwela* by the blood on his hands and once washed off he became free to participate in the feast.

Amora tugina

This was initially a prohibition on the deceased person's favourite place, creek or food maintained by some of the deceased's family members until the *ama* departed to *kwelanamandi*. Depending on which direction the body faced some of the family members might prohibit visiting a favourite location of the deceased. If the body faced the deceased person's favourite creek

they might stop drinking there etc. As the dead person could no longer visit these places the family members also decided not to visit them. It also allowed the deceased person's *ama* to remain there undisturbed. The same idea was behind the prohibition of the deceased's favourite food through the *amora tugina* rite. The people who took part in the prohibition were individuals from the extended family with a close relationship to the deceased. The agreement was between the living and the dead, and when the living felt that their grief had dissipated they would lift the prohibition. As people accepted the death their grief lessened and this meant that the *kwela* and *ama* had departed to *kwelanamandi*. Once their departure was agreed upon a pig was killed and cooked in an earth oven and a piece of green cordyline placed on top of the earth oven (the green cordyline symbolized peace). Thus it symbolized peace between the living and the deceased. When the food was cooked and removed a member of the family took a handful of earth and the green cordyline from the oven and holding it up told the *ama* to change its direction (the direction it was looking in was reversed). He would tell the *ama* that the family members now needed to visit the tabooed location as the *ama* had now departed to

kwelanamandi. The cordyline represented the *ama*. The Fore refer to two directions: *availi*, which means a cold place which might contain a marsh, creek or stream, and *porandi*, which refers to a hot place; and the direction was reversed during this ritual. If the *ama* changed the direction it was looking in then the living were now able to safely enter the ground that had been prohibited. This ritual was called *amora tugina* in *pamusakamana*, and meant to bring peace between the living and the dead and to reopen whatever was prohibited.

Basket sepulture

A basket sepulture was constructed inside a bamboo grove 2 metres above the ground so that the sepulture was not disturbed by animals. The body was wrapped in tapa cloth with a piece folded over the head, placed in the sepulture, and then covered in *kwavi* leaves. A man was dressed in his fighting finery and a bow and arrows placed in his right hand. A woman was dressed in her best clothing. The sepulture was decorated with bilums and other ornaments from the family and the affines. The shadows of those items used to decorate the sepulture and body would go to

kwelanamandi with the *auma*. A grass roof was built on top of the sepulture to provide shelter to the corpse. A dish-shaped hole was dug in the ground under the sepulture so that the fluids from the decomposing body entered the ground at a single point; later the hole was covered up. The body had to enter the *bagina* at a single spot as there could only be one sepulture. If a man died his widow would make a fire near the sepulture and place food and water nearby, and if she had died her children performed the duty. The same happened if a woman had died. This continued for two to three days after the body was placed in the sepulture. The site chosen for the sepulture was far away from the village because of the danger of pollution from the decomposing body and the flies. After the body rotted into the ground the hole was covered up as the *bagina* had finished eating the body. When the bones eventually fell to the ground it symbolized that the *kwela* and *ama* had departed to *kwelanamandi*. In the bamboo grove the bones were very hard to retrieve and were safe from pigs and dogs, so they were often left where they fell. If the body had been placed in a yellow sugar cane grove the bones were collected and *isakava galo* was performed. The pit was covered, the bones rubbed with pig blood to make the *ama*

and *kwela* happy, and then placed on a small new bed and left to dry. The sugar cane and bamboo groves were never cut as they were part of the sepulture and such an action would offend the *kwela* which could still return from *kwelanamandi* to harm people. After *amora tugina* the *kwela* and *ama* remained but the *kwela* was no longer a danger. They finally departed after *agona*. If *agona* was performed earlier they were said to depart after *isakava galo*.

Placing the body in a bamboo or sugar cane grove

Placing the body in a bamboo grove

A bamboo grove away from human habitation was chosen, because the smell of decomposition was the *kwela*, which would damage the *aona* of the living, and because of the large number of flies that gathered on the body. A wooden ladder was built to access the middle of the bamboo grove at a height of about three metres above ground level. A platform was then constructed from wood and covered with tapa cloth. A chair was made from red sugar cane and the body placed at a forty-five degree angle. The body's decorations were not removed when the body was wrapped up in tapa cloth and tied with *asi* with only the head left exposed. As the head was

decorated with a headdress and pig tusks it was not possible to cover the head. The walls of the sepulture were then constructed with saplings and covered with cordyline leaves and a grass roof constructed. The deceased's head was within the roof of the construction. The purpose of the construction was to try and keep the flies off the body; however, huge numbers of flies covered the decomposing body. It was also a miniature house that became a home for the corpse, *ama* and *kwela*. As the body rotted fluid flowed into the ground at a single spot under the corpse. Close male relatives, normally in twos, would visit the site to express their grief. The widow would visit the sepulture to make a fire and to leave a container of water and a cooked sweet potato for the *ama* and *kwela*. The visitors told the *ama* what they had brought and mourned the death of their loved one. The food and water was examined the next day and if they were found to have been disturbed this indicated that the *ama* had eaten and drunk from the offerings of the previous day. Often the widow would make a fire by the sepulture in the morning and afternoon to keep the *ama* warm. After three days they stopped as it became too dangerous to approach the sepulture. It was very dangerous during this time as

the full power of the *kwela* gathered at these sites. Once the body had decomposed the power of the *kwela* faded. Eventually the bed collapsed and *isakava galo* was performed. Even if the bones were not retrieved the ritual was still performed and a libation of pig's blood poured on the sepulture.

The body of a great warrior was sometimes disposed of using this method as he was too respected to be eaten. The body was displayed publicly as he had touched upon so many people's lives that there was not enough meat on the body to be shared amongst all the mourners. This man did not just belong to the affines but to other families and clans. It was also believed that when the body decomposed and entered the ground the *bagina* welcomed the souls and the *kwela* and *ama* would be happy. Sometimes a dying person requested this kind of sepulture.

Placing the body in a sugar cane grove

This followed the same process as the bamboo grove except the platform was built in the middle of a yellow sugar cane grove known as *kanike* in *pamusakamana*.

Alternative sepultures to transumption used in the North Fore

Burial

There were two ways of burying the body: one way was exactly the same as in the South Fore, and the second method involved the same kind of burial pit with the head stuck out of the ground supported by a piece of wood under the chin. The head was decorated with a headdress and the nose with pig tusks. It was also supported around the neck by moss, and a small amount was used to cover the head. This form of burial allowed the family members to come and see the face of the deceased when they wanted to. Eventually the burial pit collapsed and the family prepared a feast called *akitaena* (*isakava galo* in the South Fore) for the affines; this took place before or after *agona*. The bones were removed at this time in an identical ritual to that in the South Fore. If the body was buried and later removed for transumption by the female relatives any maggots had to be eaten, as the whole body had to be consumed.

Platform sepulture

In the North Fore people did not always want their body to be disposed of by transumption, so their wishes were respected and their body was placed on a platform in their favourite place after death. This resulted in the body being eaten by maggots, which were then collected by the mourners, mixed with wild green vegetables and cooked in bamboo tubes. By eating the maggots the North Fore believed that the *ama* of the deceased would give blessings to the *aona* of the participants. The practice of eating maggots was common throughout the North Fore, but not in the South Fore.

It was the duty of the female agnates to eat the maggots and fluids from the decomposing body until the entire corpse was consumed. Breadfruit, banana, *igagi* and *ikwaya* leaves were placed under the bed to collect the maggots and body fluids. As the maggots fell to the ground they gathered under the leaves and did not disperse. The Fore regarded the maggots as the deceased person's body, and treated them with the same respect as they would have if they were eating the deceased's body. They ate the

maggots out of respect and the *kegina* transferred from the maggots to the wombs of the female agnates who ate them. The principal reason for this practice was to reduce the grief of the family members by allowing them to express their grief for a person who should not have died, and to receive blessings from the *ama*. This practice was therefore in concept a form of transumption, the broad definition of which allows for it, and different from the platform sepultures of the South Fore, where the body entered the ground and the *bagina* welcomed the *kwela* and the *ama*.

The practice of *agosi* (*andagosa* in the South Fore) was performed by rubbing fluids from the decomposing body on the abdomen of a pregnant woman in the hope that her unborn child would have a similar mental or physical attribute to that of the deceased. In Anumpa *agosi* was not practised.

Alternative sepultures to transumption used in the Gimi

Traditionally, there were three methods of disposing of a corpse: on a platform, burial and transumption. Transumption was the favourite means to dispose of a body, then burial and finally on

a platform. Transumption was the favourite because it allowed the mourners to show their respect for the deceased by consuming the corpse, and not allowing it to be eaten by maggots or worms. The custom of transumption came from the ancestors and had not been recently introduced from another group. Another important reason for transumption was to ensure that the children of the family inherited the deceased's *aona* and *nahedaena* and for the participants to receive *aona* from the *ama*.

An important man was sometimes placed on a platform if there were too many mourners to participate in transumption, as it would have been disrespectful if some mourners could not fully participate in the transumption rites. However, the bodies of leaders and exceptional people, whenever possible, were eaten: it was a waste to bury their bodies when their souls could be passed on to their children, and the participants could receive blessings from the deceased by eating the body. It was the bodies of normal people that were commonly buried. It was estimated that 50% were consumed, 30% buried and 20% placed on platforms.

Burial

A rectangular shallow sepulture was dug using digging sticks. The leaves of cordyline and a white tree leaf called *ayayama* in Gimi were placed inside and the body laid down in the sepulture and covered with the same leaves. Wood was placed on top, more of the same leaves and then the sepulture was covered with soil. Finally, a fence was built around the grave so it was not disturbed by pigs or dogs.

Platforms

Platforms were built next to bamboo groves away from the village. Four posts were put in the ground and a platform built fastened with vines. White leaves from the *ayayama* tree, yellow leaves from the *mu* tree and red leaves from the *kumi* plant were placed on the platform. The body was laid on top and a roof built over the top with wood and leaves. A hole was dug under the platform to collect the fluids and maggots that fell from the platform; they were then consumed by the mourners. Later the bones were collected and placed at a spot chosen by the family

which became the final sepulture. There was no feast when this happened and it would be many years after the person had died.

Alternative sepultures to transumption used in the Keiagana

Burial

The affines prepared the sepulture at a place chosen by the deceased or the family. Normally he would be buried in his favourite place, such as a garden or place in the bush. The body was placed in a sitting position in a round hole with *kamata* leaves underneath. The corpse was not supported with wood and the head was allowed to rest on the deceased's chest. Afterwards, dry leaves were used to fill the hole and earth was then placed on top. A fence was built around the sepulture to make sure it was not disturbed by pigs or dogs. The family watched over the grave to ensure that sorcerers did not interfere with the body. When the body was buried the family told the *ame* that it should stay on the land allocated to it. After decomposition the grave was opened in a ritual called *hayamfa akite*, which means to remove the bones. A feast was prepared in the hamlet for the affines and other mourners of the deceased. The leaves from the earth oven used to prepare this feast

were taken by the deceased's son or daughter and placed on the sepulture to make the *afe* and *ame* happy so they would depart to *aparu*. The grave was opened and the collar bones and jawbone taken back to the family. Sometimes the jawbone was kept in one of the deceased's children's houses as a reminder of the deceased, or the bones were placed in a bilum and worn around the neck of family members. Once the memory of the deceased faded the bones were hung up somewhere on the family's land to reinforce land ownership. The position of the grave was marked by planting a tree or cordyline by the sepulture so land ownership was again reinforced.

Platforms

Bodies were sometimes disposed of on platforms, and the decomposing body and maggots were consumed by the mourning relatives, and the fluids rubbed on the bodies of the mourners during *waya masavene*. Later the bones were collected and placed on another small platform and some kept for their connection with the deceased.

Alternative sepultures to transumption used in the Kanite

Burial

The burial pit was a round hole dug in the ground with dry leaves placed in the bottom. The body was placed in a sitting position in the sepulture. When a person died the hands were immediately placed together under the deceased's chin so that the jaw would not fall open before rigor mortis set in. The hole was then filled with dry leaves, wood placed over the top and finally earth. A fence was built around the sepulture so it was not disturbed by wild pigs or dogs. The sepulture became the home of the *haiyane* and the *hawamu*. After two or three years, when the body had decomposed, the sepulture was opened and the bones removed in a rite called *avamofa yogita*.

If a child died they would be buried next to their dead cousins or siblings, and occasionally on top of a grandparent's sepulture. The reason for burying a child like this was to ensure that the grandparent would care for the child's souls when they arrived in *haiyamu*. Attractive-looking children were more likely to be eaten out of love and affection.

Avamofa yogita

The family prepared a feast with a pig for the mourners, as this was the final feast after which the souls of the deceased would depart to *haiyamu* (the land of the dead). The affines went to the sepulture and spoke to the *haiyane* and *hawamu* telling them it was time to leave for *haiyamu*. After the sepulture was opened, pig blood was poured into the grave as an offering to the *haiyane* and *hawamu*. It was normally the mother's brother who removed the bones from the grave. Before he did this he rubbed pig blood on his hands so that he was protected from the *haiyane*. The jawbone, thigh bones and skull were removed, rubbed with grease and carried by hand to the deceased's family. Then the food was removed from the earth oven and shared amongst the guests. The man who removed the bones was given a pig leg for his dangerous work of removing the bones. The bones were given to one of the sons or brothers of the deceased. The family then decided on where to place the bones on their land. The sites normally chosen were bamboo groves, the deceased's favourite place, or under a tree. The bones were placed on a platform made of bamboo and bush rope. The new location was a temporary sepulture to please the *haiyane*

and *hawamu* and make them happy before they departed to *haiyamu*. When the body was buried the souls could not see, but this temporary sepulture allowed them to see their land before they left to *haiyamu*.

Burial inside a tree

If the family knew of a tree that had fallen down which had a hole in it they would sometimes use it as a sepulture. This was the decision of the man before he died. Normally a man who requested this kind of sepulture had a close connection with the area where the tree trunk had fallen down. He would typically be a man who enjoyed hunting in the bush.

The men cut the hole to make it large enough for the body, and then the body was placed inside the hole which was lined with moss. The entrance was closed with a large epiphytic fern that was removed from a tree and placed over the entrance to the sepulture where it continued to grow. The bones were not removed from this kind of sepulture. In a rite called *musa* (to send the souls away) the *hawamu* and *haiyane* were sent to *haiyamu*. A feast was prepared and the head pay was given to the affines. Blood from the pig was

taken by the family to the sepulture and poured on top and the souls told to depart as the family had made them happy and it was now time to leave. If the deceased had been killed then the family had to avenge the death before *musa* was performed.

Burial on a rock

A type of large moss was peeled back off the stone and the body placed in the hole and covered up again. The body was placed on dry leaves and covered with a pandanus mat. The site would be a favourite place of the man and he would ask the family to bury him at that location when he died. Blood was poured on the sepulture during *musa* and the family members told the *hawamu* and *haiyane* to depart to *haiyamu*. If the deceased was murdered then the death had to be avenged before *musa* could be performed.

Platform

Four posts were placed in the ground and a bed built from sugar cane tied with bush rope at a height of about 2 metres. The bed was covered in dry leaves and the body placed on top under a roof of pandanus and breadfruit leaves. The body was decorated

with the deceased's best ornaments and covered with a pandanus leaf mat and breadfruit leaves. A hole was dug under the platform so the fluids from the decomposing body could flow into the ground. Once the flesh had decomposed the hole was filled, and after one or two years the family performed *avamofa yogita*. The fluids and maggots from the decomposing body were not consumed, and fluids were not rubbed on the bodies of the mourners.

Alternative sepultures to transumption used in the Yagaria

Placing the body in a cave

Sometimes the body was tied up in a blanket made of tapa cloth and placed in a cave. It was then covered in a woven pandanus leaf mat and placed on dry leaves. The cave entrance was finally blocked with wood to stop wild pigs from disturbing the corpse. After the body had decomposed the bones were removed in a rite called *apuwa kitute*. This was the final obsequy and marked the departure of the *aune vha* and *haiyana* to *konolu*.

Apuwa kitute

In this ritual a pig was killed and the grease rubbed on the bones before they were removed from the primary sepulture by the affines and placed in a bamboo grove, buried or placed in a tree. The area where the bones were finally placed became the sepulture of the deceased and was not disturbed by local residents. During this obsequy the *aune vha* and *haiyana* departed to *konolu*.

Burial

Traditionally the body could be buried in two different ways: one with the body in a horizontal position and the other in a sitting position. The body was dressed and wrapped in tapa cloth before being buried. The tapa cloth supported the jaw by being crumpled up under it so it remained closed. The deceased faced their favourite place if the body was sat up. The hole was then filled with dry leaves and covered with wood and earth. Lastly, a fence was built around the grave so it was not disturbed by animals. After the body had decomposed *apuwa kitute* was performed. The bones were removed and placed in one location and this became the secondary sepulture.

Platform sepulture

The deceased chose the site for the platform to be built before he died, or the family members chose a location. Four posts were put in the ground and the platform built about 3 metres above the ground. The bed was constructed with wood tied together with bush rope. A mat was made of pandanus leaves covered with tapa cloth and finally moss. The body was placed on top and then the bed rolled around the body and fastened. The maggots and fluids from the decomposing body were collected and cooked in bamboo tubes and eaten by the family members out of sorrow. The decomposing fluids were also rubbed on the bodies of the family members as they mourned. The women and children of the deceased's family performed this ritual and the affines did not take part. Later the secondary burial rite *apuwa kitute* was performed.

Alternative sepultures to transumption used in the Usurufa

Burial on a raised platform

The body was wrapped in a pandanus leaf mat and placed on a platform built in a domestic pandanus tree. It was the duty of the male affines led by the senior matrilineal uncle to prepare the

sepulture. Under the pandanus tree the women cleaned and levelled the ground, and then covered it with a pandanus leaf mat, so it would be easy to collect the maggots that fell from the corpse. When the maggots started to fall on the mat the women with two or more children would collect them and drown them in water. The maggots were wrapped in wild greens, placed inside bamboo tubes, cooked, cut into pieces and shared amongst the female agnates. This continued until the maggots consumed the body and the women consumed the maggots. Once the body was consumed the bones were washed in a river and *ayanta utaleiye* was performed. Only the female agnates and older children ate the decomposing body as they feared that the *kwata* would harm smaller children if they took part. The purpose of this ritual was to ensure that the children inherited the deceased's souls and to show respect for the deceased by consuming his body via the maggots.

Burial between the buttresses of a tree

Male bodies could be placed in a sepulture between the buttresses of a tree. Sometimes these bodies were removed out of love for the deceased and eaten by the women.

The body was placed on a stretcher and carried to the sepulture by the male affines. Leaves were used to construct a bed and the body was placed on top in a sitting position, with the knees pulled up, the arms hanging down and the body fastened with bush rope against the 'v' in between the tree buttresses. A fence was built around the front, leaves put over the body and then dry wood placed over the buttresses. This ensured the corpse was not disturbed by wild pigs or dogs. After one or two days a feast called *musane* was prepared and the souls of the deceased were told to depart.

Burial

It was the responsibility of the male affines to prepare the sepulture. A hole was dug so the body was placed in a sleeping position. It was dug to the depth of a man's waist and a woven pandanus mat placed in the bottom and covered with leaves. Then the body was placed inside and covered with more leaves. Wood was placed over the top, then cordyline leaves and finally earth. The sepulture was marked by a fence built around it. After the head pay was given to the affines *musane* was performed.

Alternative sepultures to transumption used in the Kamano

Basket sepulture

A bamboo grove belonging to the deceased was chosen as the site for the disposal of the body, as it continued to mark the final grave of the deceased long after the body and basket had rotted away. The grove acts as a memorial to the dead person and the site reinforces land ownership of the male descendants of the deceased. The site was always away from the village to protect the living from the pollution of decomposition, and the village from the hordes of flies that gathered around the body.

The basket was constructed of bamboo and bush rope and mounted on a wooden pole secured firmly in the ground. A fence was then built around the site to keep out dogs and wild pigs. The construction of the sepulture was normally the responsibility of the male family members. The body was placed in the fetal position in the basket and the affines were then free to take any ornaments from the body in memory of the deceased. The body was then covered in breadfruit leaves to protect it from flies and to hide the decomposition. The construction allowed the body to decompose into

one spot under the basket: this ensured that the body was eaten by the land. This was not a common sepulture in the Kamano.

When the women and children came to mourn the deceased they could hear the maggots eating the body, and this was viewed as disrespectful to the deceased, so the women and children ate the decomposing fluids and maggots, and rubbed the fluids of decomposition on their bodies out of love and respect for the deceased. The crushed maggots and fluids were mixed with wild green vegetables and cooked in bamboo tubes and eaten. The *amemaha* gave *avimaha* to the participants, which gave protection from sorcerers and could even reverse the effects of a sorcerer's spells. So the body was eaten out of love and respect for the deceased, and for protection through the blessings of the *amemaha*. This ritual was performed by the female agnates.

Ezamo pite swunawu

After the body had decomposed the family and affines gathered for a feast to transfer the bones to the final sepulture. This marked the end of the mourning. The bones were gathered and rubbed with grease, and blood from a pig was poured into a shallow grave.

Breadfruit leaves were then placed inside as a bed and the bones placed on top. This was then covered with more leaves and covered in earth. Cordyline was planted over the site to mark the grave. Sometimes the bones were buried in a sugar cane garden or next to a banana tree if the deceased had worked these gardens when alive, so these were appropriate places to put the bones. This ritual was called *ezamo pite swunawu*. Afterwards the souls were no longer harmful and were allowed to see their land for a final time before they departed to the land of the ancestors.

Zeferina yoginone

Later, the platform was opened up and the bones rubbed with pig blood, and then placed in a cordyline fence, in a bamboo grove or tree to reinforce land ownership. The same ritual was performed for the other means of disposing of the body. This ritual marked the final departure of the souls.

Body placed next to a river in the deceased's land

If a person requested, or the family chose, a body might be placed in a cave or hollow in a stone by a river that flowed through

the deceased's land. The place chosen was always in the shade and the *amemaha* would stay at this location. The body was placed on leaves in a sleeping position with a traditional headrest under the head; it was then covered in leaves. The site became the *amemaha's* home and it would not harm the living. When requested by family members it would assist in increasing the food at feasts.

After the body rotted, the family would remove the jawbone and collar bones and these would be used to give protection to family members through the *amemaha*. Finally *zeferina yoginone* was performed.

At the base of a tree

A bed was made between the buttresses of a tree consisting of leaves covered by a 'pulpul' from a female member of the deceased's family. 'Pulpul' material was then placed over the body and covered with leaves; a large breadfruit leaf covered the face. Wood was piled up between the buttresses so that the body was protected from dogs and wild pigs. The site for the sepulture was chosen by the man before he died or by the family if he had not done so. Normally the site chosen was the deceased's favourite place.

Later when only the skeleton was left, the mourners returned and dislocated the bones, which were then rubbed with pig grease. Pig blood was poured on the ground and the bones placed there with a pile of wood on top marking the sepulture during *zeferina yoginone*.

Burial

The grave was dug with digging sticks and shaped like a shallow ditch the length of a man. The body was laid in this shallow grave and covered with leaves; a large breadfruit leaf covered the face. This allowed family members to come back and look at the face for a last time. Family members would bring food, water, sugar cane and other foods to the grave for the *asimu* and this continued until they started to forget about the deceased. After the flesh had decomposed, the bones were dislocated and rubbed with grease on a cordyline leaf. A libation of blood was poured into the grave and the bones buried for the final time during *zeferina yoginone*, and this marked the end of the mourning period.

Alternative sepultures to transumption used in the Awa

If the deceased was killed by sorcery, or died of an illness, the following happened to his body. After two or three days the male affines prepared a bamboo basket lined with dried cordyline leaves and having placed the body inside dragged it up to the entrance of the ancestral cave and threw it inside. This happened between 11 and 12 in the morning when the ghosts that dwelt in the cave were least active and posed the least danger to the men who disposed of the body. The body was not carried on their shoulders, as the carriers would have become contaminated with the sorcery that had killed the deceased. The *kwanda* would not harm any of the affines so they had the duty of carrying the body. Each village had its own cave or cave shaft into which the bodies of those who died of sorcery or illness were disposed of.

Alternative sepultures to transumption used in the Yate

Ancestral caves

There are two ancestral caves in the Yate used for the disposal of bodies. Each cave belongs to one of the two founding clans of the Yate-speaking people, and all the other Yate clans with different

names belong to one of these two founding clans. If there were fighting or arguments, those who lived in villages away from the cave might choose to bury their dead.

Before a person died they would request for their body to be placed in the ancestral cave. Ulele has a cave where the bodies of the clan members were temporally placed until decomposition of the flesh was complete. Inside the cave there was one location for men's bodies, one for women's and another for children's. This made the souls of the deceased happy with the company of other souls of the same sex, or in the case of children of the same age. The male members of the family would carry the body into the cave after performing a ritual at the entrance. During this ritual the men rubbed pig grease and blood onto the cave entrance using cordyline, and told the *lusi* why they had come and whose body they had brought. Dry cordyline and breadfruit leaves were used to make a bed in the cave and the body was placed on top. Then pig grease was rubbed on the body to make the *hawamu*, *hamea* and *hangro* happy, and they were then told to remain in their new home. The men would check the body until decomposition was complete and then the family performed a second burial rite. Before the bones

were removed there was a feast called *yeferina yogita*, and food was presented to the affines and other mourners; after this feast the *hangro*, *hawamu* and *hamea* departed to *aprufina*. The bones were then collected and buried at the base of a tree and cordyline planted to mark the new sepulture. As humans had been created by the *lusi* and entered the world through this cave it was believed that they should be returned to the cave where the *lusi* had created them. If the family did not perform the obsequies correctly the *hangro* would harm the women or children of the family.

Women's bodies were meant to be placed in the ancestral cave. It was believed that the women who came out of the cave were polluted and were not meant to be eaten, so they were returned to the *lusi*. The *lusi* gave birth to humans so the women were not consumed, out of respect for their ability to create life like the *lusi*. Women were called the 'men's house'; they were the bilums of men (wombs from where men were born) and out of respect their bodies were not eaten. In the Ulele the bodies of women were normally placed in the ancestral cave, but the bodies of respected women were sometimes eaten to ensure the transfer of domestic *himona*

and for *himona* to be given to the participants of transumption by the *hamea*.

Burial

A grave was dug with digging sticks, and the body laid in the sleeping position on a bed of leaves; it was then covered with more leaves, sealed with wood and earth, and a fence built around it to protect it from animals. Any site could be chosen, as long as it was on the deceased's land. Normally the site chosen was the deceased's favourite place such as a garden, forest or mountain. This became the home of the *hangro* and *hamea*. Once the flesh had decomposed, the grave was opened, and a final feast was held in honour of the deceased. The bones were rubbed with pig grease and blood poured into the grave. This was done out of respect for the dead person and to make the souls happy. The *hamea* would appear in dreams and thank the mourners for their thoughtful behaviour. The jawbone might be removed at this time and its powers used by family members during wartime. When the death was to be avenged the deceased's son, brother or 'poroman' would visit the grave at night and request the help of the *hangro* and *hamea*.

Food and water was placed by the sepulture until the deceased had grown enough food in *aprufina*. Women's graves were not opened at a later date like an important man's grave.

Occasionally the *hangro* made children sick and if this happened the family performed a ceremony to send the *hangro* back to its grave. A bunch of flowers and leaves were waved around the house of the sick child and the *hangro* chased away.

Placed in a tree

The site chosen was away from human habitation, because of the fear of the *hangro*, and the hordes of flies that would gather around the body. The bodies were placed on beds constructed of wood in *hagu* trees (small bush-like trees), and a fence was then built around the tree to protect the body from animals. The body was put on the bed in the sleeping position and covered in leaves.

The fluids from the decomposing body were collected, mixed with wild green vegetables, cooked in bamboo and eaten by the women and children. The fluids were also rubbed on their bodies to give protection from sorcery through the *himona* of the deceased. If

a man died his wife and children did this, and if a woman died her sisters and daughters took part in the ritual.

Close relatives would make a fire at the sepulture and place food and water there for the first week or two after death. It was believed that the *hawamu* would be hungry when it arrived in *apruřina* so food was left at the sepulture until the new gardens of the *hawamu* were producing food (this was believed to take 1-2 weeks in *apruřina*). People would not touch any plants, trees or water near the sepulture out of fear of angering the *hangro* which might then harm family members.

If the deceased was an important man the bones would be gathered and a feast held after decomposition of the flesh. The bones of the deceased would be rubbed with pig grease and blood poured into the sepulture where the bones would finally be laid to rest.

Placing the body in a cave other than the ancestral cave

The dying person would let his family know that his body was to be placed in a particular cave. The body was placed inside in the

sleeping position and covered in leaves. The entrance to the cave was then sealed with stones. Food and water would be placed outside the entrance to the cave until the *hawamu* had its own supply of food in *apruřina*.

Disposal of a body on a platform

The body was placed on a platform if requested by a dying man or by his family. The bodies of leaders and good warriors were often placed on platforms out of respect. The platform was built in a garden of the deceased, or at the deceased's favourite place in the forest. This was also a sign of respect as the family did not want the body to be eaten by worms. The bed was made from sugar cane and bamboo and was three to four metres above the ground. It was built on four posts, the body was placed inside and a roof stopped the rain from washing the body.

A hole dug in the ground under the bed allowed the fluids from the body to enter the deceased's land. Once the body had decomposed the bones were removed and buried in the hole under the platform during the rite of *yeferina yogita*. Pig grease was

rubbed on the bones and the *hamea* and *hangro* were told it was time for them to depart to *aprufina*.

Appendix E:

Social structure, birth, marriage, adoption and fostering in the South Fore

Social structure in South Fore society

Traditionally, the Fore had no collective name and described themselves as *ka kina* ‘one people’. The Gimi were known as *mani kina*, the Keiagana as *osa gina* and the Moraei as *moraei kina*. The Awa were the *pore kina* and a patrol officer mistakenly applied their name (Fore) to the *ka gina* (Glasse, 1962a). In this part of the highlands there was no political structure or traditional name that united people who spoke a common language; nor would this have had much meaning where language boundaries merged through a dialect chain.

Dialect groups, of which there are three in the Fore, are homologous with the phratry which consists of a loose association of clans descended from a common ancestor (Glasse, 1962a). This has been elaborated on in the cosmology section. Although there was a loose association, clans were just as likely to be at war with members of their own dialect group as with clans from other dialect groups. The phratry was rarely called upon to denote ancestry except during the 'kibungs' as described by Lindenbaum (1979).

Each village is made up of clans, some of which also contain subclans which arrived as refugees (Glasse, 1962a; Lindenbaum, 1979). Geographically each clan inhabits one or more hamlets depending on the number of lineages. Each hamlet's residents would be referred to by the name of the ground on which their hamlet is built. This is different to an extended family or 'line' as those who are not resident are not included. However, families are still connected through obligations even if they are not resident. The lineage is an important concept, as lineages form a clan, and genealogies can be traced by some of the older generation to link the lineages back to a common ancestor (M P Alpers, personal communication).

Due to warfare clans, lineages and individuals were frequently changing residence, sometimes for several years at a time, and this was the reason for the highly flexible fictive kinship system that developed in this part of the highlands (Lindenbaum, 1971; Lindenbaum, 1975a; Lindenbaum, 1975b). Lindenbaum (1971) described kinship in the Fore as fluid. The situation was maintained by warfare, which caused movements of people who were incorporated into host clans who constantly wanted to increase their numbers, but this also gave rise to suspicion. Clans were trying to preserve themselves by strengthening their identity through sorcery accusations whilst trying to attract newcomers. The Fore did not fight to acquire territory as there was no shortage of this commodity; it was a way of expressing enmity, and this initiated war (Lindenbaum, 1971). Illness was attributed to sorcery, ghosts, spirits and infringements of expected social behaviour (S.Glasse, 1963a). However, sorcery was thought responsible for most deaths, and this fuelled the repetitive cycle of warfare (Lindenbaum, 1971).

Lindenbaum (1975b) describes sorcery as a way of maintaining the status quo by levelling imbalances, so that there was a constant

state of balanced competition. As senior clans became large due to their incorporation of refugee clans a point was reached where suspicions of deaths from sorcery would fall on the refugees and this would result in the departure of a group. A similar idea explained how a powerful Fore leader whose wives and daughters died of kuru lost prestige, thus allowing his neighbours a chance to take his position.

Birth

When a woman entered labour she stayed at the birthing hut in the *kami* and was assisted by her *endai* or other female relative with firewood and food. The unmarried women from the family kept her company and helped her with whatever else was required. During labour she was normally assisted by her mother, mother-in-law, or another old woman from either family. The unmarried women and children were sent away and did not witness this event. When the child was born the family would take vegetables and sugar cane to the hut for the mother and other women who had assisted in the delivery. *Kasanda* was the *pamusakamana* name given to the woman who delivered the baby and cut the umbilical

cord. The cord was burnt on a fire and the placenta normally buried. The baby was washed and wrapped in an old bark cloth. Any blood on the ground was washed away with water and the ground sprinkled with dust. The umbilical cord attached to the baby was dried with fire ash and after a few days it fell off allowing the mother and child to leave the birthing hut. The other members of the family prepared an *aindu* ritual to remove the pollution of the birth from the community. A husband removed his bows and arrows and anything else he deemed important from his wife's house in the *kami* before she returned with the newborn. The old women led the return at night holding burning bamboo to protect the men from the pollution of birth. If the bamboo burnt to the end it was a sign that the baby would have a long life span. Behind came the mother and child and other women. The men sang for the whole night to stay awake fearing to put their heads on the polluted ground.

Shirley (Glasse) Lindenbaum (S.Glasse, 1963b) gives an account of women's rites of passage at menstruation, pregnancy and at childbirth.

Tiana

This payment was made a couple of weeks after the birth of a child to the affines. If the child was female then the payment went to the oldest brother of the mother, and if the child was male the payment went to the same man and to the family that would have an ideal potential wife for the newborn when he became an adult. The mother's brothers always received a small share of the *tiana* payment and the rest was divided amongst their cousins in the case of a female, and more distant ones in the case of a male to secure a wife for the newborn. *Tiana* was the only payment from the family to the affines after the birth of a girl; after that the family received payments for her. From the moment an individual was born they were entangled in a web of personal and family exchanges that determined who they would marry and who would consume their body after death.

Marriage

Ideally a man would receive a bride from his affines, and ideally the girl came from his mother's grandfather's brothers' patrilineal line: which are cousins twice removed on his mother's

side. This was the preferred choice of bride in the South Fore. If the ideal bride was not available the affines would provide another match if possible from their clan. Parents would always remind their daughters as to whom they should marry. The affines did not have to be permanent, but the affine-agnate relationship was normally longstanding and of deep explicit significance to the Fore. If a man was not given a girl to marry when the agnates requested, the *agona* payment for his mother might be withheld when she died. This would only happen if tensions already existed between the two groups. Often the boy's mother was used as an excuse for not providing a bride: her uncles and brothers would accuse her of not performing her duties towards them correctly. If a father died and the exchange was no longer ongoing the sons might look elsewhere for brides, or might repair the relationship with their traditional affines if a conflict existed.

A man's mother would often ask the family for their daughter to be her son's wife, or the unmarried woman's family might offer her to the boy's family if they wanted to have a strong relationship with the man, his family and his clan. Marriages were a way of settling obligations and debts, of forming new alliances and

strengthening old ones, of removing distrust and hatred. The partner was normally selected by the patrilineage but the prospective bride and groom also had recourse to action if they were unhappy with the decision. The normal age for a girl to become betrothed was fourteen or fifteen. The parents would approach the affines, after tentative enquiries about marriage prospects, with a cooked pig and share this before they asked for their daughter's hand in marriage for their son. It was the girl's male cousins who decided if they were happy for the betrothal.

If the marriage was agreed upon the boy's parents would start giving part of their garden produce to the parents of the girl. The girl would assist her future parents-in-law with their gardening, and sometimes stay with her future parents-in-law for several days at a time. The marriage arrangements were formalized in a ritual called *aninada ana* in *pamusakamana*.

Aninada ana

This meant steamed greens and was the name of the feast that formalized the marriage arrangements. The boy's parents cooked a pig at their house and invited his future affines to the feast. Two to

three months after *aninada ana* the bride price was paid; occasionally, if it was not ready the 'bilas' (bridal finery – in this context the bride price's reciprocal payment from the affines) was given first. Whatever number of pigs was given by the first group, the second group had to return an equal number of pigs. As well as pigs the bride price consisted of: bilums, tapa cloths, shells, salt blocks, arm bands and bows and arrows. Those who received the bride price contributed to the 'bilas' and those who contributed to the bride price received a share. Of significance to the mortuary rites is that the distribution of the body followed the same rules and patterns as those pertaining to who received bride price for a woman and her sons.

The night before the marriage all the women gathered in one house and the future bride and her female friends of the same age group ('poromeri') were presented with a cooked pig, which they all took a bite from. The relationship of a woman with her 'poromeri' is discussed by Lindenbaum and Glasse (1969). The first bite belonged to them and the second bite of meat was dropped on a plate and given to the *anagra*. This encouraged the 'poromeri' to accept the inevitable change of losing a friend to another clan, and out of

respect for the *anagra*. The women also rubbed the grease from the pig on their bodies, so they looked beautiful at the marriage ceremony. The future bride sat by the fire and stories were told to her by the older women as to how she should behave when married. Songs were sung and the girl was kept awake by her age mates who beat her with a small banana tree in the hope that she might receive *aona*.

During the same evening the girl's parents took one of the cooked pig's legs in a bilum carried on a piece of firewood, a headdress, an armband and a bilum for their future son-in-law. They walked to their future son-in-law's men's house and the bride's father entered first and placed the bilum, headdress and armband on the groom. Then he brought his wife into the men's house and she placed the piece of firewood on the fire. The groom had been sat amongst his agemates and his future mother-in-law pulled him out of the group as she called the name of his clan. This ritual was performed to cool down the man's *aona* and *yesegi* before he married. The firewood was symbolic for the *aona* the man might experience that night. The gifts made the man happy and let him know that his future parents-in-law now regarded him as their own

son. For the rest of the night the man sat next to the fire and was instructed by the older men on how to behave when married. At other times the men sang and his agemates ensured that he stayed awake and maximized his opportunity to receive *aona*.

In the morning the bride was dressed in a new pulpul and tapa cloth; the rest of the 'bilas' was placed on the girl when she was near the groom's village as it was too heavy for her to carry over a distance. Near the groom's house she was dressed in several pulpuls and tapa cloths and carried the bilums and shells. As she walked under the heavy load she was supported by her agemates. The other family members carried cooked pigs and vegetables, which were placed outside the groom's men's house. The gifts were then distributed amongst those who contributed to the bride price and some of the goods were set aside for the bride, and bows, arrows and a cooked pig for the groom. The bride would sit on banana leaves in the *kami*. The family prepared three piles of food for the affines: one for the girl's brothers, one for her male cousins and one for the *anagra* who would eat her and her sons when they died.

Both sides gave speeches and the affines told the bride's mother-in-law to ensure that her new daughter-in-law was well cared for in her new clan. Her parents, aunts and cousins stayed with her till the next day when a marriage ritual known as *kasaili* in *pamusakamana* was performed.

Kasaili

In the morning the bride was dressed by her in-laws and then taken to the area where the *kasaili* ritual was to be performed. *Kasaili* means to shoot an arrow for the bride. The men gathered in a crescent formation with the groom stood in front of them. In front of the groom stood the clan's women in a crescent formation facing a target mounted on a tree. In front of the women stood the bride. The groom went forward and collected an arrow from the bride and having returned to his original position he shot the arrow over the heads of the women and bride at the target. If the first arrow missed the process was repeated and the audience would cheer loudly on the release of each arrow. This was a public display of his ability as an archer. A second arrow was then shot to determine the

man's ability as a hunter etc. Afterwards the results were discussed in the men's house.

Kiovikina

This was the name in *pamusakamana* of the final marriage ritual performed after *kasaili*. The leftover pig meat was cooked with greens in bamboo and a piece placed in the groom's mouth which he then spat out. He then called out the name of a mountain in a cold place and *walovu ale*, the name of a tree in *pamusakamana*. This ritual sent the groom's *aona* away temporarily to protect it from his new wife. The bride also performed the same ritual but sent her *aona* into the *kami*. This was the first time the couple made eye contact in public. Even after marriage they would avoid each other if they met on a garden trail; gradually they would get to know each other when the man brought firewood to his parent's house or when visiting. Not long afterwards they would be tasked with making their first garden together and eventually this was the place where they would have sexual intercourse. Once this happened the man took a gift to his agemates in the men's house.

The newly married couple

Once the couple had had sex 5-6 times the husband was allowed to accept food from his wife's hand. The best food from their first garden was given to those who had contributed to the bride price and was known as *wayayanagai* in *pamusakamana*. When the woman left her village to be married her parents gave her piglets to raise and when her first gardens had been consumed one or two of the newly-weds' pigs were given to those who had contributed pigs to the bride price and this was the last payment for those who had contributed to it. The groom now became responsible for organizing the bride price for the son of the cousin who had organized his bride price. Part of the bride price was given to a woman who had already married in from the bride's paternal clan and this woman would act as a godmother (*anaso*) and had equal rights to the *anagra* to part of her body when she died. The bride would also form a close relationship with one of her husband's male cousins; she would tell her family, and her parents would request the man to protect her rights in her new village. The two families now entwined by marriage continued to give gifts to each other and to welcome their in-laws into their house. It was important that the woman

maintained relations with her family for support and protection and to find brides for her sons. The man maintained relations out of respect for his affines, to avoid their wrath, to receive brides for his sons, to avoid curses that would kill his children, and to ensure that his souls would reach *kwelanamandi*.

Earlier works (Glasse, 1962a; Glasse, 1969; Glasse, 1964) have stated the preferred choice of bride from the affines and in particular the mother's brother's daughter and this is further clarified by Glasse (1970), who acknowledged that this referred to the girls of marriageable age amongst the affines and was not literal. Clan members never intermarried, nor did subclans with the host clan in normal situations, but occasionally this rule could be ignored. Kuru did have an impact on marriage, causing a decrease in polygamy and an increase in the number of bachelors. Women also had more say in who they married and family life was severely disrupted. Kuru also caused more men to seek women outside of the normal affine relationship due to the scarcity of women. Glasse (1970) also points out that the dispersal of women in the Fore led to a reasonable gene flow.

Adoption and fostering

Adoption was not common in the South Fore, but was well accepted; occasionally when a woman married, one of her brothers would be adopted by her husband. During the kuru epidemic adoption became more common; some children died with their mothers but many were fostered out before the mother died. Sometimes the father would care for the children and this became increasingly common after the prohibition of warfare by the colonial administration (S.Glasse, 1963b). Children born of mothers with kuru were described as normal and healthy and they would be fostered by the husband's family unless the bride price had not been paid, in which case a child might be fostered by the affines.

Appendix F:

Social structure and rites of passage in the North Fore, Gimi, Keiagana, Kanite, Yagaria, Usurufa, Awa, Yate and Auyana

Social structure in the North Fore

Kinship

A village consists of senior clans whose members have been resident for at least four generations, and these senior clans contain subclans whose members are referred to as members of the senior clan, but originally came to the village as refugees and were hosted by the senior clan. The subclans and senior clan acted as a military and political unit in defence but not always as a unified unit if they were assisting another clan in another village, as there they might have different obligations. The subclans always maintained their

own *amani* when they took up residence as refugees; the senior or host clan's *amani* could harm members of the subclans if it did not recognize them. Clan names were the names of the founding *amani* and their descendants. Clan members were believed to have the same physical characteristics as the founding *amani*. For example, members of the Kasoru clan are light skinned, and those of the Okasa clan tall, like the pine trees found in the Okasa area.

Local subclans were named after places where a lineage settled following a dispute within the clan; this made it easier to refer to groups of people. However, even though they now had a different clan name they were still members of their original clan and maintained their relationship with their original *amani*. Members of a clan who had changed their clan name could intermarry with members of their original clan, but a girl's parents might refuse a betrothal request for their daughter by using the excuse that she would be marrying her own brother.

A man did not always marry into his established affines; it depended on the parents' relationship with them at the time and the availability of a bride. The most important source of brides was

the established affines, but if a problem arose, the parents might find a bride from another clan. The affine-agnate relationship was precarious as it depended upon political circumstances, and was therefore not permanent. Decisions regarding marriage were made by the lineage, but all the clan members assisted with bride price. Sometimes sister exchange occurred to stop wars, but this was not common. It was taboo to marry a person from the same clan even if the clan members lived in distant villages. Everyone who bore the same clan name was regarded as a blood brother or sister descended from the clan's founding *amanî*; however, this did not imply that there were any obligations to assist other members of the same clan.

If people left their community due to war or internal disputes, they would normally take up residence with one of their sisters' husband's families and the marriage exchange would continue. Sometimes a subclan would stay, grow and prosper, and this stopped disputes, as the affine-agnate relationship remained strong.

Adoption and fostering

Adoption of a wife's younger brother by the new husband was not common. They did not give the first-born children back to the affines for adoption. Orphans might reside with the patrilineal or matrilineal line: it depended on their relationship with individual adults and the relatives' attitude towards the children. If the bride price had not been paid then the children belonged to the affines.

Marriage

When a woman married, the husband's family took on obligations that had to be fulfilled to maintain a successful relationship with the affines. The mutual obligations of the affine-agnate relationship were central to Fore exchanges, and for a harmonious relationship to exist they had to be fulfilled. The agnates referred to a bride's womb and ability to carry children as the reason for paying bride price, as this ensured a clan's future. A husband would say:

“Mi kisim sid bilong banana na kam planim”.

By this, he meant that his new wife would bear children to ensure the future prosperity of the clan, and the members of his clan should appreciate her value. If the patrilineal line failed in its obligations to the affines, the affines would curse their sister so she would not give birth to any children, or they would curse her children so they failed to thrive and eventually died.

The preferred choice of bride amongst the affines was the mother's male cousins' daughters. The family would make garden food presentations to the potential bride's family and on the second or third attempt they would secure an agreement for the betrothal.

Social structure in the Gimi

It was forbidden to marry within the same clan, even if the members lived in distant villages, as the members were regarded as brothers and sisters. Refugees from the same or other clans were adopted into the host clan and did not intermarry. The children of refugees would become members of the host clan during initiation and received *aona* and *nahedaena* from the host clan's *nehima*. From that time onwards, they became connected to the host clan's

land and were full members of the clan. There were no subclans in the Gimi, as exist in the Fore and many other groups in the Eastern Highlands.

The preferred choice of bride in the Gimi was from the affines. Ideally, a girl would be chosen from the daughters of the cousins once removed. If an ideal girl was not available then the affines would try to find a suitable replacement. Sometimes the agnates found a prospective daughter-in-law from another clan. Adoption was not a common practice in the Gimi.

Social structure in the Keiagana

Clan structure

In Ke'efu village in the Keiagana there are three senior clans: Afaru, Moke and Tunuku. These senior clans contain junior clans whose members arrived as refugees from other communities. If the community is threatened externally or the clan is referred to in everyday events the name of the senior clan is always used; however, if there is internal dissent their original clan names are used. People always maintained their original clan name that was

passed down in the patrilineal line. If members of a clan fled to another area after an internal dispute they might change their clan name, but they still belonged to their original clan. Inter-marriage with other linguistic groups was common and subclans could intermarry with the host clan. This was the same as in the Fore.

Kinship

The preferred choice of bride from the *negafo* was a mother's brother's daughter as she would come from the same family as the man's mother and would therefore look after her in her old age. If they did not have a potential bride available they would find a girl who was a cousin once removed. People never married members of their own clan.

Adoption and fostering

Fostering occurred, with the children normally given to those who were infertile. Babies could be given to mothers who were lactating and had lost their own child, and older children to those who could not have children. If the parents died the family would

normally foster the children, and sometimes one of the mother's brothers would foster if the bride price had not been paid.

Social structure in the Kanite

The clan system in the Kanite

People never married within their own clan; instead they married women from the other clans within the Kanite. In Kokopi there are four Kanite clans and one from the Yate who settled in Kokopi; they now use the Kanite language but maintain their own *tusi*. Each senior clan is composed of its own members and refugee groups who maintain their own *tusi*. This was the same system as found in the Fore.

Social structure in the Yagaria

Clan structure

There were three founding clans descended from the first *negi* in Daginava village in the Yagaria. The major clans have resident subclans and the senior clan name was used when referring to all the residents. People were not absorbed into the senior clan and maintained their own clan name and *negi*. Marriage within the

same clan was forbidden as its members were regarded as having the same 'blood'.

Kinship

A man's first choice of bride was one of his mother's brothers' daughters, and if a bride was not available the family would ask for one of the second cousins. If a girl was not available from the affines, they would find a bride from another clan. Children were normally adopted by the affines and sometimes by the family. When a girl married, her new husband might also adopt her brother as his first son. This was not a very common practice.

Social structure in the Usurufa

Clan structure

Inside the Usurufa there are three senior clans who are the traditional landowners, and the rest of the population is made up of refugees from as far afield as Kasokana, Okasa, Kasoru, and from the Auyana. Refugees maintained their own clan's name and the senior clan's name would be used to refer to a population made up of the senior clan and subclans. Only when there was internal dissent

would the subclans' names be used by the senior clan, who would remind them of their refugee status. The senior clan and subclans did not intermarry even though they still maintained their own clan identity.

Kinship

Marriage within the same clan was forbidden so wives were sought from other clans. The Usurufa intermarried with all the surrounding linguistic groups. Marriage between near neighbours was encouraged to try and keep the peace with the surrounding communities. The preferred choice of bride on the side of the affines was from amongst mother's cousins' daughters.

Children were sometimes adopted within the family by a sister or brother's wife. This normally happened if a woman was unable to bear children, or if the child's parents died.

Social structure in the Kamano

Clan structure

In the Kamano, 'senior clan' refers to those clans who are the traditional landowners; they also contain subclans made up of refugees from other clans. The subclans were never absorbed into the senior clan, and a subclan's name would only be called if there was disagreement between the senior clan and the subclan.

Mandeville (1979) has written about affinity and migration amongst the Kamano and also about adoption (Mandeville, 1981).

Bride price

Bride price was paid to the affines and, in return, the affines presented gifts to the family known as 'bilas'. A man would ideally marry a female cousin twice removed on his mother's side. The bride price and 'bilas' recipients were the same as those in Fore society. The bride's cousins received the largest share of the bride price and her biological brothers a small amount. The largest share was given to the male cousin who was the major sponsor of the woman's rite of passage celebration at menarche.

Social structure in the Awa

The preferred choice of bride amongst a man's affines was one of his mother's brothers' daughters. The Awa rarely intermarried with the Fore, Auyana or other linguistic groups. Hayano (1973) states that the Awa feared Fore women because of their knowledge of sorcery and believed that intercourse with them would lead to illness and death. Richard Loving (1973) has written about Awa kinship terminology and its use. David Hayano looked at marriage, alliance and warfare amongst the Awa and sorcery accusations amongst close and distant neighbours (Hayano, 1973; Hayano, 1974).

Social structure in the Yate

There was no marriage within the same clan as the people were regarded as having the same 'blood'. The first choice of bride was one of father's mother's brothers' sons' daughters. If a preferred bride was not available the affines would find another bride from the clan. The Yate intermarried with their surrounding linguistic groups. If the parents died the children would be adopted by the patrilineal line.

Social structure in the Auyana

It was forbidden to marry within the same clan, even if the members were resident in distant villages. The first choice of bride was one of father's mother's sisters' daughters or sons' daughters. This would be cousins once or twice removed on the patrilineal side and the parents of the children who married were called *kesunanda*. The female affines of marriageable age were regarded as sisters so a man was forbidden to marry one. If a preferred bride was not available the parents would find one from another clan – it really depended on the parents' ability to find a bride. Adoption occurred if the parents died; other family members would adopt the children, and sometimes the affines adopted them if *auhaya beyaba* (head pay) had not been settled properly. The Auyana did not intermarry with the Awa but they did with the North Fore and the Kamano.

Structure of clans and subclans

Arora is made up of six clans, with one senior clan and five junior clans, as well as refugees who arrived at various times and stayed. People kept their connection with their original *manihe* even if they were refugees and they were never incorporated into

the host group's clan. The Auyana had two founding clans with a similar story to that of the Ai and Takai in Purosa, and the *manihe* came from Manyavindi in Okasa. When lineages fled during war they always kept their original clan name but they often used their host clan's name if threatened externally.

Sepuna consists of four clans of which two are senior clans called Okifumo and Wandovina. The subclans did not come from other groups but were related to the two senior clans. After a division in the senior clan the subclan moved away and took on a new name but they were still related to the senior clan and had the same *manihe*. Subclans and senior clans allowed intermarriage: as long as people came from differently named clans they could intermarry.

Appendix G:

Ethnographic descriptions of mortuary rites in linguistic groups surrounding the kuru-affected region

Introduction

This chapter summarizes the data collected from linguistic groups surrounding the kuru-affected region. It opens with a brief description of some of the common themes surrounding death in all societies and then those in Melanesia. The descriptions of mortuary rites and eschatologies in the Papua New Guinea literature are summarized in relation to the common themes outlined, and implicitly in relation to the detailed ethnographic descriptions. In the Eastern Highlands the literature exposes many cultural similarities between the different linguistic groups of that area. This is followed by brief ethnographic descriptions of the eschatologies of the linguistic groups surrounding the kuru-affected

region from whom data were collected. This chapter shows that the eschatologies of the Fore and other kuru-affected groups were not unlike those of their more distant neighbours.

All societies have developed their own solutions to the problem of death, and each has surrounded death with a complex of beliefs and rituals. However complex and diverse these beliefs and rituals are, we can acknowledge common themes, and so make those differences easier to understand. Some of these themes are mentioned by Colin Murray Parkes (1997). These include the idea that the multiplicity of beliefs and rituals meets the needs of particular societies, and that their symbolic or poetic truths may transcend western reason. Funeral rites confirm death, identify the mourners, reaffirm beliefs surrounding death and send the deceased into the next world. In non-western traditional societies death is not instantaneous, and the souls of the dead remain with the living and interact with them until the secondary mortuary rites, which mark the passage of time, are completed and allow the living to continue with their normal lives. For Malinowski mortuary rites recreate the group's solidarity and morale, and for Hertz they end with the integration of the soul into the land of the dead and the living into

their community (Hertz, 1960; Malinowski, 2008). For Van Gennep mortuary rites end with the social order restored and the mourners returned to normal life (Van Gennep, 1960). Decomposition of the body has led to a bewildering range of methods to avoid putrefaction, including mummification, transumption, cremation, exposure and cryogenics, to name but a few.

Hertz (1960) largely restricted his analysis of mortuary rites to those of South Asian tribal societies, and in doing so isolated the components of secondary burial. The key elements are the corpse, souls and the mourning relatives who take on changing roles between death and the secondary mortuary rites, which he divides into two stages. During the intermediary period the corpse is temporarily stored, the souls remain near the corpse and the relatives are separated from society during their mourning. After putrefaction of the flesh the bones are reburied, the souls depart to the land of the dead and the family members are reintegrated into society. These components sit well with the ethnographic descriptions of the kuru-affected region, and help clarify the brief descriptions of mortuary rites found in ethnographies about other peoples in Papua New Guinea.

Rosalind Moss (1925) has brought together data from a variety of sources about burial customs in Polynesia, Melanesia and Indonesia. Although the date of publication precludes any data on the highlanders of New Guinea, the collection of data from the region of enquiry provides some interesting insights into burial rites and eschatologies in Oceania. The descriptions cover the afterworlds on earth and in the sky. On earth, this includes locations such as volcanoes, caves, forests and various types of sepultures. There are chapters on the journey of the souls to the land of the dead and the requirements for admission, on the nature of the afterlife, on beliefs in annihilation, disposal and orientation of the body, and on grave gifts. For coastal and island communities there are descriptions of sea burial, canoe coffins and island afterworlds. Although there are differences throughout the region there are also many similarities. These include types of sepultures, beliefs in the orientation of the body, the purpose of grave goods, beliefs in a journey to the land of the dead and an admission ritual or ordeal. Luckert (1971) describes volcanoes, mountain tops, caves, boulders, forests, the sky and islands that are homes of the dead, and obstacles to a soul's final

destination that include rivers, ravines and crossroads which must be crossed.

Rivers (1920) has written about soul-substance in New Guinea and Melanesia, and talks about the belief in souls found in some of the writings about the region. He also describes the belief in two souls found amongst the inhabitants of the Tami islands near Finschhafen and Kiriwina of the Trobriand Islands. The Asabano of central New Guinea believed in two souls: one was benevolent and connected to the bones of the deceased, and the other harmful and associated with the flesh (Lohmann, 2005). In New Ireland, life-force is transferred from the corpse to a Malangan sculpture and finally released during the rotting of the sculpture. Carving is considered as making a skin which replaces the body as the container for the life-force liberated at the end of decomposition of the body. After a brief display, the sculpture is placed in the forest to decay and to release the life-force (Kuchler, 1988).

The Garia of Madang District believed that humans had souls called *enumu*. The soul became *kopa* if the person died of natural causes or sorcery, or *kaua* if he died in battle. *Kaua* are dangerous

and roam the land of the living seeking vengeance for their death, while *kopa* are benevolent. *Kopa* helped their kinsmen in battle by guiding their arrows, provided game for hunters, protected crops and the health of kinsmen, and assisted the living through dreams. However, if kinsmen failed in their obligations to the *kopa* it stopped assisting them, and in some circumstances punished them. To ensure help from the *kopa* the relatives made offerings to the ghost during ceremonies. After death the ghost embarked on a perilous journey to the land of the dead during which it had to avoid Kesene, a monster, who lurked on the track and devoured unwary spirits. Kinsmen placed offerings at the sepulture of the deceased to buy off Kesene, whilst others performed a ritual to try and drive the monster away. Both types of ghost could go to one of three lands of the dead supervised by Obomwe, the snake goddess, who gave birth to mankind. The lands of the dead were called Nesua, Waliwau and Sie and life there was similar to that of humans. After two or three generations in the land of the dead the ghosts turn into flying foxes or bush pigeons (Lawrence, 1984).

The Lakalai of West New Britain believed that a person has three souls which depart from the body after death. The *halulu* was

a simulacrum of the deceased, the *kalulu* a double of the living person's soul and the *hitu* the ghost of the deceased. The Kevemumuki clan of the Lakalai people believed that the land of the ancestors was on the top of Mt Pago, a volcano behind the coastal strip. The founding ancestor was called Sumua, who created taro and fire and gave them to his descendants. Other clans of the Lakalai have similar beliefs about their clan's guardians and the lands of the dead (Valentine, 1965).

Mummification was practice also found in Papua New Guinea. In the Torres Strait the primary purpose of mummification was to preserve the physical integrity of the person for as long as possible. Again, the concern with decomposition of the corpse of a loved one was a source of anxiety to the grieving family members. Complete mummification and the preservation of body parts were practised in several locations in Papua New Guinea. The Anga of the Aseki region of the highlands practised complete mummification and there are references to preserving bodies in the surrounding areas as far south as the coast of Port Moresby and west into the Wahgi Valley. The Buang of the north coast also smoke-dried bodies. A second centre for this practice existed around Geelvink Bay and

east of the Wissel Lakes (Pretty, 1969). Pretty (1969) suggests that the reason for the practice stemmed from the Melanesian desire to placate the spirit of the deceased and out of a desire to prolong their physical presence.

Hallpike (1977) states that the Taude of the Goilala Subdistrict of Central Province placed the corpses of chiefs on platforms and buried other members of the community. The raised platform was a basket-like construction and after putrefaction of the flesh the bones were retrieved, washed and kept in a bilum.

Exchange during mortuary rites in Massim societies has been recorded by a number of anthropologists. The emphasis of their work is on exchange and there is no reference to souls of the dead or beliefs about the eschatologies of these societies (Damon and Wagner, 1989). Amongst the Tanga of New Ireland Foster (1995) has documented social reproduction during mortuary rites and does not mention the souls of the dead or other eschatological details.

For the west of the highlands region Robert Glasse (1965) has written about beliefs in the soul and the afterlife amongst the Huli

of the Southern Highlands. Amongst the Huli, *dinini* is the immaterial essence of human personality, which survives death in the form of a ghost which can affect the living. The Huli do not believe in any judgement of the soul and its final destination is not dependent on a person's actions when they were alive. The ghosts of warriors and those slain in battle go to *dalugeli*, a desirable place, from which they can still return to the land of the living to haunt the place where they died. The ghosts of other people might remain around their residence trying to steal the souls of their partner or children. Some disappear into pools on river bends whilst others fall into a hole and land in *humbinianda*, a hot waterless afterlife. Male ghosts are believed to protect their family members and female ghosts are said to be dangerous. If a ghost is found to be responsible for some misfortune through divination an offering is made to it at the sacrificial hut, called *damanda*, located next to the ghost's sepulture. Offerings were made to male ghosts for their assistance and the same ghosts were propitiated to remove curses that affected the living.

From the Western Highlands there are data about the Mae Enga and the Kyaka Enga (Bulmer, 1965; Meggitt, 1965). The Mae

Enga believe that a person's spirit is in some way implanted into a child from the totality of the ancestral spirit pool. When a person dies the spirit becomes a ghost remaining with the corpse till burial, after which it wanders through the clan's land. Ghosts are regarded as malevolent and are considered responsible for most deaths and illnesses. In particular, they fear the ghosts of family members, with children fearing their father's ghost and fathers their children's ghosts. This fear stems from the tensions within the living family which continue between the transcendental and terrestrial realms after death. To placate a ghost an offering of pigs is made with a request from the family members to remove the curse that affects their family member. The ancestral ghosts as a whole are placated in rituals held by their living clan members (Meggitt, 1965).

The Kyaka believe that a person's soul, called *imwambu*, becomes a ghost after death. Ghosts are believed to help or harm their living family members. They can assist with such things as fertility of pigs and gardens, warn of dangers and help during conflicts. Ghosts can also cause illnesses such as leprosy, yaws and mental illness, and are held responsible for half of the deaths in

Kyaka society. In general, ghosts punish the family for infringements of the expected mortuary rites and for wrongs committed before the person died. Ancestral ghosts are believed to be benevolent to their living clan members and inhabit forest areas (Bulmer, 1965).

In the Mt Hagen area a corpse was prepared by the deceased's relatives and friends who covered it with pig grease and then placed it on a platform. Traditionally the body of a big man was tied up on poles and displayed with wealth contained in bilums before burial. After the arrival of friends and relatives the body was taken to the burial ground. The sepulture was dug with digging sticks, the body interred and covered with leaves, and finally the grave covered with soil. The head was normally left exposed so that the deceased could be seen for an extra day and then the head too was covered up. The size of the ceremony depended on the importance of the deceased and those of low status were buried without ceremony. Women who were described as "no good" were buried in deep graves, heavy stones dropped on their chests and a torn bilum used to cover their eyes before the sepulture was covered up. After putrefaction of the

flesh the bones were disinterred during a feast and placed in the spirit house in the cemetery (Mennis, 1982).

Strathern (1971) has described mortuary rituals amongst the Melpa of the Mt Hagen region. If a 'big-man' died the ghost of the deceased was told to avenge his death. The body was placed on a high platform by the tree where the man had made *moka*. His corpse was dressed in fine attire and a message sent to the ancestors that their living relatives were upset by their failure to prevent the death of such an important man. This ritual also warned enemies that the death would be avenged. After a day the body was buried but the deceased's ornaments were left displayed and mourners still came to the sepulture. After a week a small feast was held and the mourners departed. At this time the widow donned bilums, which became the lodging place for the deceased's ghost. During the final feast, payments were made to affines and those who had assisted with the funeral rites, and the ghost of the deceased was removed from the widow to the sepulture. The skulls of the deceased were exhumed and those of ordinary people placed in ossuaries, which were small houses in the cemetery or in the village. The skulls of 'big-men' were placed in skull houses, called

peng manga, which consisted of a platform with a conical roof on top of a long pole placed in the ground. Offerings were made at both kinds of secondary sepultures when the help of the ancestors was required or out of respect for them (Strathern, 1971).

Paula Brown has written about death payments and political organization in the Chimbu (Brown, 1960; Brown, 1961; Brown, 1972). Her work on death payments focuses on kinship and obligation and shows some differences to the exchanges that take place in the Eastern Highlands. The affines assist in pooling resources at the start of the mortuary rites, and this includes pigs. These payments are loans which the agnates repay at a later date. The size of the feasts is also larger than those of linguistic groups to their east and reflects the larger social groupings and population density of the Chimbu region. She considers the nurturing of children and residence of the deceased as important factors in death payments amongst the Chimbu rather than agnatic relationships.

Read (1954) suggested a possible boundary between different cultural and linguistic groups in the highlands. The boundary that he suggested was that of the Chimbu divide which separated the

western inhabitants from the highlanders to their east. Again this boundary was not clear-cut and some groups, notably the Siane and Bena Bena linguistic groups, held Chimbu-style *kanggu* gatherings during which young people engaged in sexual liaisons. The Asaro also held *geru* fertility festivals like the linguistic groups of the Chimbu region. However, Read noted that the construction of villages was different, and that for groups in the Chimbu area the *geru* fertility festivals were a more dominant part of the culture and the people held much larger pig ceremonies than those of their eastern neighbours. Those groups to the east shared many cultural similarities, such as male cults, social structure, political systems and agricultural practices.

The description of the *nama* cult of the Gahuku (Read, 1952) is similar to male cults in the Siane, Bena Bena, Kamano, Yabiyufa, Awa, Gimi-Labogai, Kamano, Usurufa, Yate and Fore linguistic groups (Berndt, 1965; Langness, 1974; Newman and Boyd, 1982; Salisbury, 1965). This is also supported by Strathern (1970), who compares male cults in the Eastern Highlands to those in the Western Highlands, and to the area around Mt Hagen, where there were no cult houses. However, Glasse (1965) gives a brief

description of male initiation amongst the Huli of the Southern Highlands which resonates with descriptions further east. A very broad two axis approach has been taken to the analysis of fertility cults throughout Papua New Guinea, with one axis being male-female participation in fertility cults and the other axis having a scale between an emphasis on developing males and reconstituting the clan. Whitehead suggests that there are gradual changes in cults from the east to the west across the highlands (Whitehead, 1986a; Whitehead, 1986b).

Read's (1965) description of Gahuku-Gama social structure is similar to descriptions by other anthropologists of groups in the Eastern Highlands (Berndt, 1971; Gillison, 1993; Glasse and Lindenbaum, 1971; Glasse, 1962a; Glasse, 1969; S.Glasse, 1963b; Hayano, 1974; Hayano, 1990; Lindenbaum, 1979; Pataki-Schweizer, 1980; Robbins, 1982; Salisbury, 1956; Watson, 1983). Read (1959) also wrote about leadership and consensus in Gahuku-Gama society and his ethnographic descriptions resonate with other ethnographic descriptions from the Eastern Highlands (Gillison, 1993; Glasse and Lindenbaum, 1971; Glasse and Lindenbaum, 1975; Hayano, 1990; Lindenbaum, 1971; Lindenbaum, 1975a; Lindenbaum and Glasse,

1969; Robbins, 1982; Salisbury, 1956; Watson, 1983). Child-rearing practices have also been described as similar for the Bena Bena, Fore and Tairora (Langness, 1990).

Differences in precolonial horticultural traditions in the Eastern Highlands existed (Watson, 1967). Nevertheless, there are also many similarities throughout the Eastern Highlands in the methods used by those who inhabit grasslands and those who inhabit forested areas (Bourke et al., 2000; Boyd, 1981; Boyd, 1985; Boyd, 2001; Pataki-Schweizer, 1980; Sorenson, 1976).

In the Eastern Highlands Salisbury (1965) has written about the Siane and Berndt (1965) about the Kamano, Usurufa, Yate and Fore. In the Siane a god called Oma Rumufa (Black Way) presides over the land of the dead where he takes on the form of a white circle of light. Ghosts, called *korova*, are often dangerous and need to be propitiated. However, ancestors are considered benevolent and offerings are made to request their help and to thank them for their assistance. There are also myths telling how people emerged from the land and how they migrated to their present locations. The social structure consists of lineages that make up clans, which

constitute villages in a locality with a defining name for the inhabitants of that region.

The similarity of the described cultural practices and beliefs in the Eastern Highland's linguistic groups supports the data showing the shared beliefs in the souls of the dead, the land of the ancestors and the founding clan ancestor, as set out in Table 1. As already mentioned, there was no political structure or traditional name for people with the same language. There are differences in dialect within languages, and sometimes languages changed through dialect chains; where there was a discrete linguistic boundary people living near it simply became bilingual. Though family and clan boundaries were clearly defined and strictly observed, linguistic and cultural boundaries were not considered significant. This allowed the easy sharing of ideas across linguistic groups. Communities in other linguistic groups often became allies in time of war and, if needed, places of refuge; these alliances were frequently strengthened by marriage exchange and affiliation of individuals or groups into ancestral clans.

Most of the following ethnographic descriptions of mortuary rites and related practices are based on single interviews conducted in conjunction with blood sampling and on the literature, which, in most cases, did not address the particular issues. The work was conducted prior to the in-depth ethnographic study in the South Fore and the surrounding kuru-affected linguistic groups. It was still possible to find older people who were informed about the precolonial mortuary practices in the Anga, Pawaian and Mikaru. However, in areas with a longer history of colonial contact informants were very old and struggled to recollect past practices. This was especially true of the Gadsup, Tairora, Bena Bena, Gahuku, Asaro and Siane linguistic groups. A series of interviews were conducted later to confirm through triangulation if the linguistic groups that surrounded the kuru-affected region shared similar eschatologies; these results are presented in Table 1.

Tudawe

The Pawaian people inhabit an area to the east of Mt Karimui, consisting of approximately 900 square miles of dense rainforest, that makes up the southern boundary of the Eastern Highlands

Province. In 1972 they numbered around 3100 people and were administered loosely from the Karimui Patrol Post, which was established in 1961. The Pawaian people refer to themselves as Tudawe or Yar.

The Pawaians were noted for their bush skills by the early administrators of Papua and many served with exploratory expeditions for the government and oil companies. However, their villages located far up the Purari River were never visited by kiaps until after World War II. In 1957 the south of the Fore region terminated in the villages of Paiti, Kasarai, Urai and Mugaiaimuti, but the local people were able to name abandoned villages further south called Abonai, Asapinti and Irendi. These villages had been occupied by the *yanarisa kina* who had since abandoned them and moved elsewhere. To the south of this area lived the semi-nomadic Tudawe, who survived in low-lying malarious country on a staple of sago. Most of their villages to the south of the Fore were found on the lower Tsoma and Subu (lower Lamari) rivers and along the upper Pio River. Their close proximity to these rivers allowed the Tudawe to develop good swimming and canoe skills.

The Tudawe and their Mikaru neighbours to the west of the kuru region were involved in extensive warfare resulting in exo- and endo-cannibalism. Certain cultural traits, such as young males' avoidance of sex, strict taboos on name use and the use of bark capes by both sexes, were traits adopted from the Anga, with whom the easternmost Tudawe had contact through marriage exchange and adoption.

There are close relations between the Tudawe who now inhabit Yagagiti (previously they lived in Weme) and the Mononi clan of Miniri in the Simbari-speaking part of the Anga. After the collapse of the Mononi clan following an outbreak of epidemic encephalitis in 1957 the survivors took up residence in Weme for almost a decade. Traditionally, the Tudawe traded with the inhabitants of Paiti in the South Fore and had more extensive relations with the Gimi (Gajdusek and Alpers, 1972).

The following summary is based on interviews conducted in Haia, in the Lufa District of the Eastern Highlands, and in Venio, in Karimui District of Simbu Province. There were no elderly inhabitants in Yagagiti to interview.

The inhabitants of Haia interacted with their clansmen who lived in Herowana and received brides from Maimafu in the Gimi-Labogai. In exchange they gave tapa cloth, bird of paradise feathers, animal furs and shells. The villages of Wabo, Yagagiti, Poroi and Subu spoke the same language (Tudawe), but the language of the Mikaru (often referred to locally as Daribi) was different. The first kiaps arrived from Kikori after World War II, and later from Goroka, Lufa and eventually Karimui after the construction of the airstrip in 1961. A patrol house was built in Haia in 1968, a mission in 1973 and a mission airstrip in 1974.

The Tudawe have a legend about the origin of the practice of transumption. There was a man who married his own sister in the Anga, and one day the husband told his wife to fetch him water; she refused his request so he beat her and she ran away. She walked through Kilimari, Yagagiti, Subu and other Tudawe communities. At one village she rested the night and in the morning asked the men to shoot a palm tree near their village with arrows. The men did so and she then told them that a man was following her tracks and they should shoot him like they had the palm tree. Not long after the woman had left the village the husband arrived, and he

aggressively demanded if the villagers had seen his wife. When he threatened to kill the villagers they turned on him, killed him, and threw his body into a nearby river. However, the body remained where it had been thrown and after several days the curious villagers started to remove parts of the body, which they roasted or dried in the sun, and eventually ate. The Tudawe thought the meat tasted good, and so exo- and endo-cannibalism started amongst the Tudawe.

The Tudawe believed that illness was caused by sorcerers, 'masalai' and ghosts; deaths were attributed to sorcery, and more frequently to warfare. After a death the family and relatives gathered to mourn and after two days the body was placed on a raised platform. The corpse was either left to decompose at the sepulture or it was dismembered secretly by the mourners and consumed. Transumption of the body was out of respect and love for the deceased, and the mourners did not want the corpse to be eaten by insects or wild animals. There were also beliefs that the abilities of the deceased would be inherited by the living family members who took part in transumption, and that participants might receive blessings from the soul. The abilities might be fighting, hunting,

gardening or other skills. Importantly, the Tudawe described transumption in the following way:

“... they wanted to show compassion and respect towards him, and the very act of eating his body was a way of saying that we have taken the person to live with us again.” (Interview 121)

By treating the deceased properly the family members inherited his abilities, received blessings and could call on the assistance of the soul of the deceased during times of need: during illness, battle or for more mundane matters like finding lost pigs or to ensure a successful garden harvest. By eating the deceased the surviving members of the family increased their chances of survival in an often hostile world. These beliefs applied equally to men and women who died. Finally, there was a gastronomic element to transumption, with those not closely related to the deceased enjoying the taste of the meat that was regarded as superior to the meats of wild animals.

Not all corpses were consumed: those that were considered diseased, such as those who died of leprosy or dysentery, were often

left on the platforms to decompose. However, there were no fixed rules, as they believed that if the body was left on the platform for a couple of days the disease would leave the body as it bloated during the first stages of decomposition. The body was then fit for consumption regardless of what the person had died of – luckily this area was not ravaged by the dysentery epidemic of 1943 that killed so many of their neighbours. Those who died in battle were always consumed and requests made to the deceased's souls to help avenge his death.

The platform was built at a height of two metres above the ground near a pandanus or 'tulip' tree which would mark the deceased's sepulture. A fence was built around the structure to protect it from wild animals. Older men who were experienced in dismembering bodies and were not frightened of the ghost would climb onto the platform and prepare the body for transumption. In Haia all the flesh was carefully removed from the body, but the intestines and other internal organs were left on the sepulture. The genitals and hair were also not eaten. It was very important that the bones were not damaged in any way during the de-fleshing of the corpse, as the bones would be finally placed in the clan ossuary

or kept in remembrance of the deceased by the family members. Bones, especially the collar and finger bones, were often kept by family members as relics and talismans.

In Venio the whole body was eaten during transumption, and the skull broken open and the brain consumed. The meat was mixed with greens or sago, cooked in bamboo tubes, and afterwards salt and spices were spat onto it. Men were not allowed to eat women's bodies as the pollution of a female corpse would have damaged a male warrior's fighting abilities.

There were no death payments among the Tudawe and no rules regarding distribution of the corpse; it was entirely up to the family as to how they distributed it, but the affines often received the head. All the family members, affines and other mourners of the right age were allowed to take part, though there were individuals who chose not to take part in transumption. If the family did not want the body consumed the affines might compensate them so they would drop their objection; or the family might compensate the affines by giving them pigs to consume rather than the corpse: the two groups would come to an amicable arrangement. If only one or two people

objected to transumption the rest of the family and mourners would secretly arrange to meet and consume the body, so there would be no arguments or fights during transumption. Parents never ate their own children. The corpse was meant to be consumed by the older men and women (those over 30). Participants had to be married and children and initiates did not witness transumption. There were some men who regularly took part in transumption. Traditionally, women were not meant to take part, as the deceased had been born from a woman and they believed it was not correct to eat their offspring; however, not many followed this rule.

Several days after the flesh from the corpse had been consumed a feast was held for the participants of transumption consisting of pigs that belonged to the deceased or their family.

If the body was left to decompose it remained on the sepulture until all the flesh was removed from the bones. As the body decomposed no crops were removed from gardens surrounding the sepulture as the Tudawe feared that insects and birds that had eaten part of the decomposing body had also touched the garden foods, and if they were eaten they would contaminate the eaters.

After putrefaction the bones were buried under a tree and each sepulture maintained a link to the souls of the deceased and were avoided by children who might be harmed by the ghost. This ritual was performed by old men who were not frightened of ghosts. The soul of the deceased entered an afterworld that was geographically located at the ossuary or in the rainforest, depending on the clan. Requests were made to the souls at the ossuary or sepulture to remove a curse from a child, or to request assistance. Offerings might be made to an individual ancestor, or to all the ancestors; and consisted of meat burnt over a fire, the smell of which reached the land of the ancestors. If warriors from the clan required assistance in battle they built a rack that held their weapons and burnt meat offerings on a fire underneath. The smell of the offering attracted the souls of the ancestors requested to assist, and they would accompany the smoked weapons into battle and ensure victory. The Tudawe were able to name their ancestors back through five generations.

In Venio the body of a man could be placed on a platform in the men's house and the fluids of decomposition consumed, together with anything that remained on the body, till everything except the

bones had been consumed. A similar rite was performed for women in their area of the village.

Exocannibalism was performed by the victors as they celebrated a revenge killing. The head was always left so their enemies knew who had been killed; the victors cut off the muscle and fat that they wished to consume and took it back to their own village for consumption. As the victors returned home they rejoiced, singing and dancing along the way, and as they approached their village the women and children would join them. Enemies were eaten out of hate, and for revenge, and this quenched the victors' thirst for further conflict, as the killing of their loved one had been avenged. This was especially true if their loved one had been killed and eaten by the enemy. The eating of the dead added insult to the grief of the deceased's family, and the death had to be avenged and the insult righted by eating part of a dead enemy warrior. If a warrior was killed and his body left on the battlefield then the avenging side would treat an enemy's body with the same respect. The meat was cooked in bamboo or a steam oven, and cut into small pieces and placed on a banana leaf on a traditional plate. Everyone was allowed to participate if they chose to, and there were no

prohibitions on participation. The warrior who had killed the enemy was decorated and also participated in eating part of the body. The ghost of the deceased was a threat only to its own family, not to its killers or their families. If a woman from the victorious clan was married to the deceased enemy warrior she would immediately return to her father's village with her children. The victors would pour water from a specially decorated piece of bamboo onto the widow and her children, so they were protected from the ghost of the deceased, and this ritual often started the peace process between the warring factions.

There was also another reason for exocannibalism: some of the men enjoyed eating the meat from a human body. They stated that it was much tastier than the meats of wild animals and these men would not hesitate to kill a stranger on their land so his body could be eaten.

Mikaru (Daribi)

The name Mikaru was used by the early patrol officers to refer to the people of this area and was retained by linguists, most

notably S. A. Wurm. The word was derived from the Daribi name for Mt Karimui, *migaru*. The name *mengaru* is used by the Chimbu-speaking people to the north to refer to the Daribi. The people themselves use the name Daribi. Those living to the west of Karimui Station call themselves Daribi and those at the base of Mt Karimui distinguish themselves by using the name *migaru page Daribi* (Daribi at the base of Mt Karimui). In addition to the Daribi a pocket of about 1000 Tudawe-speaking people live in the Sena River Valley to the east of the station. The Tudawe speakers are bilingual and intermarry with their Daribi neighbours (Wagner, 1967).

According to the Daribi, a person is not born with a soul (*noma*); instead it develops within them as they grow. After death the *noma* becomes an *izibidi* (ghost) which travels down the Tua River till it reaches *yazumar* (the land of the ancestors), or if unavenged or unmourned remains and haunts its sepulture (Wagner, 1967). If the harmful ghost of the deceased was causing disruption in the community the family members would kill a pig and perform a ritual to send it away to *yazumar*. In Table 1 the

word for the land of the ancestors is *tova* and this might be due to differences in dialect amongst the Daribi.

Before a person died they would make their final wishes as to the disposal of their body and the wish was always obeyed by the family as they feared the curse of the ghost. The Mikaru often placed bodies on platforms that had a metre deep pit underneath into which the fluids from the decomposing body fell. Wagner (1967) states that these were called *ku* (dripping pit) and has a picture of one in his book on the Daribi. A fence surrounded the sepulture so it was not disturbed by wild pigs or dogs. Pigs were killed during mortuary feasts so that their souls would accompany the ghost to *yazumaru*, the land of the dead. Personal items like a man's bamboo pipe and string bag were hung from cordyline planted around the sepulture. After the putrefaction of the body the pit was filled in and the bones removed to the ancestral cave. All the bones were placed in a single pile in the cave. Sepultures were avoided by the living and people would not kill any animals in their vicinity.

Those who died of dysentery, leprosy and yaws were buried in the sleeping position in a shallow burial pit. The body was covered

with tapa cloth, leaves and finally covered with earth. The bones of those who were buried were not retrieved from the sepulture.

In the Mikaru a body was dismembered by the women of the family of the deceased, and then divided into those parts for eating and the head and internal organs which were buried. The body belonged to the family but other participants at the funeral were allowed to take part in transumption even if they had no right to the body. Children were not allowed to take part in transumption and all participants had to be married with children. Most men did not take part so their abilities were not damaged, but a few did. After the completion of transumption the men hunted wild animals and a feast was prepared to compensate the women who had taken part in transumption. The bones were placed in the clan's ancestral cave.

Wagner (1967) has interpreted the rules of transumption amongst the Daribi in terms of the symbolism of "eating meat together" and, in contrast, "giving meat". Those who were unmarried did not take part in transumption and were not eaten when they died, because they had not taken part in exchange.

People were allowed to take part in the transumption of those they shared meat with, but not those they gave meat to or received meat from. So the transumption of dead clan members was equated with the sharing of bridewealth contributions and distributions.

Members of the nuclear family did not participate in transumption of each other.

After a massacre of Dobu clan members in 1960-61 about 30 people were killed by a combined force of neighbouring clans and the dead consumed by the victors (Wagner, 1967).

Huva

The Huva language is a dialect of Yagaria, and is spoken in the area around today's Lufa Station in the Labogai District of the Eastern Highlands Province (Wurm, 1978).

Transumption was a practice handed down through generations and only stopped after the arrival of the Australian government and missionaries. The Huva did not eat their dead enemies, and if one of their corpses remained on the battlefield they would send women related to the deceased to collect the body and to return it to the

deceased's patriclan. The corpses of those who died of diseases such as leprosy were always buried. Traditionally, bodies were disposed of by transumption, burial, on a platform or in a cave. Burial was for unimportant members of the community; those who were respected were placed on platforms. A platform was built at a site chosen by the deceased and the body placed on the platform and covered with cordyline leaves. After the completion of putrefaction, the family would remove the bones and bury them in the ground or place them in the clan ossuary. The body was not disturbed after being placed on the platform as people feared the harmful soul of the deceased.

If the body was disposed of by transumption, the women and children were the main participants as the Huva believed that the corpse would harm initiates' or warriors' abilities. So, in practice, the body was consumed by the women and children, and the occasional old man who no longer worried about his abilities.

The body was dismembered by an elderly man or woman who was skilled in the procedure and then divided amongst the participants of transumption. If a man died his body was consumed

by his family members and if a woman died her body was consumed by her patriclan. However, a woman's head was always returned to her husband's clan as they had paid the bride price for her.

Meigs (1995) explores rules surrounding the consumption of food and the social relationships between givers and recipients. According to Meigs the Huva had a religion that was based around the regulation of an individual's vitality called *nu*, which included all bodily substances. Of specific interest are the rules for adult participation in transumption; these are listed in Appendix B in her book under 'Relative food rules'.

A mature male was allowed to participate in the transumption of his father and both his grandfathers, but not their wives. A man could participate in the transumption of a brother who was much older, but not one who was similar in age. Classificatory brothers could be consumed as well as consanguineal cross-cousins. Mother's brothers could be consumed but not a man's sisters or aunts as men did not participate in transumption of females. A man did not eat children or any of his wife's affines.

Adult females could participate in the transumption of all consanguines apart from children. They were also expected to participate in the transumption of their husband, and their husband's father, mother and sisters.

Asaro

In the Asaro bodies were cremated, buried at a spot chosen by the deceased, or eaten if the deceased was a warrior.

Exocannibalism was not practised amongst the Asaro. If the body was buried a shallow hole was dug with a digging stick and cordyline leaves placed in the bottom. The body was interred in the sitting position, the hole filled with cordyline leaves and a tapa cloth placed over the top which was then covered in soil. Later, the bones of the deceased were placed in a river, and this marked the departure of the souls to the land of the dead. If the ritual was not performed, the ghost could not depart and it soon became angry and retaliated against the family members.

Corpses were cremated on a river bank in the middle of the night so enemies were unaware if the person had died or not. The

ashes of cremation were thrown into the river so they were safe from enemy sorcerers who might use them for further sorcery. The river contained the land of the dead and the deceased's souls resided there after death. People respected the river and would not throw rubbish into it or wash naked in it, as it would have offended the souls of the dead.

Bodies of leaders and warriors were disposed of by transumption out of sorrow and respect, to ensure that the deceased's clansmen avenged the death and for the deceased to live on within the participants. The family did not want the body of someone who had done so much for them to rot in the ground, and by treating the deceased's body in this way they ensured that they received blessings from the soul of the deceased and that the abilities of the deceased would be inherited by the family members who participated in transumption.

When a person dies his vital essence takes the form of a ghost called *foroso* (*holoso* in Table 1, this difference is possibly due to dialect), which remains in the vicinity of the living. The *foroso* can cause illness, accidents and other misfortunes though they can also

be of assistance with minor matters. They are only harmful if they have been maligned in some way, such as not cleaning their bones or grave, or forgetting to call out their name during a ceremony. The Asaro distinguish between the recent dead, *foroso* whose names are known, and ancestors, *abwaho*, whose names are no longer remembered (Newman, 1965).

The Asaro built small spirit houses in their gardens and made regular offerings to their local ‘masalai’ to ensure the growth and fertility of their gardens and pigs. The Asaro also held Chimbu-style pig festivals when *gerua* boards were worn to please the ancestors, who ensured the success of the festival and the continuing fertility of the clan and its possessions. During the *jabarisa* ceremony, or during times of crisis, offerings were made to the ancestors at a sacred site within the community’s ceremony ground. The site consisted of an area enclosed by a wooden fence. In the Asaro sacred stones called ancestors are buried underneath these sites and were brought from previous sites when the clan moved.

Stones that are connected with the ancestors are also reported elsewhere (Glasse, 1965; Watson, 1983). Amongst the Mae Enga the

clan stones are called 'eggs of the sun' and might be natural stones, or parts of artifacts including pestles, mortars and club-heads that resemble crops or animals. These stones are buried near an ancestral house built in thick woodland and belong to the whole clan. Clan stones functioned to ensure the fertility of the clan's ground and the success of the clan in human affairs (Meggitt, 1965). Amongst the Kyaka the stones belonged to individuals but offerings benefited the whole clan. The types of stones were the same as those of the Mae Enga but also included figurines and round river stones (Bulmer, 1965). Stones were also buried in the centre of gardens, and small ones cast around gardens to ensure a successful harvest (Berndt, 1965; Newman, 1965).

Siane

After death corpses were placed on a stretcher covered in cordyline leaves rubbed with oil from the red pandanus fruit. Once the first signs of putrefaction occurred the body was put on a platform (which was the most popular sepulture), buried at the deceased's favourite place or consumed. During wartime bodies were sometimes cremated to shorten the mortuary rites.

If a person was to be buried their limbs were tied up in the fetal position before rigor mortis set in. The pit was lined with sticks and grass to make a small house and, once it was covered with earth, poles were placed over the sepulture to create the appearance of a roof. A fence was built around the sepulture to protect it from pigs and dogs, and flowers were planted inside the fence (Salisbury, 1965). The body was placed in the sepulture with its back to the sun and the head hanging forward so the face of the deceased looked to the bottom of the burial pit; flowers were placed in the burial pit to form a cushion around the face. Salisbury (1965) states that the bodies of important men were dismembered and buried throughout the clan territory, or cremated and the ashes scattered. The corpses of unwanted spirits were thrown into deep limestone chasms. If the body remained on the platform till putrefaction had finished, the bones were then removed and placed in the clan's ossuary or buried at the deceased's favourite place.

Transumption was the normal method of disposal for bodies of leaders or other highly respected members of the community killed in battle. Transumption expressed the mourner's anger at their loss of a loved one and their sadness at losing a member of their family

and community. The practice ensured that the souls of the deceased would assist the warriors to avenge the death. Women's bodies were not normally consumed, but a small number of women who carried war shields in battle were consumed. There was a gastronomic element to transumption, and people enjoyed eating corpses with plenty of meat on them.

The body was eaten only by the family members and close paternal relatives; the affines did not participate. Men did not participate in the transumption of a woman's body, and a widow never ate part of her husband. The whole body was consumed apart from the bones. The meat was either roasted or cooked in bamboo tubes. Finger bones and jawbones were kept and worn by the family members as relics and talismans. Sometimes the skull was placed in a bilum and carried around by one of the female relatives. Later the skull was buried with the rest of the deceased's bones.

The Siane believed that if the ghost of the deceased was angry it might cause disease in children or pigs or stop gardens from growing well. To remove the ghost's curse the family would remove the bones from the sepulture and hold a feast during which the

bones were thrown into a nearby river. This removed the ghost forever from the community. In a similar ritual, a doll that represented the deceased was made from cordyline leaves, cockatoo feathers, bush vines and flowers and during the feast the ghost was sent away forever. Souls were not only dangerous; they could also be called upon to assist the family members to cure illness and to fight battles. Salisbury (1965) stated that the spirit of a living person is called *oinya*, and after death it becomes *korova* (*orova* in Table 1) and finally it enters an undifferentiated pool of *korova* known as ancestral *korova*. When ancestral *korova* entered the bodies of infants they were given the names of deceased ancestors. The *korova* of a recently deceased person was harmful to the living but once incorporated into the ancestral *korova* it benefited the living.

Cremation took place during wartime when mourning rituals were cut short because of fighting. After the primary cremation the remains were left for a day, then burnt a second time, and the ashes and any remaining bone fragments buried. Exocannibalism was not practised amongst the Siane.

Salisbury (1956) has described the unilineal descent system and clan structure of the Siane. He also describes social structure and the importance of the flutes as the centre of religious life. Each pair of flutes represents a clan's male and female founding ancestors and the geometrical designs on the flutes are symbolic of the lineage ancestors. A clan's members are involved in exchanges with their ancestors and their land.

Gahuku

The normal means of disposal of a body in the Gahuku was cremation, but transumption was occasionally practised prior to the arrival of Europeans. The principal reason for these practices was that it was unfitting for the body of a loved one to be eaten by worms or maggots. The Gahuku also feared that their enemies might steal the remains of the body and use them in sorcery against the family.

For cremation, a funeral pyre was built with dry wood and the body placed on top and the pyre lit. Once the body had been cremated the ashes were gathered and thrown into a nearby river

so enemy sorcerers could not collect the ashes. The place of cremation became the sepulture of the deceased but the soul went into the river. The remains of cremated women were spread along the river bank and were not thrown into the river.

Occasionally a particularly attractive young warrior who died in battle would be partly eaten, out of love and respect and to partake of his sterling qualities (Alpers, 1992). After transumption the bones of the deceased were either disposed of in a river or buried.

Many aspects of Gahuku-Gama culture have been described, such as initiation, leadership, marriage and social structure (Read, 1952; Read, 1954; Read, 1955; Read, 1959; Read, 1965), but there are few details of mortuary practices and rituals and no investigation of their cosmology.

Yabiyufa

In the Yabiyufa linguistic group bodies of family members were buried, cremated, placed on platforms or consumed. The bodies of enemies from nearby villages were always left for the enemy to

collect, but if the deceased enemy was from a distant village the victors might consume the body. They believed that the spirit of the deceased from a distant village would not harm those who ate the body.

Corpses of men and women were consumed by the family members and not by the affines. Transumption was out of love and respect and to incite revenge. There were beliefs that the living would inherit certain qualities of the deceased during the mortuary rites. Those who died of strange or contagious diseases were not eaten. The body was dismembered and cooked in bamboo tubes in the deceased's garden and the entire body was consumed apart from the bones. The bones were often burnt with the deceased's other personal items. The jawbone was kept as it had a connection to the deceased's *holoha* (the souls which remained with the living and assisted them until the final mortuary feast when it departed with the dangerous soul), which helped family members, especially during wartime. Family members amputated fingers or ear lobes as a sign of their grief, and these body parts were buried near the deceased's sepulture.

Burial took place in a pit and the body was placed in the sitting position supported between two pieces of wood. The deceased's possessions were placed inside and the pit covered. Each clan had its own cemetery near the village where their relatives were buried and the boundaries were marked with cordyline. Vegetables from the deceased's garden were placed by the side of the sepulture. After the body had decomposed a secondary burial rite was performed and the bones were reburied. During this rite the souls of the deceased departed to *holohebatoka* (the land of the ancestors).

Cremation was the favourite means of disposing of a diseased body rather than burial, as the Yabiyufa feared the smell of decomposition from a buried body. A hole was dug in the ground, a funeral pyre constructed inside it and the body placed on top in the sitting position. The ashes and remains from the corpse remained in the hole after cremation, which was then covered up and became the sepulture of the deceased. The deceased's possessions were also burnt on the funeral pyre.

During the final mortuary rite pigs were killed and their blood poured on to a small doll that represented the deceased, and the

spirit summoned and asked to depart. The *holoha* could cause disease and misfortune amongst the family members and its departure was welcomed by the living.

Bena Bena

Traditionally, the bodies of the deceased were buried, placed on platforms or consumed. If the deceased came from a village in the grasslands they would often be buried, and if they lived in forested areas or on the edge of valleys they would be placed on platforms or in caves. Transumption was primarily practised out of love and respect for the deceased and to incite a desire for revenge amongst the warriors. Diseased bodies were not consumed, nor were the bodies of enemies. Bena Bena male-female relationships, men's cults and child-raising have been described (Langness, 1967; Langness, 1974; Langness, 1990) but few details of their mortuary practices have been recorded.

Agarabi

The Agarabi inhabit the northern boundary of the Eastern Highlands Province between the Gadsup, Kamano and Tairora

linguistic groups, and the Amari in the Markham Valley. There are 31 villages in an area of 107 square miles. The Agarabi are unique in making pottery in the Eastern Highlands. Their contact history is similar to that of the Kamano (Gajdusek and Alpers, 1972).

When a person died the family and relatives would gather and mourn over the body for 2-3 days, and then the body was disposed of by burial, or on a platform in a tree or bamboo grove. The Agarabi did not practise endocannibalism. The bones were always removed and placed in a cave or the deceased's favourite place during secondary burial.

A widow would cut off her finger in grief and bury it near her husband's body. The hair of the deceased was also kept and put in a bilum and worn around the neck of a family member. The Agarabi believed that these talismans would afford them protection from harm.

If a person was buried a post was put in the ground near the sepulture and the deceased's belongings tied to it. When it was time

to avenge the deceased arrows which had been tied to the post were removed and taken into combat.

The souls of the dead went to the land of the ancestors at the top of Kassam Pass in Eastern Highlands Province called *banama*.

Gadsup

The Gadsup inhabit 23 villages in the northeasternmost corner of the Eastern Highlands Province with a population of 9000 in 1972. The Oyana people are regarded as speakers of a dialect of Gadsup and are separated from each other by a two days' walk through land occupied by Tairora- and Kamano-speaking peoples. The Gadsup linguistic group in turn has two small enclaves, one of Binumarien and one of Kambaira, both of which are dialects of Tairora. The Gadsup also border two Austronesian linguistic groups in the Markram Valley, the Amari and the Atsera (Gajdusek and Alpers, 1972).

The Gadsup were the first highlanders to be contacted by Lutheran missionaries in 1919; the missionaries were followed by gold prospectors and even later by government officials. In 1917

Lutheran missionaries had established a mission at Kaiapit in the Markham Valley overlooking Atsera and Amari villages which were subject to sudden raids by the Gadsup, who killed and consumed their enemies. The Atsera were also reported to eat the dead (Radford, 1987).

The missionaries first visited the Gadsup in December 1919 and in 1920 they tried to establish a mission in the Binumarien group; however, this was not successful and it was soon closed. In 1922, a native mission was established in Gadsup with the aim of winning the people's confidence so they could be dissuaded from cannibalism, warfare and sorcery (Radford, 1987).

The Gadsup used the following sepultures for their dead: burial, platforms, between the buttresses of a tree, caves and limited transumption. Burial was the favourite sepulture in the Gadsup, and they believed it was the best way to show respect to the deceased by allowing the worms on the clan's land to eat the body. If the body was put on a platform, edible green vegetables were placed underneath and the fluids of the decomposing body were then cooked and eaten by the mourners. This was done for

important men, and the body was consumed by the men to ensure that the deceased's *elabainta* and *kavam* were transferred to the living so that the men would receive blessings from the *venhamami*. The bones of the deceased man were kept in the men's house and requests made to the *venhamami* when assistance was required. The souls of the deceased would depart from the village cemetery at the end of the mortuary rites. The land of the dead, called *wanimapa*, was located at the top of the highest mountain in the Tairora.

Du Toit (1975) states that the soul had a visual dimension called *timami* and a manes (a deified ancestor) dimension called *aumi*. There was also a counterpart of the body but this concept is not elaborated upon. The *timami* departed from the body at death, but the *aumi* remains near the corpse and after burial it departed to become an ancestor. The different names used by Du Toit compared to my own data are probably due to different dialects or different concepts of the souls described.

The Gadsup, Tairora and Agarabi who bordered the Markham Valley communities practised exocannibalism against their lowland

neighbours, who also conducted exocannibal raids on the highland villages.

Tairora

The Tairora inhabit 530 square miles at the eastern edge of the Eastern Highlands Province. They inhabit 50 villages surrounded by the following linguistic groups: Kamano, Agarabi, Gadsup, Atsera, Banir, Genatei, Owenia-Waisara, Awa, Auyana and Oyana. There are two cultural divisions amongst the Tairora: the Pinata-Kokonbiri-Oraura in the southwest corner that make up about 6% of the total population, and the Tairora proper (Gajdusek and Alpers, 1972).

Pinata-Kokonbiri-Oraura group

These three villages are found south of the upper Lamari River in the forest high above the grasslands. The inhabitants can make themselves understood in Obura but claim to speak a different language to the central Tairora. Though this linguistic difference may essentially be a matter of dialect, they are culturally distinct

from the Tairora proper, with their own blend of Awa and Tairora culture (Gajdusek and Alpers, 1972).

Tairora proper

The Tairora language has three dialects: two in the Tairora Valley – Abiera in the northwest and Batainabura in the northeast – and Baira in the centre south.

The Tairora had no history of transumption or exocannibalism (except for those villages bordering the Markham Valley), though they had heard stories – which may, of course, not have been true – about their neighbours, including the Barua, of eating the dead. When they engaged in conflict with their Gadsup neighbours neither side engaged in exocannibalism.

Male bodies were placed in a cave, between the buttresses of a tree or between two fallen logs. Women were normally buried, but if an exceptional female leader died she might be buried in the same way as males. The *oralaka* (harmful ghost) of the deceased person remained at the primary sepulture and could harm the family members if it was unhappy with the mortuary rituals. The *maraura*

(simulacrum) was called upon to assist the living in avenging the deceased's death. Close relatives, especially brothers and sisters, cut off ears or fingers and buried them near the deceased out of sorrow for their loss. After putrefaction the bones were removed in a ritual that involved feasting. If the body of an important man was placed on a platform his arms and legs were placed inside bamboo tubes. After putrefaction the bamboo tubes were buried under the sepulture during a mortuary feast. The bones were buried by the gardens as the Tairora believed the soul of the deceased would assist the family's garden harvests. In some areas the bones of important men were placed in caves. The souls of the deceased entered the afterworld after secondary burial and shadows of the deceased's possessions accompanied the souls to the land of the ancestors.

Watson (1983) mentions an afterworld in the Saruwaged Range to the north of the Tairora. The land of the dead was called *bánamáqa* (this is written as *vanamaha* in Table 1) and ghosts (*bana*) could return and frighten humans. He reported that ghosts also assisted the living.

Anga

The Anga linguistic stock consists of 12 non-Austronesian languages, some of which can be divided into dialects (Gajdusek et al., 1972). The Anga have been referred to as the Kukukuku, but since this is a derogatory term used by their neighbours it has dropped out of use. The Anga people do form a recognizable linguistic and cultural complex which stands in marked contrast to their neighbours. The northwest portion of their area lies on the border with the kuru-affected region and is made up of the Simbari- and Barua-speaking peoples. These two groups were brought under administrative control in 1963 after the establishment of the Wonenara patrol post (Gajdusek and Alpers, 1972).

Barua

In 1972 the Barua numbered 4400 and inhabited the north-central region of the Anga. The language consists of three dialects: Barua with 2800 speakers, Imani with about 300 speakers and Wantekia with about 1300. The Barua-Wantekia live in the Wugamwa River valley that flows into the Aziana River. The

Wantekia have four clans: the Dumbulia, Aurugosa, Wenabi and Wantekia. They are separated from the Simbari speakers by the Lamari-Vailala Divide which rises to over 3000 metres. The Barua-Imani live in the area of the headwaters of the Aziana River and were in frequent conflict with the Genatei. They are separated from another group, also called Imani, who speak the Wajokesa language and live on the headwaters of the Waffa River, by the Mount Piora massif (3700 metres). The southeastern part of the Aziana headwaters is inhabited by the Barua-Barua. They also inhabit Marawaka, Amdei and Usurampia in the Ipmayaiga River valley. The Barua are the local salt makers and the most successful agriculturalists amongst the Anga. Their salt manufacture was based on the cultivation of cane grass on the valley floors from which the salt was later extracted. Packages of Barua salt were widely used in the Eastern Highlands as trade items and bridewealth.

The Barua and the closely related Simbari practised extensive sex avoidance and institutionalized homosexuality of male initiates (Gajdusek and Alpers, 1972).

Simbari

The Simbari numbered about 2000 people in 1972 and occupy dense forest on the eastern side of the Lamari River and south of the Lamari-Vailala Divide in the Aure, Puruya and Kupbinga valleys. The Simbari describe themselves as belonging to the following groups: the Dunkwi near the Lamari River, the Muniri in the Puruya Valley, the Simbari, Malari and Yatwia of the Kupbinga and Aure drainage and the Bulakia, Iambananya and Injauinye groups on the lower Ipmayaiga River (Gajdusek and Alpers, 1972). The name Dunkwi is the name of one of the clans at Morandugai village, and the village was mistakenly named Dunkwi by government patrol officers; *moraei* is the name used by the South Fore for the inhabitants of Dunkwi. The Barua are called *kayogina* by the South Fore, which means salt people. In the Simbari language *indales* is the name used to refer to all the Anga peoples (Mbaginta'o, 1976).

Traditionally, these people were semi-nomadic and each family had a number of houses in different locations from which they tended taro gardens or hunted and trapped wild animals. They also

gathered seasonal foods from the forest. The Simbari traded with bark capes, plumes from birds of paradise, cowrie shells and yellow orchid stems.

Those groups that lived nearer the Papuan plain also cultivated red pandanus and sago. Traditionally, taro was their staple food, but recently introduced sweet potato varieties have now begun to dominate their diet (Gajdusek and Alpers, 1972).

The following ethnographic description is based on data collected from the *moraei* inhabitants of Dunkwi, from residents of Mugaiaimuti in the South Fore and from the work of Mbaginta'o (Mbaginta'o, 1976). Traditionally, there was no intermarriage between the Simbari or the Barua and their kuru-affected neighbours. There were also no cases of kuru amongst any of the Anga groups. The reason for this was simply that the Barua and Simbari did not practise transumption in their own culture, and they never participated when they were visitors in the South Fore. Some *moraei* allies of the Mugaiaimuti people who were killed in battle against the Ketabi and Kamira were eaten by their Mugaiaimuti allies, but the Simbari warriors did not participate in

the transumption of their fellow warriors. It was too far to return the bodies to Dunkwi, and the Mugaia muti people thought that transumption of their allies who died assisting them was a suitable way to honour them. The Simbari were well aware of the Fore practice of transumption, and accepted it as a Fore tradition and did not comment on it.

Beliefs in illness and death in the Simbari are different to those of the kuru-affected region: the primary causes are wild ghosts, evil spirits and the loss of one's own spirit familiars, which can be captured by evil spirits or ghosts that are manipulated by enemy shamans. The evil spirits and ghosts are cannibals who eat their victims and cause illness or death (Mbaginta'o, 1976).

After death a person's property was destroyed, as the Simbari believed that the shadows of the destroyed property would accompany the deceased into the afterlife. The deceased's gardens were destroyed for the same reason and his hunting grounds tabooed in a rite called *yabisa*. If the mortuary rituals were not performed properly the ghost would harm the family members.

The mourning was normally performed in a female relative's house which men rarely visited. The deceased's fingers were cut off, cooked in an earth oven and dried over a fire. They were then worn by close family members as relics and talismans. The body was wrapped in a bark cape, tied to a pole, and suspended above the fireplace in the mourning house, so the fluids from the body dripped onto the grieving widow who sat under it. This continued until the skin separated from the bones.

Offerings were made to the ghost of the deceased by placing food on the body to placate it. The village was totally silent except for the mourners, as it was believed that unnecessary noise would attract cannibal ghosts and spirits that would try to eat the corpse. The mourners did not sleep in the mourning house as they believed that ghosts and evil spirits would capture their spirit familiars. There were no death payments amongst the Simbari.

The sepulture was built in an abandoned garden at a distance below the village. It had to be below the village otherwise the ghost would sweep down and kill the inhabitants of the village. The site was also well away from any other recent burial sites. The sepulture

consisted of a platform built in a bamboo thicket, sugar cane grove or pandanus tree. Walls were built on the platform with sugar cane and the corpse placed inside in the sitting position with food and offerings. Weapons were placed at the entrance to the structure so their shadows could be used by the deceased's ghost to protect it from cannibal ghosts and spirits. Rituals were then performed to stop the ghost from following the mourners back to the village. The Simbari believed that if ghosts or evil spirits ate the body of the deceased, they would send pigs which contained the captured spirits of the deceased into the family's pig traps. If a pig is captured shortly after the death of a family member the pig was given to non-relatives to consume, as the family members believed they would die if they ate it.

After a man's body had been placed in the sepulture his widow was isolated in a mourning house well away from the village and remained there until her husband's body had decayed: this prevented the ghost from entering the village and harming the inhabitants. Once the process of putrefaction was completed she collected the bones and returned to the mourning house, where the bones were dried in the sun and painted with red clay. Then she

rubbed the ashes of burnt rats on the bones to complete the purification process. The widow and other close family members wore some of the bones if they chose to, and these acted as relics and talismans.

To remove the pollution of death from the widow the men went into the forest and hunted wild animals, which they brought back to the village and smoked over the fire in the men's house. They also made bullroarers which were not seen by the women and children. Early one morning the villagers went to the mourning house and took the widow to her husband's garden where she dug for sweet potatoes. The men used the bullroarers on the end of long bamboo poles and the women and children were afraid to look at them, and even if they looked they were not able to see them as they moved at such a high speed. The men continued to use the bullroarers all day driving the deceased's ghost from the village and the surrounding area as they dismantled the sepulture. A new entrance to the village was constructed and leaves with magical properties placed there to stop the ghost from entering the village once the widow had returned. The mourners then re-entered the village led by the widow. As she entered the gateway two men using axes broke

bamboo tubes as the other men used the bullroarers allowing the widow to enter the village without her husband's ghost. The ghost returned to the sepulture or departed to the land of the ancestors. The purpose of this process was to remove the pollution of the ghost from the widow. A meal consisting of the smoked carcasses of wild animals was then prepared in a steam oven. The men continued to use the bullroarers for several days afterwards to ensure the ghost was driven away (Mbaginta'o, 1976).

The bones of the deceased were wrapped in banana leaves and placed in a cave, as the family members feared sorcerers might steal the bones and use them to work sorcery against them. The land of the dead was called *kimamzanga* and was entered through a cave high up on a cliff face in the mountains. It is forbidden to climb the mountain that contains this cave.

Ankave

To the southeast of the Simbari the Ankave (Mbwei) inhabit the Suowi River valley. Traditionally, warfare accounted for many of the deaths amongst the Ankave, but *ayao* (sorcerers), *ombo*

(cannibal monsters), *pisingain awo* (forest spirits) and *pisingain siwi* (ghosts of the dead) are also held responsible.

The *ombo* are of most concern to the Ankave. They appear like ordinary people but contain a cannibal being inside them that they can direct at will. This monster can insert objects into people's bodies, cut up their intestines and block their blood vessels. They inhabit the deep forest and gather to consume the bodies of those they have killed. The *ombo* might replace a family member, and the other family members can only distinguish the difference by the red eyes and dog-like ears of the *ombo*. The *ombo* delight in collectively feasting on the rotting flesh of Ankave corpses.

When a person dies it is believed that the deceased's spirit has left the body and the family members start to mourn. They cover their bodies with mud and ashes from the fire, and tear their foreheads with their nails or cut them with bamboo knives. Traditionally, bodies were disposed of on a platform (nowadays they are buried) and a magic door made to stop the ghost from following the mourners back into the village. During the night the villagers attempt to frighten the ghost away by shouting and waving nettles

and smouldering bark-cloth. The next day the family members leave the village and camp in the forest where they construct *aziare* ornaments which are used to mark a widow in mourning. A widow will wear her husband's bark-cloth cape and orchid-stem shoulder belt. She might also wear his dried fingers and his nose plug. A widower modifies his apron by removing some layers and allows his hair to grow. Sometimes the family members prohibited consuming the deceased's favourite food or chewing of betelnut till the end of the mourning period. Following the death the mourners take great care not to anger the deceased's ghost, which remains in the vicinity. After 2-3 years a drum ceremony is organized during which the ghosts of anyone who has died during this time are sent away. Smoked eels are presented to relatives of the deceased, and the widow and other close relatives are re-dressed in new clothes marking the end of the mourning period (Bonnemère and Lemonnier, 2007).

Conclusion

In all the linguistic groups where interviews were conducted there were beliefs in the 5 souls of the deceased, a land of the dead

and a founding clan ancestor, the same concepts as those of the linguistic groups of the kuru-affected region.

The Anga are a different linguistic and cultural stock to the other groups in the Eastern Highlands. However, they had similar beliefs about souls, the land of the dead and a founding ancestor. There was no intermarriage with groups affected with kuru, and the Barua and Simbari groups did not practise transumption or exocannibalism.

The Agarabi, Gadsup and Tairora villages that bordered the Markham Valley, to the east of the kuru region, were involved in warfare with their lowland Papuan neighbours that involved exocannibalism. In light of the ethnographic descriptions exocannibalism is likely to be one of the results of warfare, rather than the primary purpose of the raids. Exocannibalism and endocannibalism were not practised by the inhabitants of Agarabi or Tairora villages away from the Markham Valley. The Gadsup practised a limited form of transumption where the decomposing fluids of leaders were consumed by the men.

The Tudawe shared many of the South Fore beliefs about transumption, which was a popular form of disposal of corpses, particularly amongst the Tudawe who lived in the Karimui area. The Mikaru were the westernmost group interviewed and they practised endocannibalism and exocannibalism.

Transumption was the dominant means of disposing of corpses in the kuru-affected region and moving northwest away from this region the practice became more restricted. Although the Asaro, Bena Bena, Siane, Gahuku, Yabiyufa and Huva practised transumption, it was mainly limited to the deaths of warriors and leaders.

Linguistic group	Soul	Simulacrum	Abilities	Harmful ghost	Occult abilities	Founding ancestor	Land of the dead
Tairora	<i>aihovainti</i>	<i>maraura</i>	<i>banataila</i>	<i>oralaka</i>	<i>kempuka</i>	<i>aukai</i>	<i>vanamaha</i>
Gadsup	<i>pukilaum</i>	<i>venhamami</i>	<i>elabainta</i>	<i>vami</i>	<i>kavam</i>	<i>titohuhi</i>	<i>wanimapa</i>
Agarabi	<i>auran</i>	<i>heheyan</i>	<i>tinafun</i>	<i>kove</i>	<i>akona</i>	<i>namubaru</i>	<i>banama</i>
Asaro	<i>sikalahu</i>	<i>vola</i>	<i>magu</i>	<i>holosa</i>	<i>hamuyave</i>	<i>manguroka</i>	<i>gotohava</i>
BenaBena	<i>sikalafui</i>	<i>meha</i>	<i>maku</i>	<i>sefui</i>	<i>seketerimo</i>	<i>kliyei</i>	<i>fienonaga</i>
Yabiyufa	<i>gepamutiya</i>	<i>holoha</i>	<i>maku</i>	<i>holoha</i>	<i>elevole</i>	<i>ludaiva</i>	<i>holohebatoka</i>
Gahuku	<i>agepamuiza</i>	<i>voguna</i>	<i>mulune</i>	<i>holosi</i>	<i>alevole</i>	<i>gohanata</i>	<i>gotoapa</i>
Siane	<i>weramura</i>	<i>weuna</i>	<i>mangu</i>	<i>orova</i>	<i>weliye</i>	<i>lanaebato</i>	<i>minovaminova</i> <i>embato</i>
Gimi-Labogai	<i>lumupa</i>	<i>aona</i>	<i>amora</i>	<i>korevana</i>	<i>athavuvana</i>	<i>neimaha</i>	<i>hinama</i>
Mikaru	<i>doyeve</i>	<i>kowa</i>	<i>navavira</i>	<i>binoma</i>	<i>widaitma</i>	<i>oiromuro</i>	<i>tova</i>
Simbari	<i>kluge</i>	<i>wakunamba</i>	<i>mungida</i>	<i>kamanda</i>	<i>amuraka</i>	<i>menule anga</i>	<i>kimamzanga</i>
Pawaian	<i>neiyaviri</i>	<i>tausano poma viri</i>	<i>neiyesa</i>	<i>noma viri</i>	<i>boma viri</i>	<i>nwea dorume</i>	<i>yamedoya</i>

Appendix G Table 1. Table of the names of the five souls of the deceased, the founding clan ancestor and the land of the dead in the languages of the linguistic groups that surround the kuru-affected region. It is important to note that variations of these words exist in some dialects within linguistic groups. Informants from the same linguistic group sometimes used different words or variations of a word. However, we were able to confirm that the above concepts of the five souls, a founding ancestor and the land of the dead existed in all the linguistic groups in this table.

Appendix H

List of interviews

Appendix H Table 1

Notes:

N/C = no cassette

PNGIMR = Papua New Guinea Institute of Medical Research

Interviews conducted by Mr Sena Anua

Interviewee number	Linguistic group	First name	Surname	Village	Clan	Sex	Age	Interviewed by	Place of interview	Date of interview	Number of tapes	Medium
1	SOUTH FORE	TIU	PEKIYEVA	AGAKAMATASA	BAIVASA	MALE	70	SENA ANUA	AGAKAMATASA	17/5/03	1	DVC
2	SOUTH FORE	ANDEMBE	KATAGO	KETABI	BAIVASA	FEMALE	58	SENA ANUA	KETABI	30/2/04	1	DVC
3	SOUTH FORE	ANNAE	YAVIS	KETABI	TAKAI	MALE	70	SENA ANUA	KETABI	24/3/04	3	AUDIO
4	SOUTH FORE	ANI	AGIGI	KETABI	KETABI	MALE	72	SENA ANUA	KETABI	26/3/04	1	AUDIO
5	SOUTH FORE	AMUKA	KATAGO	KETABI	AI	MALE	70	SENA ANUA	KETABI	27/3/04		AUDIO
	SOUTH FORE	POGASA	ANDOKAVA	KETABI	BAIVASA	MALE	67					
	SOUTH FORE	KAVAWANITA	UVAINA	KETABI	TAKAI	MALE	70					
	SOUTH FORE	UTIGI	KATAGO	KETABI	AI	MALE	53					
6	SOUTH FORE	PAUJI	KATAGO	KETABI	AI	MALE	63	SENA ANUA	KETABI	28/3/04	1	AUDIO
7	SOUTH FORE	IGANA	ALESAGU	PAIGATASA	GIMISAF	MALE	68	SENA ANUA	PNGIMR	20/4/04	2	DVC
8	SOUTH FORE	ANUE	AMANADIGI	PUROSA-TAKAI	TAKAI	MALE	78	SENA ANUA	PUROSA-TAKAI	23/4/04	1	AUDIO
9	SOUTH FORE	DALUMBO	TAVUNA	TAKAI	KARU	FEMALE	68	SENA ANUA	TAKAI	9/3/05	1	AUDIO
10	SOUTH FORE	DAIGI	AVAGUYE	TAKAI	TAKAI	MALE	52	SENA ANUA	TAKAI	5/4/05	1 (2 MISSING)	AUDIO
11	SOUTH FORE	AMUKA	KATAGO	KETABI	AI	MALE	70	SENA ANUA	KETABI	23/4/05	2	DVC
12	SOUTH FORE	TANA	WAVATI	MUGAIAMUTI	AI	MALE	48	SENA ANUA	MUGAIAMUTI	25/4/05	1	AUDIO
13	SOUTH FORE	TUVA	KAYALA	MUGAIAMUTI	BAIVASA	MALE	72	SENA ANUA	MUGAIAMUTI	25/4/05	N/C	
	SOUTH FORE	DOIYEVA	KAKINDA	MUGAIAMUTI	BAIVASA	MALE	73					
14	SOUTH FORE	TUVA	KAYALA	MUGAIAMUTI	BAIVASA	MALE	72	SENA ANUA	MUGAIAMUTI	26/4/05	3	AUDIO
	SOUTH FORE	DOIYEVA	KAKINDA	MUGAIAMUTI	BAIVASA	MALE	73					
	SOUTH FORE	IGAMBA	KULALO	MUGAIAMUTI	BAIVASA	MALE	72					
15	SOUTH FORE	TUVA	KAYALA	MUGAIAMUTI	BAIVASA	MALE	72	SENA ANUA	MUGAIAMUTI	26/4/05	2	DVC
	SOUTH FORE	DOIYEVA	KAKINDA	MUGAIAMUTI	BAIVASA	MALE	73					
16	SOUTH FORE	AMUKA	KATAGO	KETABI	AI	MALE	72	SENA ANUA	KETABI	27/4/05	N/C	
17	SOUTH FORE	AMUKA	KATAGO	KETABI	AI	MALE	70	SENA ANUA	KETABI	27/4/05	N/C	
18	SOUTH FORE	ANNAE	YAVIS	KETABI	TAKAI	MALE	70	SENA ANUA	KETABI	28/4/05	N/C	
19	SOUTH FORE	WAYOVU	BELUSE	TAKAI	TAKAI	MALE	65	SENA ANUA	TAKAI	29/4/05	2 (1 MISSING)	AUDIO
20	SOUTH FORE	MENI	AVAGUYE	TAKAI	TAKAI	MALE	75	SENA ANUA	TAKAI	5/5/05	3	AUDIO
21	SOUTH FORE	ANDEMBE	KATAGO	KETABI	BAIVASA	FEMALE	58	SENA ANUA	KETABI	27/5/05	2	AUDIO
22	NORTH FORE	KENNOL	EUNE	KASORU	WANDOGAVARASA	MALE	72	SENA ANUA	KASORU	13/10/05	2 (1 MISSING)	AUDIO
23	NORTH FORE	KENDOLI	EVINE	KASORU	WANDOGAVARASA	MALE	56	SENA ANUA	KASORU	14/10/05	2	DVC
	NORTH FORE	PAYAMBA	AMUNOVE	KASORU	WANDOGAVARASA	MALE	68					
24	NORTH FORE	ANATILO	PONA	ANUMPA	ANOTU	MALE	78	SENA ANUA	ANUMPA	15/10/05	3	DVC
	NORTH FORE	MANDEAVU	AMISA	ANUMPA	WANDOGAVARASA	MALE	68					
25	NORTH FORE	ANATILO	PONA	ANUMBA	ANOTU	MALE	78	SENA ANUA	ANUMBA	13/10/05	3	AUDIO
	NORTH FORE	MANDEAVU	AMISA	ANUMBA	WANDOGAVARASA	MALE	68					
26	NORTH FORE	AURA	PAGIRO	KASOGU	PAMIA/	MALE	72	SENA ANUA	KASOGU	15/10/05	3	AUDIO
27	NORTH FORE	ANATILO	PONA	ANUMBA	ANOTU	MALE	78	SENA ANUA	ANUMBA	16/10/05	2	AUDIO
	NORTH FORE	MANDEAVU	AMISA	ANUMBA	WANDOGAVARASA	MALE	68					
28	SOUTH FORE	TAGASA	PINAGA	MUGAIAMUTI	AI	MALE	73	SENA ANUA	MUGAIAMUTI	5/2/06	1	AUDIO
29	SOUTH FORE	TETE	KINAGAYA	AWAROSA	TAKAI	FEMALE	72	SENA ANUA	AWAROSA	6/2/06	1	DVC
30	SOUTH FORE	POGASA	ANDOKAVA	KETABI	BAIVASA	MALE	69	SENA ANUA	KETABI	9/2/06	1	DVC
31	SOUTH FORE	ASISI	ILALABE	IVINDODI	BAIVASA	FEMALE	62	SENA ANUA	ILASA	7/5/06	1	AUDIO
32	SOUTH FORE	MENI	AVAGUYE	TAKAI	TAKAI	MALE	75	SENA ANUA	POVOLARI	7/5/06	3 (3 MISSING)	AUDIO
33	SOUTH FORE	TETE	KINAGAYA	AWAROSA	TAKAI	FEMALE	79	SENA ANUA	KETABI	14/7/06	2	AUDIO
34	SOUTH FORE	ANAPE	MAVINA	AGAKAMATASA	MAIVASA	MALE	62	SENA ANUA	AWAROSA	14/7/06	1	AUDIO

Interviews conducted by Mr Pibi Auyana

35	NORTH FORE	ANATILO	PONA	ANUMPA	ANOTU	MALE	78	PIBI AUAYANA	KASORU	12/4/05	N/C	
36	NORTH FORE	ILALAVA	AMAGAYA	MAGE	ANOTU	MALE	74	PIBI AUAYANA	MAGE	13/4/05	N/C	
37	NORTH FORE	YOGAYO	PAGIRO	KASOGU	ANOTU	MALE	67	PIBI AUAYANA	KASOGU	14/4/05	N/C	
38	NORTH FORE	AUSAVI	KAWI	AWANDE	ANOTU	MALE	76	PIBI AUAYANA	AWANDE	16/4/05	N/C	
39	NORTH FORE	IGI	TAWASA	ANUMPA	AMERU	MALE	76	PIBI AUAYANA	ANUMPA	17/4/05	N/C	
	NORTH FORE	IYOSA	ISANATI	ANUMPA	AMERU	MALE	69					

Interviews conducted by Mr David Ikabala

40	SOUTH FORE	ANDEMBE	KATAGO	KETABI	BAIVASA	FEMALE	56	DAVID IKABALA	KETABI	27/2/02	1	AUDIO
41	SOUTH FORE	MASASA	ANDOKAVARA	MIARASA	OKASA	MALE	68	DAVID IKABALA	MIARASA	10/6/02	N/C	
42	SOUTH FORE	KUKUMBA	AVAENA	AGAKAMATASA	WANITAVE	MALE	68	DAVID IKABALA	AGAKAMATASA	20/6/02	1	AUDIO
43	SOUTH FORE	MINIGO	MORAE	AGAKAMATASA	WANDA/MORAE	MALE	69	DAVID IKABALA	AGAKAMATASA	21/6/02	1	AUDIO
	SOUTH FORE	PAGIRO	OREU	AGAKAMATASA	AI	MALE	72					
44	SOUTH FORE	IKABALA	IKABALA	AGAKAMATASA	AI	MALE	72	DAVID IKABALA	AGAKAMATASA	21/6/02	1	AUDIO
45	SOUTH FORE	PIKWASETA	WANIVI	AGAKAMATASA	AI	FEMALE	58	DAVID IKABALA	AGAKAMATASA	22/6/02	1	AUDIO
	SOUTH FORE	AYAKA	YOVIGA	AGAKAMATASA	KARU	FEMALE	54					
46	SOUTH FORE	ONDUKA	OMASA	IWAKI	WANDA	MALE	64	DAVID IKABALA	WANDA	28/6/02	N/C	
47	SOUTH FORE	TIU	PEKIYEVA	AWAROSA	BAIVASA	MALE	70	DAVID IKABALA	AWAROSA	29/6/02	1 (1 MISSING)	AUDIO
	SOUTH FORE	KEMO	TUSALAKO	AWAROSA	BISOSA	MALE	60					
	SOUTH FORE	BAVINA	SOLAKE	AWAROSA	AI	MALE	65					
48	SOUTH FORE	TARUBI	TAGUSE	AI	AI	MALE	66	DAVID IKABALA	AI	30/6/02	1	AUDIO
49	SOUTH FORE	ANAZO	AVARENA	MUGAIAMUTI	AI	MALE	56	DAVID IKABALA	MUGAIAMUTI	26/7/02	1	AUDIO
50	SOUTH FORE	ALEKO	KWANAMA	MUGAIAMUTI	IWAKI	MALE	69	DAVID IKABALA	IWAKI	19/1/03	1	AUDIO
51	SOUTH FORE	PATA	ANAZO	MUGAIAMUTI	WANDA	MALE	54	DAVID IKABALA	MUGAIAMUTI	28/2/04	2	AUDIO
	SOUTH FORE	AYOMA	AMANADIGI	MUGAIAMUTI	WANDA	MALE	68					
52	SOUTH FORE	TIU	PEKIYEVA	AWAROSA	BAIVASA	MALE	70	DAVID IKABALA	AWAROSA	26/11/03	N/C	
53	SOUTH FORE	AYOMA	AMANADIGI	MUGAIAMUTI	WANDA	MALE	68	DAVID IKABALA	MUGAIAMUTI	27/11/03	2	AUDIO
	SOUTH FORE	PATA	ANAZO	MUGAIAMUTI	WANDA	MALE	54					
	SOUTH FORE	TAMIYO	ANAZO	KETABI	KETABI	FEMALE	58					
54	SOUTH FORE	AYOMA	AMANADIGI	MUGAIAMUTI	WANDA	MALE	68	DAVID IKABALA	MUGAIAMUTI	29/11/03	N/C	
	SOUTH FORE	PATA	ANAZO	MUGAIAMUTI	WANDA	MALE	58					
55	SOUTH FORE	INAMBA	KIVITA	WANITABI	WANITAVE	MALE	64	DAVID IKABALA	PNGIMR	19/1/04	1	DVC
56	SOUTH FORE					MALE		DAVID IKABALA	PNGIMR	22/1/04	2	DVC
57	AUYANA	FERA	NANA	AMAIRA		MALE		DAVID IKABALA	AMAIRA	28/1/04	1	DVC
58	USURUFA	OIBO	MALIO	ILAFU		MALE	76	DAVID IKABALA	PNGIMR	30/1/04	1 (1 MISSING)	DVC
	USURUFA	YAOBI	MAI	ILAFU		MALE	84					
	USURUFA	ALIKEN	KENAW	ILAFU		MALE	44					
59	SOUTH FORE	IGANDU	DAGAYA	IVAKI	TAKAI	FEMALE	70	DAVID IKABALA	IVAKI	26/2/04	1	DVC
60	SOUTH FORE	PAUJI	KATAGO	KETABI	AI	MALE	63	DAVID IKABALA	MUGAIAMUTI	29/2/04	1	AUDIO
61	SOUTH FORE	AYOMA	AMANADIGI	MUGAIAMUTI	WANDA	MALE	68	DAVID IKABALA	MUGAIAMUTI	29/2/04	N/C	
	SOUTH FORE	PATA	ANAZO	MUGAIAMUTI	WANDA	MALE	54					
	SOUTH FORE	TAMIYO	ANAZO	KETABI	KETABI	FEMALE	54					
62	SOUTH FORE	TAMPENDO	TEU	MUGAIAMUTI	AI	MALE	66	DAVID IKABALA	AI	27/6/04	1	DVC
63	AUYANA	YASINA	KALABE	ARORA	AWANDE	MALE	78	DAVID IKABALA	MUGAIAMUTI	27/6/04	1	DVC
64	SOUTH FORE	AGAGIMO		MUGAIAMUTI	AI	MALE	67	DAVID IKABALA	MUGAIAMUTI	26/7/04	1	AUDIO
	SOUTH FORE	ASOTA		MUGAIAMUTI	WANDA	FEMALE						
65	SOUTH FORE	ALIKOKO	TUVA	MUGAIAMUTI	AI	FEMALE	65	DAVID IKABALA	MUGAIAMUTI	26/7/04	1	AUDIO
66	AUYANA	KUSHA	NANA	AMAIRA		MALE		DAVID IKABALA	AMAIRA	12/8/04	2	DVC
	AUYANA	MELTON	WAYA	AVIA		MALE						
67	SOUTH FORE	WAE	YAROFA	URAI	AI	MALE	65	DAVID IKABALA	MUGAIAMUTI	27/8/04	2	DVC
68	SOUTH FORE	GIDEON	KOKA	MUGAIAMUTI	WANDA	MALE	65					
69	SOUTH FORE	ETA	PONE	PAIGATASA	KIMISAPA	MALE	74	DAVID IKABALA	PAIGATASA	13/10/05	2	DVC
70	SOUTH FORE	AWAPARU	YAYO	PAIGATASA	UWANOSA	MALE	70	DAVID IKABALA	PAIGATASA	14/10/05	4	AUDIO
71	KEIAGANA	KOKORE	YASONA	UWAMI	HENAGARU	FEMALE	76	DAVID IKABALA	UWAMI	17/10/05	2	AUDIO
72	NORTH FORE	ANEAVU	POSAGU	OMA-KASORU	PIGYA	MALE	69	DAVID IKABALA	OMA-KASORU	10/12/05	1	AUDIO
	SOUTH FORE	ABAKA	OMATI	MUGAIAMUTI	AI	MALE	48	DAVID IKABALA	MUGAIAMUTI	26/7/06	1	AUDIO
	SOUTH FORE	DAGAYO	MINDINYE	MUGAIAMUTI	WANDA	MALE						
73	SOUTH FORE	KASIKODI	TUIMBE	ILESA	MANIVISA	FEMALE	64	JAMES KISAVA	ILESA	22/4/05	N/C	AUDIO
74	SOUTH FORE	PAPAIYO	TAGUNA	AWAROSA	MBIVASA	FEMALE	72	JAMES KISAVA	AWAROSA	22/4/05	N/C	AUDIO
75	SOUTH FORE	TAVOLA	IWI	MBISOSA	AWAROSA	MALE	67	JAMES KISAVA	AWAROSA	23/4/05	N/C	AUDIO
76	SOUTH FORE	KOKA	OMA	KAMIRA	KIGARUBAMESA	MALE	74	JAMES KISAVA	KAMIRA	24/4/05	N/C	AUDIO
77	SOUTH FORE	ATENAMOU	BAVASA	KETABI	BAIVASA	MALE	65	JAMES KISAVA	KETABI	25/4/05	N/C	AUDIO
78	SOUTH FORE	ANUE	AWAINA	PUROSA-TAKAI	TAKAI	MALE	72	JAMES KISAVA	PUROSA-TAKAI	26/4/05	N/C	AUDIO

Interviews conducted by Mr Wandagi Henry Pako

Interviewee number	Linguistic group	First name	Surname	Village	Clan	Sex	Age	Interviewed by	Place of interview	Date of interview	Number of tapes	Medium
79	SOUTH FORE	ULUMBA	TUMAUNE	PAITI	AI	MALE	63	HENRY PAKO	PAITI	13/10/05	1 (1 MISSING)	AUDIO
80	SOUTH FORE	KAIKA	KAMENO	TAKARI	AI	MALE	65	HENRY PAKO	TAKARI	14/10/05	2	AUDIO
81	SOUTH FORE	AWAYAVE	KOIYE	ASAV	KEMO	MALE	59	HENRY PAKO	GIMI	17/10/05	2	AUDIO
82	SOUTH FORE	KOIYE	TASA	EIMO	MANIA	MALE	62	HENRY PAKO	EMO	17/10/05	1	AUDIO
83	SOUTH FORE	PAVE	YARAGI	WAISA	KARU	MALE	70	HENRY PAKO	WAISA	14/1/06	3	AUDIO
84	SOUTH FORE	PAPAIYO	TAGUNA	AWAROSA	BAIVASA	MALE	72	HENRY PAKO	AWAROSA	18/1/06	3	AUDIO
85	SOUTH FORE	KARO	ASEGU	KAMATA		MALE		HENRY PAKO	KAMATA	21/1/06	3	AUDIO
86	SOUTH FORE	IGANA	ALESAGU	PAIGATASA		MALE	78	HENRY PAKO	PAIGATASA	23/1/06	2	AUDIO
87	SOUTH FORE	TOGAMBA	OBIO	WAISA	KASORU	MALE	67	HENRY PAKO	WAISA	16/7/06	3	AUDIO
88	NORTH FORE	ANATILO	PCNA	KASORU	ANOTU	MALE	81	HENRY PAKO	KASORU	30/7/06	3	AUDIO
89	NORTH FORE	IYOKAYO	PAGIRO	KASOGU	NAGAOJU	MALE	70	HENRY PAKO	KASOGU	31/7/06	2	AUDIO
90	SOUTH FORE	WANE	AMAKALO	WAISA	KASORU	MALE	56	HENRY PAKO	WAISA	24/7/07	2	AUDIO
91	SOUTH FORE	PAKO	OMBEGA	WAISA	KASORU	MALE	68	HENRY PAKO	WAISA	30/3/08	4	AUDIO
92	NORTH FORE	MANDEVU	AMAISA	ANUMPA	WANDAGAVARASA	MALE	71	HENRY PAKO	ANUMPA	16/4/08	2	AUDIO
	NORTH FORE	ANATILO	KONANO	ANUMPA	ANOTU	MALE	83					
93	AUYANA	OSAVA	TAUMA	SAPUNA	OKIFAMO	MALE	66	HENRY PAKO	PNGIMR	17/4/08	1	AUDIO
94	KEIAGANA	ESAIVA	ASOYAVU	KE'EFU	AFARU	MALE	68	HENRY PAKO	PNGIMR	18/4/08	2	AUDIO
95	KEIAGANA	YOGANO	WAIEKA	KE'EFU	AISANOFI	MALE	77					
	GIMI	ASANO	TATULA	ORARATU	MANE	MALE	52	HENRY PAKO	PNGIMR	19/4/08	1	AUDIO
96	USURUFA	SALA	SEWAGE	OSENA	WAEVISA	MALE	72	HENRY PAKO	KAINANTU	22/4/08	1	AUDIO
97	KAMANO	FUKA	WAGARINTO	GARUFI	HENEGARU	MALE	81	HENRY PAKO	KAINANTU	22/4/08	1	AUDIO
98	YAGARIA	KEVUTO	ASONE	HAGAVENA	YAMULO	MALE	73	HENRY PAKO	PNGIMR	27/4/08	1	AUDIO
99	AWA	WAREVU	YEVANA	ILAKIA		MALE	64	HENRY PAKO	WAISA	27/4/08	2	AUDIO
	AWA	MOSES	TOM	ILAKIA		MALE	46					

Interviews conducted by Mr Tusu Pako

100	SOUTH FORE	PAKO	OMBEA	WAISA	KASORU	MALE	70	TUSU PAKO	WAISA	1/7/05	2	DVC
	SOUTH FORE	TOGAMBA	OMBIO	WAISA	KASORU	MALE	60	TUSU PAKO	WAISA			
101	SOUTH FORE	KOKA	OMA	KAMIRA	KIGARUBAMESA	MALE	64	TUSU PAKO	IVINGOI	4/7/05	2	DVC
102	SOUTH FORE	KAVA	UBAINO	KETABI	AI	MALE	61	TUSU PAKO	KETABI	13/10/05	N/C	
103	SOUTH FORE	WAYAGA	YALITA	IVAKI	KARU	MALE	64	TUSU PAKO	IVAKI	14/10/05	2	DVC
	SOUTH FORE	AMAO	KATA	IVAKI	KARU	MALE	53					
104	SOUTH FORE	KILANDO	AMANDAGA	UMASA	TAKAI	MALE	69	TUSU PAKO	UMASA	15/10/05	3	DVC
105	SOUTH FORE	WAIKA	AMANAPU	YAGAREBA	WANITAVE	MALE	64	TUSU PAKO	YAGAREBA	18/10/05	2	AUDIO
106	SOUTH FORE	AMASA	TETEWASO	WAISA	KASORU	FEMALE	68	TUSU PAKO	WAISA	19/10/05	1	AUDIO

Interviews conducted by Mr Jerome Whitfield

107	SOUTH FORE	PAPANI	AGAYA	WAISA	KASORU	MALE	68	JEROME WHITFIELD	WAISA	6/8/98	N/C	
108	SOUTH FORE	YOMIE	NONITA	MENDILASA	KARU	MALE	68	JEROME WHITFIELD	WAISA	11/8/98	N/C	
109	SOUTH FORE	EVOY	YEGAVARA	WAISA	KASORU	MALE	63	JEROME WHITFIELD	WAISA	12/8/98	N/C	
110	SOUTH FORE	ATENAMU	BAVASA	KETABI	BAIVASA	MALE	65	JEROME WHITFIELD	KETABI	12/8/98	N/C	
111	SOUTH FORE	PAKO	OMBEA	WAISA	KASORU	MALE	55	JEROME WHITFIELD	WAISA	14/8/98	N/C	
112	SOUTH FORE	TUNVA	KAYALA	MUGAJAMUTI	BAIVASA	MALE	72	JEROME WHITFIELD	MUGAJAMUTI	18/8/98	N/C	
113	SOUTH FORE	AGIRE	ANDOKAVA	KETABI	BAIVASA	FEMALE	72	JEROME WHITFIELD	KETABI	20/8/98	N/C	
114	SOUTH FORE	ANIMO	KAGUYA	YAGAREBA	PAMIYA	MALE	69	JEROME WHITFIELD	YAGAREBA	11/1/03	N/C	
115	KAMANO	KARISO	BOONE	HENGANOFI		MALE	80	JEROME WHITFIELD	GOROKA	18/4/03	1	DVC
116	KANITE	WAKIGAMO	HAGA	KIMIGOMO		MALE	60	JEROME WHITFIELD	GOROKA	26/6/03	6	DVC
	KANITE	TOFUNAMA	YASIANO	KIMIGOMO		MALE	72					
	KANITE	MOYKA	MAGUEVE	KIMIGOMO		MALE	51					
117	KANITE	STONI	JASIFANE	KOKOPI		MALE	60	JEROME WHITFIELD	PNGIMR	7/7/03	3	DVC
	KANITE	ESO	DOMLISO	KOKOPI		MALE	50					
	KANITE	NAO	ALENA	KOKOPI		MALE	66					
	KANITE	THOMAS	ASEWO	KOKOPI		MALE	52					
118	KEIAGANA	AVONAGA	ASOGOWA	KE'EFU	AFARU	MALE	69	JEROME WHITFIELD	PNGIMR	22/7/03	5	DVC
	KEIAGANA	MAGA	ENRO	KE'EFU	AFARU	MALE	74					
	KEIAGANA	NIGIYA	ASEWO	KE'EFU	AFARU	MALE	55					
119	YAGARIA	KEVOTO	AGONE	HAGAVENA	YAMULO	FEMALE	68	JEROME WHITFIELD	PNGIMR	23/7/03	3	DVC
	YAGARIA	AGOVINTO	ANEMAMA	HAGAVENA	YAMULO	FEMALE	65					
	YAGARIA	IWORO	APEYAWA	HAGAVENA	YAMULO	FEMALE	83					
120	GIMI	KAPARA	PA'A	FUSA		MALE	65	JEROME WHITFIELD	PNGIMR	5/8/03	2	DVC
	GIMI	TERRY	PAYASILU	KETEVE		MALE	47					
121	TUDAWA	NORE	OAE	HAIA	JENE PAU	MALE	69	JEROME WHITFIELD	HAIA	9/8/03	7	DVC
	TUDAWA	PERIAI	TAIPE	HAIA		MALE	72					
	TUDAWA	TULAI	IARIVE	HAIA		MALE	73					
122	MORAI	DAGAYO	SOSO	DUNGWI	AVIYRAO	MALE	52	JEROME WHITFIELD	PNGIMR	12/8/03	2	DVC
	MORAI	WILLIAM	MINDINYE	DUNGWI	AVIYRAO	MALE	23					
	MORAI	YARAO	YARAO	DUNGWI	AVIYRAO	MALE	56					
	MORAI	JIM	MINDINYE	DUNGWI	AVIYRAO	MALE	28				1	DVC
123	LABOGAI	RUBEN	GENE	LUFU/ STATION		MALE	32	JEROME WHITFIELD	PNGIMR	12/8/03	3	DVC
	LABOGAI	GENE	ELAMOTO	LUFU/ STATION		MALE	71					
	LABOGAI	SEVE	LEPA	LUFU/ STATION		MALE	82					
	LABOGAI	AMAMU	GENE	LUFU/ STATION		FEMALE	62					
124	TAIRORA	ARU	BIBI	BONTA	FOREO	MALE	67	JEROME WHITFIELD	BONTA	10/11/03	2	DVC
	TAIRORA	KORAU	KOKI	BONTA	WANTURU	MALE	69					
	TAIRORA	ARU	BINABU	BONTA	WANTURU	MALE	61					
125	AGARABI	MAKO	INTAMA	BIKUMPIMPA		MALE	66	JEROME WHITFIELD	PNGIMR	13/11/03	1	DVC
	AGARABI	KOMA	KUNGEE	BIKUMPIMPA		MALE	64					
	AGARABI	MORGAN	YOYUPI	BIKUMPIMPA		MALE	59					
126	GIMI	ASI	HOWA	ORADATU	AMORESUS	MALE	62	JEROME WHITFIELD	PNGIMR	24/11/03	2	AUDIO
	GIMI	ATAENU	ALEDIMO	ORADATU	AMORESUS	MALE	65					
	GIMI	BATA	NARUKE	ORADATU	HOGURU	MALE	50					
	GIMI	JESSIE	ANE	ORADATU	HOGURU	MALE	32					
127	MIKARU	HEKGO	MASU	KARAMUI		MALE	72	JEROME WHITFIELD	KARAMUI	10/12/03	2	DVC
	MIKARU	ULIZI	WAGE	KARAMUI		MALE	73					
128	TUDAWA	YAPE	NOKOUWE	VENIO		MALE	71	JEROME WHITFIELD	DARIBI	11/12/03	2	DVC
129	YABIYUFA	LOUWARI	ENAGABA	ORUMBA		MALE	66	JEROME WHITFIELD	PNGIMR	16/12/03	3	DVC
	YABIYUFA	MOIYE	ASI	ORUMBA		MALE	66					
	YABIYUFA	KILIMAI	AENA	WANDO		MALE	67					
	YABIYUFA	LASAI	NOKOUWE	WANDO		FEMALE	64					
130	GAHUKU	HIIZAMUTI	OTE	ASAROUFA		MALE	83	JEROME WHITFIELD	GAHUKU	17/12/03	1	DVC
131	SIANE							JEROME WHITFIELD	ASARO	17/12/03		
132	SIANE	AGNES	YAMBUM	KAUMBA	YEMOFOYE	FEMALE	60	JEROME WHITFIELD	PNGIMR	17/12/03	1	DVC
133	GADSLUP	ORAMI	ANUME	AIYURA	PUNDAYOPA	MALE	92	JEROME WHITFIELD		8/1/04	1	DVC
	GADSLUP	JOHN	ORAMI	AIYURA	PUNDAYOPA	MALE	65					
	GADSLUP	YARU	APAPA	AIYURA	PUNDAYOPA	MALE	66					
	GADSLUP	URAMA	AKYA	AIYURA	PUNDAYOPA	MALE	53					
134	ASARO	KONISIMO	BALE	ASARO		MALE	80	JEROME WHITFIELD	ASARO	9/1/04		
135	GIMI	KOIYE	TASA	EMO	MANURU	MALE	54	JEROME WHITFIELD	PNGIMR	14/1/04	1	DVC
	GIMI	ANUMU	KORTUNO	EMO	MANERU	MALE	49					
	GIMI	TAION	KORTUNO	EMO	MANERU	MALE	49					
136	SOUTH FORE	ULUMBA	UMAU	PAITI	KETABI	MALE	62	JEROME WHITFIELD	PNGIMR	14/1/04	2	DVC
137	AWA	WABENASI	NONGIRI	MOBUTASA		MALE	45	JEROME WHITFIELD	PNGIMR	14/1/04	1	DVC
	AWA	TOWALIYA	MOTO	MOBUTASA		MALE	68					
	AWA	MARTI	TOWALIA	MOBUTASA		MALE	32					
138	KAMANO	ATOMBE	INONGKA	INONGKA	KEMAU	MALE	72	JEROME WHITFIELD	PNGIMR	18/1/04	3	DVC
	KAMANO	ASANE	FAZOPA	INONGKA	KEMAU	MALE	55					
	KAMANO	HONA	LAVATI	INONGKA	KEMAU	MALE	69					
139	GIMI	ISSAC	ASAKE	FUSAH	BEHA	MALE	61	JEROME WHITFIELD	PNGIMR	21/1/04	2	DVC
	GIMI	LOWARI	ASAKE	FUSAH	BEHA	MALE	39					

Interviews conducted by Mr Jerome Whitfield

Interviewee number	Linguistic group	First name	Surname	Village	Clan	Sex	Age	Interviewed by	Place of interview	Date of interview	Number of tapes	Medium
140	NORTH FORE	NANO	ITE	AWANDE	PAKINASA	MALE	44	JEROME WHITFIELD	PNGIMR	21/1/04	2	DVC
	NORTH FORE	CONNEY	AGOB	AWANDE	KEAKASA	MALE	61					
	NORTH FORE	OUSEVI	KOUWEI	AWANDE	KEAKASA	MALE	75					
141	SOUTH FORE	UWARA	UGUMBE	AGAKAMATASA	BAIVASA	MALE	62	JEROME WHITFIELD	PNGIMR	22/1/04	1 (2 MISSING)	DVC
142	SIANE			GUMIA		MALE	73	JEROME WHITFIELD	GUMIA	23/1/04	1	DVC
143	AUYANA	ATU	AVIRO	ASEMPA	AWA	MALE	59	JEROME WHITFIELD	PNGIMR	26/1/04	1	DVC
	AUYANA	MIKE	PARA	ASEMPA	AUYANA	MALE	58					
144	SIANE	KUNDI	JULIUS	FOE LUBUYUFA	ARANGO	MALE	86	JEROME WHITFIELD	SIANE	26/1/04	1	DVC
145	MORAI	MOSES	BALI	MALARI	AVIARAO/ AI	MALE	65	JEROME WHITFIELD	PNGIMR	28/1/04	2	DVC
146	USURUFA	YALVI	MAI	ILAFO		MALE	52	JEROME WHITFIELD	PNGIMR	30/1/04	2	DVC
	USURUFA	OIBO	MALIO	ILAFO		MALE	76					
	USURUFA	ALIKEN	KENAI	ILAFO		MALE	28					
147	KEAGANA	LAMANA	KEVANI	UWAMI	YANAGARU	MALE	48	JEROME WHITFIELD		1/7/04	2 (1 MISSING)	DVC
	KEAGANA	TIVYOKO	MANI	UWAMI	AVIYATA	MALE	65					
	KEAGANA	WAYAFA	ALAVEGU	UWAMI	AVIYATA	MALE	57					
148	BENA BENA	MOJAREKU	KINIYABA	BATAUSHA	MINJAGABO	MALE	74	JEROME WHITFIELD	PNGIMR	1/7/04	2	DVC
	BENA BENA	SAOFINA	AMAMISUHAFO	BATAUSHA	MINJAGABO	MALE	74					
	BENA BENA	CHARLIE	FIYA	BATAUSHA	MINJAGABO	MALE	34					
149	KAMANO	FURIAVO	JHAU	HENGANOFI		MALE		JEROME WHITFIELD	PNGIMR	17/7/04	2	DVC
	KAMANO	PIKIA	NAVIZA	HENGANOFI		MALE						
	KAMANO	IGAO	NESAO	ISEVI		MALE						
150	ASARO	WABENASI	NONGIRI	LUHUKU		MALE	45	JEROME WHITFIELD	ASARO	1/9/04	1	DVC
	ASARO	TOWALIYA	MATO	LUHUKU		MALE	86					
	ASARO	MARTI	TOWALIYA	LUHUKU		MALE	32					
151	SOUTH FORE	ATENUMU	BAVASA	KETABI	BAIVASA	MALE	65	JEROME WHITFIELD	KETABI	13/7/06	5	AUDIO
	SOUTH FORE	KAVAWANITA	UVAINA	KETABI	TAKAI	MALE	65					
	SOUTH FORE	UTIGI	KATAGO	KETABI	AI	MALE	58					
	SOUTH FORE	AMUKA	KATAGO	KETABI	AI	MALE	65					
152	SOUTH FORE	UTIGI	KATAGO	KETABI	AI	MALE	56	JEROME WHITFIELD	KETABI	20/9/06	51	AUDIO
	SOUTH FORE	PAULI	KATAGO	KETABI	AI	MALE	65					
	SOUTH FORE	ATENAMOU	BAVASA	KETABI	BAIVASA	MALE	65					
	SOUTH FORE	KAVAWANITA	UWAINA	KETABI	TAKAI	MALE	62					
	SOUTH FORE	KASAM	UVINDI	KETABI	BAIVASA	MALE	60					
153	SOUTH FORE	AEVEYA	IGAMA	WAISA	KASORU	FEMALE	55	JEROME WHITFIELD	WAISA	31/10/06	7	AUDIO
	SOUTH FORE	KAINAMBA	MABAGE	WAISA	KASORU	FEMALE	59					
	SOUTH FORE	YENDA	YARAGI	WAISA	KARU	FEMALE	57					
	SOUTH FORE	AMASA	TETEWASO	WAISA	KASORU	FEMALE	68					
154	YATE	EKESO	SOREPA	ULELE	KESOSEPA	MALE	80	JEROME WHITFIELD	PNGIMR	15/2/07	6	DVC
	YATE	SARANOGO	HUFAYAVEPA	ULELE		FEMALE	82			15/2/07		
155	NORTH FORE	ANATILLO	PONA	ANUMBA	ANOTU	MALE	82	JEROME WHITFIELD	ANUMBA	7/5/07	2	AUDIO
	NORTH FORE	ANUTOI	OVE	ANUMBA	ANOTU	FEMALE	72			7/5/07		
	NORTH FORE	NORI	TAVUNAGA	ANUMBA	AWELU	FEMALE	70			7/5/07		
	NORTH FORE	MONO	TOSE	ANUMBA	ANOTU	FEMALE	77			7/5/07		
	NORTH FORE	KASINADA	TAGINDO	ANUMBA	AWELU	FEMALE	77			7/5/07		
156	SOUTH FORE	AEVEYA	IGAMA	WAISA	KASORU	FEMALE	55	JEROME WHITFIELD	WAISA	30/6/07	26	AUDIO
	SOUTH FORE	KAINAMBA	MABAGE	WAISA	KASORU	FEMALE	59			30/6/07		
	SOUTH FORE	YENDA	YARAGI	WAISA	KARU	FEMALE	57			30/6/07		
	SOUTH FORE	AMASA	TETEWASO	WAISA	KASORU	FEMALE	68			30/6/07		
157	NORTH FORE	YOMA	SUKATI	AWANDE	TATAKU	FEMALE	75	JEROME WHITFIELD	AWANDE	6/7/07	1	AUDIO
	NORTH FORE	OMI	MOVESO	AWANDE	TETELU	FEMALE	71			6/7/07		
	NORTH FORE	PATO	ASI	AWANDE	HOGATERU	FEMALE	72			6/7/07		
158	SOUTH FORE	UTIGI	KATAGO	KETABI	AI	MALE	56	JEROME WHITFIELD	KETABI	17/7/07	20	AUDIO
	SOUTH FORE	ATENAMOU	BAVASA	KETABI	BAIVASA	MALE	65			17/7/07		
	SOUTH FORE	KAVAWANITA	UWAINA	KETABI	TAKAI	MALE	62			17/7/07		
	SOUTH FORE	ANDEMBA	KATAGO	KETABI	BAIVASA	FEMALE	63			17/7/07		
	SOUTH FORE	EA	ATEMAMOU	KETABI	BAIVASA	FEMALE	68			17/7/07		
159	KAMANO	WAGALINSO	NAMAMUSO	GARUFI	MUSANOFI	MALE	80	JEROME WHITFIELD	PNGIMR	21/2/07	8	DVC
160	GIMI	WIYO	ISELEPANO	ORARATU	AMORO	MALE	75	JEROME WHITFIELD	PNGIMR	1/2/08	9	AUDIO
	GIMI	YOVELU	AHILATA	ORARATU	UWADAMAU	MALE	77			1/2/08		
	GIMI	SANO	TATULA	ORARATU	MANE	MALE	52			1/2/08		
	GIMI	JESSIE	ANE	ORARATU	AMORESU	MALE	42			1/2/08		
161	KEIAGANA	KARUPI	ANOTARA	KE'EFU	ANUPAYOFI	MALE	75	JEROME WHITFIELD	PNGIMR	1/2/08	10	AUDIO
	KEIAGANA	JOGAMO	WAIKA	KE'EFU	AISANOFI	MALE	77			1/2/08		
	KEIAGANA	NIMIGEGE	VEGATA	KE'EFU	HAFALU	FEMALE	70			1/2/08		
	KEIAGANA	KAVATO	YARIMA	KE'EFU	HAFALU	FEMALE	66			1/2/08		
162	NORTH FORE	SONUKA	AKANAGA	ANUMPA	AWERU	MALE	55	JEROME WHITFIELD	PNGIMR	12/2/08	11	AUDIO
	NORTH FORE	MANDEVU	AMASIA	ANUMPA	AWERU	MALE	67			12/2/08		
	NORTH FORE	EKA	WANDO	ANUMPA	ANOTU	MALE	72			12/2/08		
	NORTH FORE	IVO	WEMPLALA	KASORU	AKAPISALU	MALE	70			12/2/08		
	NORTH FORE	ANO	PERUNDE	ANUMPA	AWERU	FEMALE	67			12/2/08		
	NORTH FORE	NORISINA	TUVANAGA	ANUMPA	AWERU	FEMALE	75			12/2/08		
	NORTH FORE	MOHO	TOSE	ANUMPA	WAKOLI	FEMALE	77			12/2/08		
163	AUYANA	KALAVE	YANSINA	ARORA	NANGONA	MALE	71	JEROME WHITFIELD	PNGIMR	17/2/08	2	AUDIO
164	YATE	OSAN	FONO	ULELE	MOKA	MALE	75	JEROME WHITFIELD	PNGIMR	26/2/08	6	AUDIO
	YATE	HAKI	HAFOSAVE	ULELE	LAFU	FEMALE	71			26/2/08		
	YATE	KAROVO	HUFAYAVEPA	ULELE	KIMI	FEMALE	75			26/2/08		
	YATE	ANDREW	EKESO	ULELE	HAYONOFI	MALE	47			26/2/08		
165	SOUTH FORE			WAISA				JEROME WHITFIELD	WAISA	1/3/08	3	AUDIO
166	USURUFA	SALA	SEWAGE	OSENA	WAEVISA	MALE	72	JEROME WHITFIELD	PNGIMR	1/3/08	8	AUDIO
167	YAGARIA	AKO	VEDI	DAGINAVA	ODOFA	FEMALE	70	JEROME WHITFIELD	PNGIMR	3/3/08	9	AUDIO
	YAGARIA	KUYAIVE	KAME	DAGINAVA	HAEROGA	MALE	68			3/3/08		
	YAGARIA	DEKE	KARAMAUSE	DAGINAVA	HAEROGA	MALE	67			3/3/08		
	YAGARIA	YAVIMO	AVUNDI	DAGINAVA	HAEROGA	MALE	70			3/3/08		
	YAGARIA	GEORGE	YARIKO	DAGINAVA	HAEROGA	MALE	36			3/3/08		
168	KANITE	AVAGU	HANTAGANEFA	KOKOPI	KIGI	MALE	68	JEROME WHITFIELD	PNGIMR	7/3/08	9	AUDIO
	KANITE	ASENO	KALABEYA	KOKOPI	KIGI	MALE	70			7/3/08		AUDIO
	KANITE	KERO	SEMAI	KIMIGOMO	KIGOMPA	MALE	68			7/3/08		AUDIO
	KANITE	MANU	ATENI	KIMIGOMO	KIGOMPA	MALE	70			7/3/08		AUDIO
169	KAMANO	WAGALINSO	NAMAMUSO	GARUFI	MUSANOFI	MALE	81	JEROME WHITFIELD	KAINANTU	11/3/08	3	AUDIO
170	AWA	WAREBO	YABALE	YAKIA		MALE	47	JEROME WHITFIELD	WAISA	14/3/08	3	AUDIO
171	YATE	EKESO	SOREPA	ULELE	KESOSEPA	MALE	80	JEROME WHITFIELD	PNGIMR	17/3/08	2	AUDIO

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