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GM CROPS: PATENTLY WRONG?

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ABSTRACT. This paper focuses on the ethical justifiability of patents on Genetically Modified (GM) crops. I argue that there are three distinguishing features of GM crops that make it unethical to grant patents on GM crops, even if we assume that the patent system is in general justified. The first half of the paper critiques David Resnik's recent arguments in favor of patents on GM crops. Resnik argues that we should take a consequentialist approach to the issue, and that the best way to do so is to apply the Precautionary Principle, and that the Precautionary Principle, in this case, supports patents on GM crops. I argue that his argument in favor of a consequentialist treatment is invalid; his Precautionary Principle in any case looks to be incompatible with consequentialism; and his conception of reasonable precautions is too ill-defined to have any argumentative purchase. In the second half of the paper I argue against GM crop patents, on three grounds. First, there is insufficient evidence to say whether allowing patents on GM crops will make research go faster than not having patents, whilst there is a good reason to think that, other things being equal, a society that allows patents on GM crops will be less just than one that does not. Second, even assuming that patents on GM crops will increase the pace of GM crop research, there is no social need to do so. Third, patents on GM crops will frequently have ethically unacceptable side effects.

KEYWORDS: Intellectual Property; GM crops; Precautionary Principle; consequentialism; tragedy of the anticommons

1. INTRODUCTION

Much has been written about broad question of the ethical justifiability of genetically modified (GM) crops.[1] This paper focuses on the narrower question of the ethical justifiability of *patents* on GM crops. This narrower question will be ethically pressing only if two assumptions hold. The first assumption is that GM crops are, considered in terms of their *intrinsic qualities*, morally permissible; for if the very process of genetic modification were wrong irrespective of its consequences, there would be little to be gained by inquiring whether we should allow patents on such processes. The second assumption is that the patent system in general is justified: for if patents in general are unjustified, there would be little point in enquiring whether patents on GM crops (which are clearly more ethically problematic than patents on, say, chairs or workbenches) are justified.[2]

So in what follows, I shall assume that the process of genetic modification is not intrinsically wrong, and that insofar as GM crops present ethical challenges for us, they do so for reasons that are *extrinsic* to the process of genetic modification – reasons hence that are inseparable from the effects that such crops may have. I shall argue that there are special features of GM crops tha6 make it appropriate not to grant patents on GM crops, even if we think that the patent system is in general justified.[3]

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1 See for example Nuffield, 1999, and Food Ethics Council, 1999.

2 If either, or both, of these assumptions were *not* to hold, then the question would still be worth asking, but would not be as pressing. For even if GM crops were intrinsically wrong, it would still be a live question as to whether patents should be prohibited, given that some argue that it is inappropriate to include a morals clause in patent law. And even if the patent system were not in general justified, it would still be debatable whether, given that we allow patents on other items, it would be fair or unfair to withhold patents on GM crops. Thanks to an anonymous referee for pressing me on this point.

3 I shall here assume that the patent system is justified on grounds of social utility, rather than, for example, fairness or natural rights. It is in difficult in general to give a natural rights or fairness based justification for Intellectual Property Restrictions (Hettinger, 1989, Wilson, forthcoming), and the difficulties in the case of patents are greater than for any other kind of Intellectual Property. This is because patents interfere more with the freedom of action of others than do other forms of Intellectual Property. For instance, copyright merely prevents the *copying* of the expression of ideas in a work: the same or similar expression of ideas does not infringe the copyright if it is uninfluenced by the original work. However, lack of influence by the material contained in a given patent claim is no defence against a charge of patent infringement. But it is hard to see how any plausible conception of either fairness or natural rights could entail that such unknowing patent infringements are wrong. (Pogge, 2006) Hence mainstream accounts of the moral basis for patents tend to appeal only to their social utility.

Assuming that the justification for patents is social utility, the patent system in general will be justified

It is important to remember from the outset that there are already various categories of inventions that are excluded from counting as patentable subject matter in most states. First, inventions that are not technical in nature are excluded (you cannot patent a scientific theory or a new method of taking a penalty kick); second, inventions that are immoral or contrary to public order are excluded (for instance, in the UK you cannot patent landmines, since the Landmines Act 1998[4]); third, methods of surgical and veterinary treatment are excluded in many countries;[5] and fourth, some countries have taken advantage of Article 27.3(b) of the Trade Related Aspects of International Property (TRIPS) Agreement to exclude patents on animals other than micro-organisms.[6]

In each of these categories of cases, we can see fairly obvious reasons why excluding such items from counting as patentable subject matter is thought to be better for society. Scientific theories are excluded from patentability because they are the basic tools by which we construct new knowledge. Scientific progress requires the ability to use this knowledge unencumbered by the need to purchase licenses, and so allowing patents on scientific theories would seriously hamper scientific progress.[7]

Immoral inventions and inventions contrary to public order are excluded because of the social function that the patent system aims to fulfill: patents are rewards that we hand out to the inventors of useful new items, on the assumption that providing such rewards will give an effective incentive to ensure that an adequate number of such inventions are produced. But where an invention is such as to cause public outrage, many feel

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only if the cost/benefit ratio for patents is better than any other alternative system for securing an adequate supply of useful new inventions. It is by no means obvious that this is in fact the case: we simply lack the relevant data that would allow us to make such comparisons. (Svatos, 1996) For a systematic overview of the different options in encouraging innovation, see Scotchmer, 2004.

4 See UK Patent Office (2006), comments to Section 1(3) and 1(4). TRIPS article 27(2) allows, but does not require signatories to have a morality clause in their patent legislation: "Members may exclude from patentability inventions, the prevention within their territory of the commercial exploitation of which is necessary to protect ordre public or morality, including to protect human, animal or plant life or health or to avoid serious prejudice to the environment, provided that such exclusion is not made merely because the exploitation is prohibited by their law."

5 In some other jurisdictions (notably the US), it is possible to obtain these patents, but you cannot sue for infringement on such methods. For more on patents on medical treatments, see Piper, 2003.

6 TRIPS 27.3(b) states that members may exclude from patentability "plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, Members shall provide for the protection of plant varieties either by patents or by an effective sui generis system or by any combination thereof." The article has given rise to a large body of literature: see Tansey, 1999 for an overview of the relevant issues.

7 I put forward an interpretation of why we do not allow patents on athletic manoeuvres in section 3.1.

uncomfortable with the idea of the patent system rewarding people who produce such items.[8]

Patents on surgical and veterinary treatments would allow the holder of the patent to prevent all others from using the treatment; but it seems wrong to many to prevent skilled professionals from freely using a technique that could save lives or prevent suffering.[9] And, lastly, patents seem to some to imply that the patent holder is entitled to a form of ownership over the patented item because it is his or her invention; but many have moral qualms about thinking of human beings as inventors or "authors" of living organisms in this sense.[10]

Resnik (2004) has recently addressed the topic of patents on GM crops at length, reaching the conclusion that we should allow such patents, subject to various ethical safeguards. The next section dissects the argument Resnik puts forward, and shows it to be invalid. In section 3, I argue against GM crop patents on three grounds. First, there is insufficient evidence to say whether allowing patents on GM crops will make research go faster than not having patents, whilst there is a good reason to think that, other things being equal, a society that allows patents on GM crops will be less just than one that does not. Second, even assuming that patents on GM crops will increase the pace of GM crop research, there is no social need to do so. Third, patents on GM crops will frequently have ethically unacceptable side effects.

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[8] There are clear difficulties with getting patent examiners to judge on whether individual patents are contrary to public order or morality. For in a pluralistic society, we can expect there to be deep differences of opinion about whether a particular invention (say, an abortifacient) *is* contrary to public order or morality. If the patent examiner were expected to make these choices, then it would be difficult to avoid charges of arbitrariness and illiberality. So in practice in most jurisdictions, patent examiners have been unwilling to apply the morals clause except in certain very clearly defined cases. For example, the UK patent examination guidelines suggest that the morals clause should only be applied where there is both a clear legislative intent that inventions of a certain kind should be outlawed on moral grounds, and where the invention clearly is of this kind. (UK Patent Office, 2006)

[9] There is an interesting apparent inconsistency here: patents on pharmaceuticals seem to raise exactly the same ethical worries of denying people access to lifesaving treatments. So if the arguments for excluding patents on methods of surgical and veterinary treatment are sound, then they should also rule out patents on pharmaceuticals; similarly if the arguments for allowing patents on pharmaceuticals are sound, then they should also show that patents on surgical techniques are legitimate. (Such inconsistencies provide us with a useful reminder not to take what is legally permissible too seriously as a guide to what is morally permissible).

[10] This understanding of patents has been disputed by the Biotech industry, which argues that we should think of patents as solely economic instruments: according to this way of thinking, granting a patent on an organism does not imply either that the patent holder *owns* the organism patented, or that the patent holder is the "author" of the life form. For more on this debate, see Sagoff (2002)

2. RESNIK'S ARGUMENT FOR PATENTS ON GM CROPS

Resnik's argument in favor of patents on GM crops follows three stages. The first stage aims to show that we should use consequentialist moral reasoning to decide whether to allow patents on GM crops. The second stage argues that the appropriate way to apply consequentialist moral reasoning under conditions of uncertainty (as we have in the case of patents on GM crops) is to apply the Precautionary Principle, which Resnik understands to be a matter of taking reasonable precautions to avoid plausible threats. The third stage argues that taking reasonable precautions to avoid the plausible threats posed by GM crops requires us merely to regulate the scope of such patents, and that not granting patents at all on GM crops would be *unreasonable* in view of the of the degree of threat GM crops pose.

I argue that each stage of Resnik's argument is flawed. The first stage makes two mistakes in moral theory. First, it wrongly equates deontological moral reasons with absolute reasons – that is, reasons to think that actions or policies are right or wrong *quite irrespective of their consequences.* However, while it is true that all absolute moral reasons are rightly characterized as deontological, it is not true that all deontological moral reasons are absolute. Hence it does not follow from the absence of absolute moral reasons either for or against patents on GM crops that there are no deontological moral reasons for or against them. Second, Resnik falsely assumes that moral reasons will be either absolute or consequentialist, and thus reasons fallaciously that *given* the lack of absolute moral reasons, the morality of patents on GM crops must turn *solely* on consequentialist grounds.

I argue that the Precautionary Principle, as Resnik envisages it, is not sufficiently determinate to allow us to decide whether we should grant patents on GM crops or not; and given this, his third stage, in which he attempts to argue that allowing patents on GM crops is a more reasonably precautionary approach than not doing so, is unconvincing.

2.1. Two mistakes in moral theory

Resnik defines deontological approaches to morality in a way that presupposes that only what I have just described as *absolute* moral reasons count as deontological: "Nonconsequentialist (or deontological) approaches... hold that the morality of an action or policy does not depend on its consequences: an action is by its nature, moral or immoral, just or unjust". (2004, p. 9) This is at best a rather contentious way of drawing the distinction between deontological and nondeontological accounts of morality. There are a variety of other ways of drawing this distinction in the literature.[11] While it would not be appropriate for me to attempt to defend a particular version of this distinction here, I would like to suggest two reasons why we should not adopt an account of deontology that makes deontology synonymous with moral absolutism, and then go on to show that by adopting this understanding of deontology, Resnik, in fact, commits himself to an incoherent account of moral reasoning.

First, other things being equal, it is undesirable to adopt a conceptual analysis that is close enough to the pre-existing extension of a concept to count as an elucidation of that concept. However, Resnik's account cannot plausibly be thought to do this. For his account excludes some thinkers who are generally regarded as paradigmatic cases of deontologists (e.g., Ross, Rawls, Nagel, Judith Jarvis Thomson).[12]

Second, absolutists face problems in accounting for the possibility of the kinds of conflicts of moral duties that we do in fact seem to face. Moral absolutists are committed to the claim that moral principles *cannot* lead to conflicting duties in actual circumstances. And so absolutists can make no room for the possibility of justified infringement of moral principles. But as Thomson (1990) argues, it is difficult to make sense of some of our most secure moral intuitions unless we allow the possibility of conflicts of duties.[13]

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[11] In the most exhaustive survey of this topic to date, Gaus (2001a, 2001b) considers ten separate ways of drawing the distinction between deontological and nondeontological moral theories. A commitment to absolute moral principles is only one of these ten ways, which he considers briefly "before turning to more promising approaches" (2001a, p. 31).

[12] For example, Rawls's account of deontology flatly denies that deontological accounts must think that the rightness of an action is independent of its consequences: "It should be noted that deontological theories are defined as non-teleological [i.e., non consequentialist] ones, not as views that characterize the rightness of institutions and acts independently from their consequences. All ethical doctrines worth our attention take consequences into account. One which did not would be irrational, crazy." (1999, p. 26)

[13] Suppose I have made a promise to meet John for lunch, but have to stop an emergency on the way and

But more seriously for Resnik's argument, defining deontology in this absolutist way leads him to advocate an account of moral reasoning that is incoherent. Resnik describes Ross and Rawls as well as himself as holding a "hybrid approach" that holds that "one needs to balance consequentialist and deontological concerns in determining how one should act". (p. 9) This is false as an interpretation of Rawls and of Ross: neither consider moral reasoning to require the balancing of absolute moral claims against the attempt to bring about the best consequences. But worse, it is simply incorrect to think that we can *balance* absolute principles against consequences. A moral principle is either absolute or it is not: if it is absolute, then it remains wrong to break it, regardless of the consequences. If it is not absolute, then it fails to count as deontological on Resnik's account. Either way there there is no room for balancing.[14]

This matters for our purposes for two reasons. First, defining deontological moral thinking in terms of a commitment to absolute moral principles cuts down the range of reasons either for or against patents on GM crops that could count as deontological. For example, if we used Rawls's criterion for what counts as deontological, then it would be plausible to argue that there are deontological reasons of fairness to allow farmers to save their seed. But it is much less plausible to think that there could be an absolute moral requirement to allow us to do so, which held regardless of the consequences of so doing.

Second, Resnik assumes that moral reasons must be either deontological or consequentialist; [15] and hence he concludes that if there are no concerns that are genuinely deontological in his sense about patents on GM crops, then any genuine concerns that there are must be concerns that are based on consequences.[16] However,

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end up missing the appointment. It seems reasonable to assume that the emergency should take precendence over a promise such as this. But moral absolutists face a problem of accounting for what becomes of the duty created by the promise. They are forced to say that a moral duty that is defeated in this way is no duty at all. But this seems to miss something important: we would usually assume that I should take myself to be under a subsidiary duty to make amends to John in some way. Hence our intuitions about moral duties conflict with absolutism, and rather imply that there can be conflicts of duties, and that these conflicts leave "moral residues."

[14] It would be open for Resnik to drop the claim that moral reasoning consists in such balancing, and argue instead that absolute deontological principles set constraints on what is permissible, and that within the sphere of what is morally permissible, we should aim to promote the best consequences. But it is not clear that we could still describe such a position as a "hybrid": rather, the absolutist deontology would enjoy a total priority over the consequentialist side.

[15] Deontology (on his definition of it) and consequentialism are "the two basic viewpoints one may adopt when doing a moral analysis" (2004, p. 8)

[16] This argument by elimination thoroughly shapes the structure of Resnik's book. See for example his

given the way in which he has defined deontology, this argument is invalid. For a moral theory (and a moral reason) could fail to be either deontological *or* consequentialist on Resnik's account. (A moral theory would be neither deontological nor consequentialist on Resnik's account if it held that whether an act is morally right or wrong can depend on *both* the act's consequences *and* something other than the act's consequences. This is the view held by Ross, 1930, for instance). And given that there are moral theories that are neither deontological in Resnik's sense, nor consequentialist, we cannot infer from the nonexistence of deontological reasons in Resnik's sense that the moral justifiability of patents on GM crops must depend solely on consequences.[17]

My case against patents on GM crops does not depend on the claim that patents on GM crops would be wrong *quite irrespective of their consequences.* Hence I am willing to grant Resnik's claim that there are no sound reasons for thinking that GM crops (or patents on GM crops) are wrong that are deontological in his sense. However we can now see that it does not follow from this claim that the only type of ethical reasoning appropriate to deciding whether there should be patents on GM crops is consequentialist reasoning. As I shall argue in section 3.2, there are good reasons to oppose patents on GM crops that are *not* reducible to consequentialist calculation. Whether we call these reasons deontological (as I would prefer), or something else is not important for present purposes.

As we shall see in the next subsections, Resnik's argument in any case fails to support the claim that an appropriate application of consequentialist reasoning would favr patents on GM crops.

2.2. Consequentialism and Resnick's Precautiohnary Principle.

We should begin by making a distinction between subjective and objective

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summary of the work: "I will examine and critique deontological arguments for and against DNA patenting and show that they generally fail to show that DNA patenting is inherently moral or inherently immoral. Only one type of DNA patenting is inherently immoral, the patenting of a whole human genome. The morality of all other forms of DNA patenting, from the patenting of gene markers, to whole genes, to artificial chromosomes, depends on the consequences of these practices for science, medicine, agriculture, society, business, industry and agriculture" (2004, p. 9)

[17] Note that Resnik's argument would have been valid if he had defined deontology in such a way that moral reasons must be consequentialist if they are not deontological (as Rawls does, for instance).

consequentialism. Subjective consequentialists believe that we should always aim to bring about what we believe to be the best result in consequentialist terms. Objective consequentialists believe that it is an open question whether we should actually aim to bring about the best consequences; the answer to this question depends on whether doing so will *in fact* bring about the best consequences. (Railton, 1984) Objective consequentialism is more easily defended than subjective consequentialism, as there are numerous cases where it seems plausible to suggest that subjective consequentialism will be self-defeating, insofar as it would lead to consequences that are worse than using another method of deciding what to do.[18] So there is an ambiguity in Resnik's claim that we should consider only consequentialist reasons in deciding whether or not to allow patents on GM crops: does he want to claim that we should *use only subjective consequentialist calculations* in deciding whether or not we should grant patents on GM crops, or does he wish to make only the weaker claim that *whether or not we should grant patents on GM crops depends solely on the consequences of so doing*?

It seems, in fact, that he intends a position somewhere in between: merely claiming that we should set our policy on GM crop patents on objective consequentialist grounds will be too weak here, as it looks like it will give us insufficient practical guidance as to what our policy should actually be; but subjective consequentialism looks to be too strong. For there is a severe epistemological problem with subjective consequentialist calculations in the case of patents on GM crops: we are aware of certain hazards that GM crops might present, such as contamination of non-GM crops, threats to biodiversity, and dangers to human health. But it is very difficult to quantify either how likely these bad events are to obtain; or if they do obtain how devastating this obtaining will be. While GM crops have thus far shown some clear advantages (see for example Carpenter and Gianessi, 2001), enough of their proposed advantages remain speculative for it to be impossible to put any clear figures on their expected benefit over the medium to long term. Subjective consequentialism dictates that we decide between doing A or B by comparing the *expected utility* of them, and perform the action that has the greater

[18] For example, Mill famously argues that those who aim at their own happiness tend to be less happy than those who aim at goals that are larger and more expansive: "Those only are happy... who have their minds fixed on some object other than their own happiness... Aiming thus at something else, they find happiness along the way." (1989, chapter 5; p. 94)

expected utility. But where we do not have enough information to assign a reasonable estimate of probability to the outcomes that may ensue, it is impossible to perform this utility calculation, and hence we will not be in a position to say whether A or B has greater expected utility.[19]

Resnik suggests that the appropriate way to apply consequentialism in such circumstances is to adopt the Precautionary Principle.[20] The Precautionary Principle has been defined in a number of different ways, and so some recent writers suggest that we would do better to think of a family of *precautionary principles*, sharing a common structure rather than merely one Precautionary Principle.[21] The general structure of such precautionary principles is (PP) *If there is an uncertain threat that meets an evidential standard E, and a seriousness threshold S, then take action A.*[22] There are three dimensions on which precautionary principles can differ in strength: they can differ in the *level* of the evidence required to trigger them; the *seriousness* of the potential threat required to trigger them; and in the *types of response* called for to stave off or ameliorate the threat.

Resnik suggests the following specification of the precautionary principle: "the PP urges us to take reasonable precautions to avoid plausible threats in the face of factual

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[19] Stich (1978) argues that scientifically plausible, but uncertain hazards are less of a problem for consequentialist reasoning than is usually thought, on the grounds that (1) any feared disaster can be expected to entail a sequence of separate events, (2) we will be able to assign a probability to many or most of these separate events, and (3) the product of the probabilities of these events in the sequence will place an upper limit on the possibility of the feared disaster occurring. However, such an approach will be of limited use in cases where the hazards in question do not depend on a linear sequence of events causing one another (as is the case, for example, for the worries about the effects that patents on GM crops will have on food security or justice). Moreover, it is false to think that we have sufficient data to make confident subjective consequentialist calculations on the utility of intellectual property regulations even where no such serious threats are involved. For example, in the literature on copyright, one can see wildly differing accounts of whether or not current intellectual property legislation is in fact utility maximizing, with some arguing for less strict copyright terms, others for stricter copyright terms, and others still to get rid of copyright altogether, all supposedly on consequentialist grounds (McGowan, 2004).Thanks to an anonymous referee for pressing me on this objection.

[20] Resnik provides no argument as to why the Precautionary Principle should be better than any other approach to consequentialist decisionmaking under uncertainty: having introduced the epistemological problem, Resnik merely states that the approach he will adopt is "one influential approach to the problem" (2004, p. 11), without comparing it to any others.

[21] See for example, Manson, 2002; Sandin, 2004; Hughes (forthcoming).

[22] This account shares the spirit of both Sandin's and Hughes' accounts. Sandin suggests that the general form is "If there is (1) a threat, which is (2) uncertain, then (3) some kind of action (4) is mandatory." (2004, p. 14), whilst Hughes (forthcoming) suggests that it is "If there is evidence stronger than *E* that an activity will cause harm more serious than *S*, then take action of type *A*." UNESCO (2005, p. 14) adopt a more specific account: "When human activities may lead to morally unacceptable harm that is

uncertainty." (p. 110). It is difficult to be certain as to how strong this precautionary principle is supposed to be, given the fact that "reasonable'"is itself highly contested.[23] However, it seems likely that whichever way we were to flesh out the concept of reasonableness, this Precautionary Principle could not do the work that Resnik wants it to do.

First, it is not clear why it should be easier to decide what "reasonable precautions to avoid plausible threats in the face of factual uncertainty" are than it is to decide which option of those available has the greatest expected utility. Resnik faces a dilemma here: either we are able to decide what counts as a reasonable precaution by reference to the predicted consequences, or we cannot. If we can, then we should be able to do the consequentialist calculation in the first place, and so his Precautionary Principle will not be doing any work; if we cannot, then appropriately applying his Precautionary Principle will have to rely on a mode of moral reasoning different from subjective consequentialism.

I assume that Resnik will want to go for the second horn of the dilemma, as otherwise his Precautionary Principle will add nothing to an ethical analysis. How then are we to understand the relationship between this idea of taking "reasonable precautions to avoid plausible threats" and the consequentialist principle? I suggest that the only plausible answer is to claim that the Precautionary Principle thus described is justified in objective consequentialist terms.[24]

There is a lot of work to be done to justify this claim. First, precautionary approaches have usually tended to focus on reducing *new* risks introduced by human activity; however consequentialists are committed to denying the acts and omissions doctrine (Williams, 1973) and so the consequentialist should treat risks from the continuation of

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scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm."

[23] "Reasonable" is contested in large part because (a) it is a thin ethical concept (there is little world-guided descriptive content in it, compared say, to describing something as cruel or merciful), and (b) describing something as "reasonable" is something that always counts in its favor, whilst describing something as "unreasonable" is something that always counts against it. So in "reasonable." we have a quality that everyone wants their position to be associated with, without there being any clear descriptive criteria for what counts as reasonable and what does not.

[24] If Resnik were not to make the claim that his Precautionary Principle is justified in objective consequentialist terms, then his argument would be inconsistent: for he would be claiming (a) that whether there should be patents on GM crops depends only on the consequences of so doing, (b) we should use his Precautionary Principle to decide whether to do so, and (c) using his Precautionary

existing bad situations as just as serious as new risks as a result of human activity. So, insofar as we have a consequentialist approach to risk reduction, we must reduce *all* risk, not just new risk. Second, precautionary approaches have tended to operationalize the "better safe than sorry" maxim, working on the assumption that it is more important to prevent things getting much worse than it is to secure the full potential benefits that a new technology could bring. But by definition, consequentialists think that the right action to perform is the one that will produce the greatest balance of benefit over harm. Often these attempts would be thwarted by playing it safe.[25] It follows that consequentialists should not be in the business of reducing risk, or reducing harm *per se*: for the consequentialist, there is no reason to think that the right action should be the one that is expected to cause the least harm overall, or the one which is the least risky.[26]

2.3. The indeterminateness of "reasonable precautions"

Given the confusions we have so far uncovered, it should come as no surprise that the third stage of Resnik's argument, in which he attempts to apply his Precautionary Principle to the question GM crop patents, is unconvincing. The basic problem is that he fails to define any criteria by which we should determine whether a given response to a plausible threat is reasonable. Without such criteria, his claim that regulated patents are a reasonable precaution is unsupported.[27]

Resnik considers only three "plausible risks" that are introduced by patents on GM crops: the threat they pose to farmers in the developing world, worries about exploitation, and worries about the commodification of agriculture. In each case, he suggests that the threats posed are plausible, but that a reasonable precaution to take against the threat is to regulate patents on them rather than refusing to grant them at all. He says little about why

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Principle will not tend to lead to the best consequences.

[25] See for example Harris and Holm, 1999, 2002.

[26] One possible reply for Resnik would be to argue that, notwithstanding these general worries about consequentialism and precaution, there are good reasons to think that *in the case of GM crops*, a precautionary approach would be highly likely to lead to better consequences than a nonprecautionary approach. But if so, Resnik would need to provide some evidence to support this claim.

[27] This lack of support matters because, as I argue in section 3.1, given the restrictions that patents place on the actions of others, the burden of proof lies on those who defend patents, rather than those who do not.

granting patents that are regulated would be a more reasonable reply to these threats than not granting patents on GM crops at all. The most we get is the following: banning DNA patents would be an

> unreasonable response to the moral, social, and economic problems related to DNA patents, since patents are likely to yield many benefits for society. In science, DNA patents stimulate discovery, innovation, and private investment in research; in medicine, they encourage the development of new tests, new procedures, and treatments; in agriculture, DNA patents encourage the production of useful crops, plants, and animals, as well as private investment in agricultural biotechnology. A ban on DNA patents would be an overreaction to the threat they pose; it would be throwing the baby out with the proverbial bathwater. (2004, p. 197)

In order to be able to assess the quality of this argument, we would need to have a better specified conception of what counts as a reasonable precaution. An example that shows up the indeterminateness of Resnik's position here is the threat (which Resnik agrees to be plausible) posed to people in developing nations by patents on GM crops. The plausible threat here is that the likely benefits of GM crops will accrue disproportionally to those who are already well off, and the harms (such as reduction of food security) disproportionally to those who are already very badly off. (Food Ethics Council, 2003). In other words, the plausible threat is that patents on GM crops will make society less just in Rawlsian terms. What would the reasonable response to this threat be? Unfortunately, Resnik has not yet said enough to determine whether it is more reasonable to respond by regulating patents on GM crops, or by not granting such patents at all.

There are two obvious ways in which Resnik might attempt to further specify his conception of "reasonable." First, he could argue that we should take "reasonable" to mean *reasonable in consequentialist terms.* On this reading, the only thing we should be taking reasonable precautions against is *losses of utility.* But this would not help his case: for if we read reasonable as "reasonable in consequentialist terms," then we are back to the problem of consequentialist decisionmaking under uncertainty, which Resnik introduced the Precautionary Principle to solve.[28]

[28] Moreover, in view of his failure to demonstrate that only consequentialist considerations are relevant, it might also seem too narrow a view to be the correct response to the risks GM crops present.

Second, we could read "reasonable" in something like its ordinary sense.[29] But this too would create problems for Resnik: when reasonable is taken in its ordinary sense, maximizing utility is neither necessary nor sufficient for a reasonable response to a plausible threat. Maximizing utility is not necessary for a reasonable response because there are cases where we think it reasonable to take precautions that we know to be non-utility-maximizing. Think for example of the reasoning by which Rawls aims to persuade us that, under the conditions of the veil of ignorance, it would be rational to adopt a maximin strategy: even if one disagrees with Rawls's reasoning here, it is not unreasonable to judge as Rawls does. Maximizing utility is not sufficient for a reasonable response, because there can be clear cases where we think that it would be reasonable to take precautions against an event that *would* maximize utility.[30] So there seems little reason to believe that an approach that was precautionary in this sense would give us an analysis that lined up with a consequentialist approach; nor that (as we shall see in section 3) it would favor granting patents on GM crops.

I conclude that the three stages of Resnik's argument do nothing to prove that it is ethically superior to grant patents on GM crops than not to: the argument in favor of a consequentialist treatment is invalid; his Precautionary Principle in any case looks to be incompatible with consequentialism; and his conception of reasonable precautions is too ill-defined to have any argumentative purchase.

3. AGAINST PATENTS ON GM CROPS

My argument against patents on GM crops falls into two parts. The first looks at the justifications for patents in general. I argue that we should start from the stated function of patents, namely to solve a particular problem of underproduction of useful inventions. Patents will always have the bad effect of reducing access to goods that are such as to be enjoyed by everyone. So even in the ordinary case, where patents are justified, this is not because patents are a good in themselves, but rather because the bad of reducing access to

[29] Resnik's discussion (2004, pp. 111-2) of the concept of reasonableness does not explicitly take a stance either way, but seems to imply that he means reasonable to be taken in its ordinary, rather than a specifically consequentialist sense.

[30] Nozick's example of the utility monster (1974, p. 41) shows this persuasively.

the useful inventions is outweighed by the good of there being more useful inventions in the first place. (Hettinger, 1989)

The second part argues that there are at least three relevant types of case where it would make sense to refuse to grant patents in a particular area: (a) where patents would increase the difficulty of designing new products to such an extent that we would have a "tragedy of the anticommons"; (b) where research in a particular area would go quickly enough without patents; (c) where we think it ethically inappropriate to withhold access to inventions of a particular type, even though allowing patents in this area might cause more inventions of a certain type to be produced. In each case, I argue that patents on GM crops meet each of these constraints; and thus conclude that there is a strong case for thinking that there should not be patents on GM crops.

3.1. Patents as a solution to the public goods problem

I shall not challenge the basis for the patent system here: I shall assume that the patent system is in general justified, and that hence if there is a sound reason to oppose patents on GM crops, this must be because there is some feature or features of GM crops that set them apart from other inventions that are the legitimate subject of patents. But having said this, it is important to examine carefully *why* the patent system is justified, where it is justified, and the conditions under which this justification breaks down.

Inventions of the type covered by patent legislation are *public goods*. Public goods are *nonrival*, and *nonexcludable*. A good is nonrival when the use of it by one person does not prevent anyone else from enjoying it, and a good is nonexcludable when it is prohibitively difficult to prevent unauthorized others from enjoying it. The basic problem that the patent system attempts to solve is the under-provision of public goods: it will tend to be irrational (in self-interested terms) to expend your own time and money creating a public good, given that everyone else will be able to benefit from the good as much as you will. It is better (in self-interested terms) to allow someone else to do the hard work, and then take a free ride on their efforts. But of course, it will tend to be irrational (in self-interested terms) for anyone else to put the effort in either; and so there is a severe risk of under-creation of such goods. And where such goods are produced, it

will often be rational (in self-interested terms) for an inventor to try to keep the underlying processes and ideas secret, so that she can reap an advantage for her work.

Patents aim to solve the problem of underprovision by making patented inventions *excludable:* the patent holder can exclude all others from using the patented item, and charge others for access to it. The underlying thought is that the provision to exclude others from the good will act as an incentive to do the necessary research and development to create useful new inventions: it will become rational to put the necessary effort in if you know that you will be able to recoup your costs (and return a profit) by charging others for access to the good. And patents attempt to solve the problem of secrecy by requiring that patentors disclose the basis of the patented item in such a way that anyone skilled in the art would be able to reconstruct it from the description.

The solution that patents offer to the public goods problem comes at a price, however. The system of incentivization that we have chosen imposes an *artificial scarcity* on the supply of the good: this will tend to be economically inefficient, insofar as there will be many people who would want to buy the good at the marginal cost of its production, but who will be unwilling or unable to do so at the price the patent holder wishes to charge. This will often also have moral implications – for example where the good that someone is being denied access to is a drug that could save their life.

It is unclear how strong an argument the requirement of disclosure makes in favor of patents. First, patents also require secrecy before a given patent is filed: both to prevent other interested parties from patenting the idea and thus establishing the relevant monopoly; and also because of the requirements of patentability. In order to count as patentable, a product or process has to involve an new inventive step beyond what was the previous prior art, and this claim to an inventive step would be undermined if the ideas were published, or were common knowledge within a scholarly community. Second, many inventions are easily reversed engineered, or wear their design on their sleeve (think of a work bench, or a paper clip for instance). In these cases, "the disclosure in the patent ... will not provide information that is not already available through the mere marketing of the product," (Streiffer, 2006, p.137) so it will be false to say that the patent has brought about any increase of disclosure.[31]

[31] Finally, we should remember that it will not in general be in a patentor's interests to reveal more than

So I take it that if there were already an adequate supply of a particular public good being produced, it would be hard to justify *introducing* a patent system into such an area. Because in such a case, we would be introducing the deadweight loss and the moral problems of patents without there being a sufficient countervailing advantage.[32]

It also follows from this that (other things being equal), where we already have patents in a particular area and the amount of the research and development in the area in question would still be adequate even without the incentives that patents offer, we should scale back patents.[33] This is because in such a case patents will not be necessary to secure an adequate supply of public goods; and thus they will not be serving a socially useful function. So, if the amount of research in a particular area would be adequate without patents, there is little reason to grant them.

Determining what constitutes an adequate amount of research in particular area is a difficult problem. It is likely to be difficult to reach a consensus on whether a given amount of research is adequate, for both epistemological and ethical reasons. Epistemologically, we have the same problem of decisionmaking under uncertainty that Resnik attempted to use the Precautionary Principle to solve: it seems very difficult, if not impossible, to determine what the adequate amount of research is before that research has actually been done. But even without epistemological uncertainty, there could still be ethical disagreement about how fast certain research should go.

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the minimum that is required by patent legislation, and so we can expect (unless patent examiners are vigilant and legislation drafted to ensure a high level of disclosure), that inventors will keep much of the relevant know-how secret.

[32] This line has been strongly argued by the opponents of software patents in Europe, given that the software industry has thus far thrived without patent protection. Note that an adequate supply of a given public good is not a maximal supply: an adequate supply is one that meets social needs. For example, it might be the case that allowing the patenting of sports maneuvers would lead to more sports innovations such as the Fosbury Flop in high jumping. But few would find it plausible to claim that there is an unmet social need for more new sporting techniques, which we should ease by providing the incentive of patents: hence given this, we are likely to focus more heavily on the negatives of such patents – the effect they would have on our conceptions of fairness in athletic competition, for instance; and hence we would judge them to be ethically illegitimate. (For more on the question of patenting sports maneuvers, see Fisher,1999).

[33] One complicating factor could be that companies may have invested large sums of money in research in the reasonable expectation of being able to derive monopoly profits by the acquisition of patents. These companies might claim that removing their monopoly would be unfair. However, it is far from clear that removing a socially unnecessary monopoly would be unfair. But even if it were granted that it was, this unfairness could easily be mitigated by announcing changes well in advance so that companies could change their plans. The problem created is not different in kind from the one that all legislatures face when they alter their taxation policies.

One approach to this problem would be to assume that we cannot have enough information to make such fine-grained choices about the amount of research that is optimal in a particular area, and that it will tend to be worse, all things considered to attempt to micro-manage a patent system by adjusting the types of incentives offered in different areas to try to make them the least restrictive possible, compatible with an adequate supply of the given public good.

But if ignorance is a factor here, it counts just as much *against* retaining the status quo as it does changing it. In view of our ignorance, it would be difficult to make a convincing case for a very precise calibration of patent lengths and breadths. But this should not stop us from using the levers of policy in a broad way, and for example, providing shorter, or less restrictive patents, or not providing patents at all, where economic modeling strongly suggests that it will be possible to do so without suffering a shortfall of the public goods in question. The problem does not seem to be different in kind from that which democratic legislatures face when they decide on systems of incentives provided by taxation, in order to steer economic actors towards certain socially mandated goals, such as avoiding pollution or ensuring that they provide training for their staff.

3.2. When is it appropriate to refuse patent applications?

The basic assumption of the patent system is that, for any patentable subject matter X, we should grant patents on X because these patents will provide necessary incentives to research into X; research into X will go more quickly if people have patents as an incentive; and that all things considered, it is a good thing if research into X goes more quickly. I take it that where patents are justified it is because this reasoning is cogent, and that where patents are not justified it is because this line of reasoning, for one reason or another, fails to be sound.

There are at least three ways in which this reasoning might break down. First, patents might prove to be counterproductive, because the thicket of previous patents ends up making it discouragingly difficult and expensive to do new research. Second, patents are unjustified where research will go at an adequate pace without them. And third, we might

judge patents in certain areas illegitimate, *despite* the fact that they increase the amount of research in a particular area, if so doing would have morally unacceptable side effects.

3.2.1. The tragedy of the anticommons

It is too hasty to assume that just because, other things being equal, the prospect of a patent will act as an incentive to an individual agent to do more research into X, that therefore granting patents for research into X will lead to more new and useful products being produced. All forms of creativity and research require a *commons*: that is, a pool of ideas, concepts and theories that researchers can draw on freely in order to construct their new inventions.[34] Patents by their very nature reduce the pool of ideas that others can freely draw on freely in making their own inventions and doing their own research. Thus if a patent has *already* been granted that covers X (or part of X), then this operates as a disincentive to research on X. As Benkler puts it, patents

> raise the expected returns from information production, and are thereby thought to induce investment in information production and innovation. However, they also increase the costs of information inputs. If certain existing innovations are more likely covered by patent, the current producers will more likely have to pay for innovations or uses that in the past would have been freely available from the public domain. Whether, overall, any given regulatory change that increases the scope of exclusive rights improves or undermines new innovation therefore depends on whether, given the level of appropriability that preceded it, it increased input costs more or less than it increased the prospect of being paid for one's outputs. (2006, p.49)

It will be a matter for empirical research to determine whether, and in what types of situations, patents will create a tragedy of the anticommons: that is, a situation where granting patents will become counterproductive, in that the difficulty of navigating the thicket of existing patents will become so great as to outweigh the positive effects of providing patent incentives.[35]

Do patents on GM crops currently create a tragedy of the anticommons? And if they do not now, is it likely they will in the future? Cases such as that of Golden Rice have

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[34] For more on the concept of the commons in this context, see Lessig, 2002, esp. pp. 19-22.

suggested to many that this is indeed a serious worry.[36] Research on Golden Rice was funded non-commercially, with the humanitarian aim of helping those worst off. When their funder, the Rockefeller Foundation commissioned an audit of the patents and technical property rights they would have to license in order to establish a "freedom to operate," they discovered 70 patents that would need to be licensed, and 15 technical property components; and the researchers decided that the only way to bring the product to market would be to transfer the intellectual property rights to AstraZeneca.[37] But it is difficult to know how strong a conclusion we should draw from this one case. For example, Golden Rice's inventor has argued that it was only as a result of patents that the information that he needed to license was made public, and so the research would not have been possible at all without patents. (Potrykus, 2001)

The key problem, as Streiffer (2006) argues, is that we simply do not have the data that would decide this issue: we simply do not have enough evidence to say whether or not the restrictions that patents on GM crops place on research will have consequences on the level of innovation that are positive or negative. So I take it that the question of whether there is a tragedy of the commons remains open, and we require further research on the issue.[38]

But it is important to note that, insofar as this uncertainty is merely an empirical one as to which way will be the most effective way of delivering new inventions, there are reasons to favor an approach that does not allow patents. For if we were able to procure the same amount of innovation in GM crops in two ways, the first with patent protection, and the second without, there is reason to think that the option without patents would be

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35 The term "tragedy of the anticommons" originates with Heller, 1998.

36 Golden Rice was supposed to be a GM crop that would be of benefit to those in Asia who suffer blindness as a result of vitamin A deficiency from eating a diet consisting mainly of rice. Golden rice was supposed to prevent this, by allowing the body to convert the beta-carotene that had been genetically engineered into the rice into vitamin A.

37 For an account of this worry, see for example, Food Ethics Council, 2003.

38 In default of such evidence, the most we can do is to point out the structural issue that makes it more plausible to be worried about the tragedy of the anticommons in GM crop patents, than in patents on other items. This is the number of existing patents the average new invention in a particular area will have to take into account, either by licensing or inventing around them. The fewer and the narrower the scope of such patents, the easier it will be to avoid the tragedy of the anticommons. Conversely, the greater the number and the broader such patents are, the more difficult it will be to avoid the tragedy of the anticommons. Cases like Golden Rice suggest that the number of patents that will need to be licensed to bring a GM crop to market is likely to be much higher than, say to bring a new paperclip or icecube maker to market.

superior on grounds of justice. This is because a society without patents will allow each person to make use of a given resource, regardless of their personal circumstances, whilst a society with patents will restrict access to the good to those who are able to pay. And assuming that wealth is not spread equitably around the global economy,

> the market is a poor measure of comparative welfare. A system that signals what innovations are most desirable and rations access to these innovations based on ability, as well as willingness, to pay, over-represents welfare gains of the wealthy and underrepresents welfare gains of the poor. ... [It] is unjust because it is geared toward serving small welfare increases for people who can pay a lot for incremental improvements in welfare, and against providing large welfare increases for people who cannot pay for what they need. (Benkler, 2006, p. 303)

Hence if we were genuinely uncertain whether or not patents would increase the number of inventions of a given type, then considerations of justice would tip the scales against allowing patents, even if we were to think justice only of minor importance.

3.2.2. Patents are unjustified where research would go quickly enough without them

Even assuming that removing patents on GM crops would decrease the rate of innovation, it does not follow that the pace of research would then be *inadequate.* For slowing the rate of research on GM crops would be an effective way of making some progress on the crisis of trust that has beset GM crops, especially in Europe. This would be important, as it seems unlikely that GM crops can reach their potential to benefit society until this problem of trust has been solved. The crisis of trust has had many causes, one of which has been irresponsible media reporting.[39] Two factors that have certainly been significant and that removing patents on GM crops could remedy are the feeling that major changes are happening very quickly without adequate time for reflection; and the feeling that the risk/benefit ratio of GM crops thus far has been lopsided (the risks of such crops fall on everyone, whether they have consented or not, whilst the only apparent benefits accrue to the patent holders and the supermarkets). Removing patents on GM crops would be likely to slow down the pace of research

[39] See for example POST, 2000 and O'Neill, 2002, chapter 8.

somewhat, thus giving the moral consensus more time to catch up with the science; it would increase the openness and the democratic accountability of research by shifting research back towards the public sector; and the renewed emphasis on the public sector and democratic accountability would make it more likely that the research done would produce GM crops that would be of recognizable benefit to society.

3.2.3. Patents with ethically unacceptable side effects

Patents can be unjustified even if they would be successful at producing more research and more products in a particular field, if they would have side effects that would outweigh the benefits of the increased research and products. In the introduction, we mentioned the fact that many (around 80) countries do not allow patents on surgical and veterinary treatments. While it is plausible to think that more (and better) methods of surgical treatments would be produced if we were to allow their inventors to collect money by excluding other doctors from making use of them, doing so would seem to many to have unacceptable side-effects. In particular, it would risk a corrupting effect on the practice of medicine, and a potential denial of life saving techniques to those who need them.

I take it that the underlying moral principle here is that it is illegitimate to give someone a license to make money by excluding others from having their basic human needs met, where those needs could be met without any cost to the person excluding.[40] But some patents on GM crops, where they are applied in the developing world, *will* involve excluding subsistence farmers from access to a technology that could be vital for meeting their basic needs, where these needs could be met without cost to the company. So insofar as this principle is valid, it militates against patents on GM crops that are necessary for food security just as strongly (perhaps even more strongly) than it does against patents on surgical and veterinary treatments.[41]

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[40] The concept of "cost" is very slippery here: there is a reading of cost on which it would cost the patent holder something every time someone uses the patented process without paying them. I argue in Wilson (forthcoming) that this conception of cost does not survive scrutiny.

[41] Someone might attempt to draw the opposite conclusion: namely that given we think it acceptable to have patents on pharmaceuticals despite their obvious incompatibility with this principle, there must be something wrong with the principle. However, I do not see that widespread nonadherence to a proposed

4. CONCLUSION

My overall conclusion is that we should *not* allow patents on GM crops. This has not been an obvious conclusion, and the issue is quite finely balanced. The Precautionary Principle, which Resnik brought in to attempt to adjudicate the issue, proved to be unhelpful. The question has turned less on issues of uncertainty than on the argumentatively more tractable question of the type of society that we wish to create. Resnik assumes that a broadly utilitarian approach to patents on GM crops, which simply aims to maximize happiness overall, is correct. We saw that there was no necessity to follow him in this.

I have presented a number of reasons why, given a perspective that takes issues of justice and equality more seriously, we should not grant patents on GM crops. Doing so would have the effect of moving much GM crop development from the private sector into the public sector, and would be likely to slow development of GM crops overall. But, as we have seen, this is not an ethical problem: rather, GM crop research has thus far been going far faster than the public as a whole has been happy with, and so slowing the pace would be to this extent, unproblematic, and moreover the crops that would be developed in the public sector would be more likely to fulfil GM's oft-cited potential to reduce world hunger than would crops developed merely for profits.

Providing a full defense of this broader vision of a society is, of course, beyond the scope of this article, but I hope that at the very least I have shown that, given a commitment to justice and to equality, we should not grant patents on GM crops.

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moral principle serves to refute it. Rather, in order to refute the principle, someone would need to produce a counterexample – a case where *it is* morally legitimate to exclude another from meeting their basic human needs, even though their meeting their needs would not cost you anything. I suspect that it will prove difficult to do so, given that such behavior will always involve treating the other as a mere means to our end. (This suggests that pharmaceutical patents may be more difficult to justify than is usually thought. See Pogge, 2006).

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