The use of recombinant dna technology can only benefit humans

The development of recombinant DNA technology is, in biological terms a very recent discovery. It was founded in 1973 by Cohen and Boyer, the first two scientists to successfully transplant a section of DNA from one bacterium and insert it into another using restriction enzymes, creating the first transgenic organism1.

As with every biological discovery the most pertinent question is, who or what can it benefit? The use of recombinant DNA technology is undoubtedly of huge medical and industrial benefit to humans. It facilitates the use of bacteria to rapidly produce enzymes, proteins and hormones needed to cure illness or for use in vaccination. It also allows the development of a faster more reliable alternative to the artificial selection used by farmers in the past to improve stock and so provide economic benefits to humans. More radically there are possibilities to alter antigens on animal organs to enable them to be transplanted into humans.

It is therefore true that humans will be large benefactors of this new technology. However, the human race is essentially a mammalian species, and so surely the vaccinations and other medical advances can be applied to a large range of other mammals. In fact it has already been used to benefit pets such as cats and dogs. It seems a little foolish to assume otherwise, after all, initial laboratory tests were carried out on mice and other animals. So it would appear that, in theory not only humans but also other mammals can benefit from recombinant DNA technology. There are also other organisms to take into consideration.

If bacteria with desirable qualities are bred in laboratories surely some beneficial “ super microbes” can be created. Indeed bacteria have now been bred to help the environment by decomposing sewage and other waste more rapidly, and to digest oil spillages without damaging fish populations. Recombinant DNA technology has also been used to save a number of rare trees, including the Cornish elm tree from extinction. The Cornish elm was falling prey to Dutch elm disease so biologists identified a disease-resistant gene in another sub-species and added this to seedlings to produce resistant Cornish elms.

Economics and logistics, will often affect who benefits from a scientific revolution. Indeed scientific professionals admit that there is a definite bias towards use for human benefit “ because the financial markets really understand that if you make a drug against cancer or AIDS, it will have a proven market. ” [S. Burrill, biotechnology specialist for Ernst & Young]. The case I cited earlier of using bacteria to clear up oil spills will not only help the environment but will also protect valuable fishing industries, so it seems once again that humans benefit. The logistics of this new technology also add to the expense.

The molecules being targeted are <1 nanometre in size, and so, by the sheer scale of the process, all the research becomes more complicated and therefore much more expensive. This would suggest that for finance reasons, only humans could benefit from recombinant DNA technology. However, with the use of genetic markers it is becoming easier to produce proteins, hormones and enzymes using bacteria. This has in a number of cases given

rise to the production of large quantities of relatively cheap vaccinations for use in veterinary medicine.

Such vaccinations have been used not only in agriculture and other animal industries (which would mainly benefit humans), but also for the care of both domesticated pets and endangered species. Hence, despite research costs, it is not only humans who are benefiting from recombinant DNA technology. A survey carried out in 1997 for New Scientist magazine claimed that of all the currently practiced uses for recombinant DNA technology, 58% were medical, agricultural or food processing uses (i. e. for human benefit), 5% were used for environmental benefits (i.

e. for cleaning contaminated land to protect wildlife) and 37% were put to " other" uses including animal care and preservation of endangered species. So, it is seemingly proven that recombinant DNA technology does not only benefit humans, but can benefit other organisms and indeed whole ecosystems. There are ethical issues that both support and undermine the title of this essay.

There are suggestions that because of moral disagreements, this technology should be saved only for medical use, and not be used for other reasons, which would directly prevent any other species from benefiting. The use of a DNA strand coding for antibiotic resistance is a popular genetic marker to ensure bacterium has accepted a new gene. There are justifiable concerns that this marking process when used in E. oli bacteria creates a new strain of this already dangerous bacterium, which, if it were to enter a human or complex organism would be virtually unstoppable. There are those that will

therefore argue that the use of this bacterium should be limited to vital human medical uses to minimise risk.

Others will argue that in order to increase crop production or save an endangered plant species it is not a good idea to produce strains resistant to pesticides or environmental changes as this could easily give rise to vast over population. Furthermore there are theories, although they are yet to be proven, that such uses could be damaging to species that feed on these plants, including humans. This would again suggest that use of recombinant DNA technology should be restricted to medical purposes. Interestingly, it would seem that the majority of ethical objections are actually against the use of recombinant DNA technology for human benefit. There are a great deal of arguments presented and I will discuss some of the main objections here. There is strong opposition to the use of genetically altered animal organs for human transplant for many reasons.

Issues including safety fears, revulsion and claims that it would be “ speciesist” – that it places human rights above animal rights have all been raised. Ideas to alter cattle or sheep DNA in order for the animals to express milk containing designated enzymes etc for human consumption have been met with heavy opposition. People are concerned that the long-term effects of interfering with the genome of a complex organism are unknown. In addition there is the much-publicised argument over the use of stem cells from human embryos for recombinant DNA technology.

There are many objections on moral and religious grounds – in fact stem cell technology is outlawed in some countries such as France, and is very strictly

controlled in others. This is a currently a major stumbling block in the potential human benefit recombinant DNA technology could provide. It would seem that much evidence exists to suggest that the sphere of recombinant DNA technology is vast and beneficial to not only a diverse range of species but also a multitude of ecosystems. However, still very much in its infancy, it seems that recombinant DNA technology will only currently be used if it is of medical, economical or social benefit to humans. Ironically for all other species of animal that can, but for the moment do not, benefit from this technology, it seems that only by using other organisms can humans benefit. In conclusion, I believe that given all the evidence it is a little narrow-minded to believe that in the long run the only benefactors of recombinant DNA technology will be humans.

However, until sufficient research and testing has been accomplished I do feel that humans will certainly form the overwhelming majority of beneficiaries. It would seem contradictory to thousands of years of evolutionary theory if humans did not use their discoveries primarily for their own benefit. Perhaps it is a good thing if, until this technology is fully proven to be safe, we do keep it to ourselves.