



Why You Should Be Concerned About Genetically Engineered Food

by Ron Epstein, Ph.D. 易象純博士

Chinese translation by Wayne Zeng and Qingnan Wang, Ph.D. 曾偉峰、王青楠博士 中譯

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What is Genetic Engineering?

Genes are the fundamental chemical codes that determine the physical nature of all living things, from the tiniest single-celled organism to human beings. Genes make up DNA, the cell-level master plan which determines how the organism is going to develop in all ways that are not environmentally influenced.

Genetic engineering is sometimes also called bioengineering or biotechnology (biotech for short). All these terms refer to making artificial changes in the genes of the DNA of a living thing. Its nature and characteristics are then changed, often in ways that could never occur naturally. Some of the effects of genetic engineering are known, but most are not. The effects we may have information about are all short term, specific and physical. The effects that remain unknown are long term, general, and mental.

Genetic engineering of foods involves the insertion of genes from plants, bacteria, insects, fish, animals or humans into the DNA of another plant, fish, or animal to create a new variety. In the case of plants this is usually done either to enhance herbicide resistance, reduce sus-

The new varieties created by genetic engineering often are the result of crossing species barriers and so could never occur in nature.

基因工程與自然繁育不同，基因工程往往可以突破物種間的障礙，在自然狀態下無法發生的過程，經基因工程即可得到新的物種。

甚麼是基因工程

從最小的單細胞有機生命直至人類，基因是決定所有生物的身體性質的基本化學密碼。基因組成DNA（染色體），在細胞水平上，它決定有機物在除了環境影響之外的全方位發展的總藍圖。

基因工程有時亦叫生物工程或者叫生物科技（簡稱生科）。所有這些名詞都指人工改變生物的染色體（DNA）裡的基因構造之後，此生物的性質與特徵也隨著改變，而這些改變在自然狀況下通常是不可能發生的。基因工程的影響，有一些我們是知道了，但大部份還是不知道。可能我們已經知道的一些影響，都是短期性的，有特定性的，和物質上的，而我們所不知道的影響是長遠的，廣泛的，與精神上的。

基因工程研製的食物包括將含有植物、細菌、昆蟲、魚、動物或人類的基因引入到另一植物、魚類、或者動物的 DNA 中的基因，創造出另外一群新的生命。在植物來說，基因工程的目的，一般在於提高植物抗除草劑的能力，減少植物對寒冷以及霜凍災害的敏感度，或者是提高它的生長率。人的生長基因已經被引入食用植物、魚類與動物中，以提高這些生物的生長速度。

基因工程與自然繁育之區別

在人工繁育動植物時，為了培養出能滿足人類特定需要的新品種，人們調控基

ceptibility to cold or frost damage, or increase rates of growth. Human growth genes have been introduced into food plants, fish and animals to enhance growth rates.

Differences between Genetic Engineering and Breeding

In the breeding of animals and plants, the natural processes of gene selection and mutation that occur in nature are manipulated to develop new varieties that have specific use for humans. In selecting those varieties, breeders both modify the processes of natural selection and are restricted by them. For example, the well-known breeding work of Luther Burbank led to the introduction of many tasty new fruits, but not even Burbank could cross a fruit with an animal. Unlike breeding, the new varieties created by genetic engineering often are the result of crossing species barriers and so could never occur in nature.

When Is It Coming?

Because almost all genetically engineered foods are not labeled, most people are not aware that they are probably already consuming them. Most cheeses contain genetically engineered rennet; milk may contain rBGH, a genetically engineered growth hormone; genetically engineered tomatoes and squashes are already on the market. In addition, the next few months should see an explosion in the numbers of genetically engineered products on supermarket shelves. Monsanto Corporation is flooding the soybean market with soybeans genetically engineered to resist large applications of the herbicide Roundup. Soybeans are found not only in tofu but also in about 60% of all processed foods. Genetically engineered corn and canola are also being widely grown in this country. Scores of new genetically engineered food plants are already in production, and genetically engineered meat and fish will probably be sold soon.

Potential Health Dangers

So much money is at stake that international corporations which have invested heavily in biotechnology have exerted heavy political pressure on the FDA and USDA, the government agencies responsible for regulating genetic engineering. They have been successful in getting them to decrease their regulation of genetic engineering and to ban required labeling of genetically engineered foods based on scientific claims about problems with it. The FDA now asserts that genetically engineered foods are essentially no different in their nutritional value and health risks from non-genetically engineered foods. Many prominent scientists disagree. There has been no long term testing of their effects. Scientific studies have already shown that in some cases serious allergic reactions can occur, and that antibiotic resistance and toxicity levels may be increased.

☞ To be continued

因的自然選擇與變異過程。人類在選擇新品種時，既改變了基因的自然選擇過程，同時又受其約束。例如，衆所周知盧社·玻班（Luther Burbank）曾培植出許多味道很好的水果新品種，可是欲使水果與動物配種，即使玻班也做不到。基因工程與自然繁育不同，基因工程往往可以突破物種間的隔別，經由在自然狀態下無法發生的過程，得到新的物種。

基因食物何時上市

因爲基因食物幾乎均無標籤註明，大多數人或許已經在享用而不自知。大多數乳酪含有基因工程的 rennet；牛奶也許含有一種叫 rBGH 的基因工程生長荷爾蒙。基因工程蕃茄與南瓜已經上市。另外，往後幾個月，基因工程產品會爆炸般地湧上超級市場的貨架。蒙杉托（Monsanto）公司正在市場上大量推出新的可以抗除草劑的大豆品種。不僅豆腐中有大豆，60%的所有的加工食物裡都有大豆。基因工程玉米與 canola 亦正在美國大量種植。許多基因工程食用植物正在生產之中，基因工程魚類與肉類也很可能很快就要生產了。

潛在的健康危害

一些國際性的公司在生物工程上投資龐鉅；既已下了大賭注，所以他們對負責管理基因工程食物的聯邦藥物食物管理局 FDA，與美國農業部 USDA 等機構，施加了強大的政治壓力。這些公司在促使聯邦機構減少對基因工程生產食物的管制上，在以科學理由爲依據廢除基因工程食物必須貼標籤的制度上，都很成功。FDA 聲稱在營養與健康方面，基因工程食物與非基因工程食物本質上沒有差別。許多著名的科學家則持不同論點。對於基因工程長遠的影響目前還沒有甚麼實驗測試。科學研究已經顯示，在一些情況下嚴重的過敏反應會發生，對抗生素之抵抗，與有毒物水平會上升。

☞ 待續

為何您應關注基因食物

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Environmental Problems

The main environmental problem with genetically engineered food plants and animals is that, when they escape into the wild, they permanently disrupt ecosystems which are the products of billions of years of evolution (or, if you prefer, of God's perfect creation). For example, the most recent conservative scientific estimates indicate that genetically engineered plants will probably cross-pollinate with wild relatives, thereby escaping into the wild and permanently disrupting ecosystems at about one percent a year. That means they will probably cause major environmental problems in about ten years.

Another potential problem area is viruses. By their very nature, viruses invade the genetic material of their hosts and often break apart and recombine using part of the host's genetic material to create new viruses. When this happens with genetically engineered plants and animals outside of the laboratory, new viruses will be created that incorporate genetically engineered genetic material. The viruses will then spread and, because they could not have been naturally produced, there may be no natural defenses against them. Depending upon the kind of virus, they may then cause widespread death of certain plants or animals, or even of humans.

Ethical Problems

Genetic engineering is a totally new kind of science. Previously science concerned itself with understanding how Nature works. For the first time in human history, through genetic engineering techniques, science is changing Nature on the most fundamental level. Rather than considering whether it should be done at all or what kind of wisdom should govern the process, most of the efforts in the field are fueled not by concern for the short or long term benefits for human beings or the planet, but in most cases by corporate pressures for short term profits at almost any cost. Certainly some short-term and rather spectacular benefits will probably occur, particularly in the medical field; however, the long term problems may far outweigh them.

March 1998 Vajra Bodhi Sea

環境問題

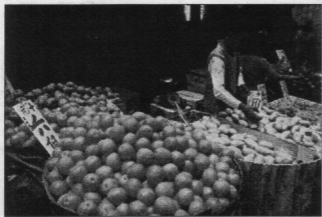
經由基因工程而生產出來的動植物產品，對環境上造成的主要問題，是這些動植物一旦進入野生動物、植物體系時，對生態體系的破壞是永久性的，此生態體系是上億年的進化結果。（若您願意，或可稱為上帝的造化之功。）例如，據最近科學上保守的估計，經由基因工程培植出來的植物，有可能與野生品種雜交，因此生態體系大約會以每年百分之一的速度遭受破壞。這意味著大約在十年之間，即可能引起重大的環境問題。

還有一個潛在的問題是病毒。病毒特有的本質是：當病毒侵入其寄生主體的基因物質中後，經常分化寄生主體的部份基因物質，並與這些物質重新組合而產生新的病毒。當這個過程發生在實驗室以外的經基因工程培植出的動、植物身上時，就能與此動植物基因物質相結合而產生新的病毒。此種病毒一旦散播；這種新生成的病毒，因為不是自然環境中產生的，就可能就沒有自然防衛機能能夠加以抵抗。這種病毒，或許會導致大規模的動植物乃至人類的死亡。

倫理道德問題

基因工程是一門嶄新的科學。以前科學界所關心的是自然界的運作。現在則是人類有史以來第一次，科學界通過基因工程技術，從根本上改變自然界的運作。人類對於基因工程的運作是否應該進行，完全不加考慮；也不思索該以何種智慧來管理其運作過程。人類在基因工程之中投入精力，其出

Genetically engineered foods create specific ethical problems for those of various faiths. Religious vegetarians, such as Seventh Day Adventists, Hindus, and Buddhists, want to be able to avoid fruits and vegetables with insect, animal, or human genes in them. Jews and Muslims, who have special religious dietary laws, want to be able to make sure that genetically engineered foods do not violate their restrictions; for instance, they won't want pig genes in their carrots. Religious leaders from a broad spectrum of faiths, in this country and throughout the world, object to genetically engineered food because they have serious doctrinal objections to the kind of tampering with the basic patterns of life that occurs in most genetic engineering. Many others who are not formally religious wish to avoid genetically engineered foods because they also have serious ethical objections. Under our current laws, meats, vegetables, and fruits can even contain human genes without our knowing it. This kind of cannibalism is repulsive to most people.



Labeling Should Be a Right of Citizens in a Free Society

Current regulations against the labeling of genetically engineered foods blatantly abridge the rights of citizens in a free society to choose what they want to eat and what they do not. You usually cannot rely on looking, tasting, or feeling to identify genetically engineered food. Labeling is necessary for its clear identification. Therefore, because labeling is not now required, citizens are effectively denied their fundamental right of free choice. Labeling genetically engineered foods would in no way restrict the rights of those people who do wish to purchase and consume them

What Can We Do?

We can educate ourselves, our families, friends, and community about current and potential problems with genetically engineered foods. On the local level, we can talk to the grocers and store

發點並非為人類謀福利，亦非是對地球的長期或是短期的福祉作考慮，大都是公司幾乎不惜任何代價地來牟求短期的利潤。當然，短期的或者是驚人的利潤，尤其是在醫學領域，都是可能得到的。但是，由此而帶來的長遠影響，很可能遠遠超過這些利潤。

基因工程研製的食物給各種宗教帶來很特殊的問題。宗教素食者，如七日基督再臨派教徒（Adventists）、印度教徒、佛教徒都希望迴避食用那些含有昆蟲、動物，與人類基因的蔬菜與水果。回教徒與猶太教徒對飲食亦不希望違反它們教裡現有的飲食條律。比如說，回教徒不希望胡蘿蔔裡面含有豬的基因。國內外的各宗教領袖們也反對人類這種藉由基因工程，來對生命模式從最基層處所加以的干涉。其他許多非正式宗教人士亦反對，並避免食用基因食物，因為這與他們的倫理道德觀嚴重抵觸。根據我們現有法律，基因工程研製的肉類、蔬菜、與水果食物可能含有人類的基因，而消費者卻可能全不知情。這種人吃人的行為對於大多數人來說實在很噁心。

要求食物貼標籤——

自由社會裡公民應有的權利

現行的禁止給基因食物貼標籤的法規，強行剝奪了自由社會中，公民願吃什麼，不願吃什麼的選擇權力。現代人對經由基因工程研製成的食物，通常都無法通過眼觀，口嚐，與感覺來辨別，所以貼標籤對於清楚鑑別此類食物是很有必要的。但是由於法律不要求一定要貼標籤，所以公民的自由選擇的基本權利，就被剝奪了。給基因食物上標籤根本不會限制到那些基因食物之購買及消費者的權利。

我們能做什麼？

就基因工程食物現有與潛在的問題，我們可以教育我們自己、我們的家庭、我們的朋友與社區。在我們的區域範圍內，我們可以在購物時與商店店主與店員交談，他們大部份對這一話題知之甚少。我們可以請他們上標籤時清楚些，這樣可以使那些不想購買基因工程食物的人，可以迴避這類食物。在國家範圍內，我們讓我們的立法代表知道我們的心聲——希望政府嚴格審核基因工程食物的研究與發展，並且要給食物上標籤。

managers where we shop. Most of them have little awareness of the issues involved. We can ask them to label them clearly so that those who wish to avoid them can. On the national level we can let our elected representatives know that we want both stricter government oversight of research and development and also required labeling.

Local officials should enact legislation both to require stores that sell genetically engineered food to post signs to that effect and to recommend strongly that those stores make information available to their customers about which foods are genetically engineered. Local school boards should consider either labeling genetically engineered milk and other foods used in school lunch programs or banning their purchase.

Our natural defense systems against danger are inadequate to warn us of the subtle, technologically produced hazards of genetically engineered foods. Nevertheless, their potential for doing serious and irreversible harm, both to us and our environment, should be taken very seriously. I personally look forward to working with all of you who are interested in requiring both their mandatory labeling and better safeguards for their research and development.

☞ The End

地方官員應該立法要求出售基因工程食物的商店掛牌子說明，並極力建議商店提供有關於基因工程食物的資訊。各地教育局（School Board）應該考慮在學校的午餐計劃中給基因工程牛奶及其他食物上標籤，或者禁止購買這些食物。

關於基因工程食物引發的細微的、技術上的危害，我們身體的防禦系統不足於警告我們。其對於人類及環境的潛在危害之嚴重性與永久性，我們應當深深加以警惕。凡是對於基因工程食物要求強制性貼標籤，或對基因工程食物的研究與發展採取適當防範措施感興趣的人，我都在此期待著攜手一起共同努力。

【編按】上期本文中兩處之「DNA（染色體）」句中之「染色體」字樣，為「染色體之化學組成」之誤，特此向讀者致歉。DNA之中文譯名為「脫氧核糖核酸」。

☞完

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接29頁「停·看·吃」文

Stop and Look Before You Eat (Continued from p.29)

可說是改造最基層的法則。也許它對農業生產有些貢獻，但是對我們下一代卻隱藏了不可限量的危機。

從以上的例子，大概已經有人在腦海裏想像出變種的世界。花園裏的花長得像豬一樣，或是看到街上的人被顆大西瓜追著跑……等圖片。為什麼沒有人去限制這項發展呢？在這講究民權、自由的時代，我們沒辦法去限制別人的創造發明，但我們有權利選擇要與不要。所以我們希望所有產品能正確地標示出是否含有基因工程的食物，這是消費者僅有的權利，也是向「基因工程」說「不要」的最有力武器。

☞完

and freedom take first priority, we have no means to limit other people's inventions and discoveries. However, we do have the right to choose what we want. Therefore, we hope that all products can be properly labeled as to whether or not they contain genetically engineered food. This is only right that consumers have, and it is the most powerful weapon we have for saying "No" to genetic engineering.

☞ The End

