Response

Coen and Cincotta are right to emphasize the important role of family planning programs in the demographic transition. We are well aware of its importance and noted so in our Policy Forum (indeed, one of us was a principal author of the "Emerging Asia" report Coen and Cincotta cite in support of their argument). But we believe that general health deserves more emphasis than reproductive health and family planning, because it was the trigger mechanism that set off cumulative economic development; family planning entered the picture at a later stage of development, when desired fertility began to decrease. For example, desired and actual fertility in Africa are generally close in magnitude, so the availability of contraceptives is not at present the decisive issue. Later in the development process, however, family planning does become crucial, as it was in the East Asia "miracle" and is now in South Asia.

David Bloom
Department of Population and International Health, School of Public Health, Harvard University, Boston, MA 02115, USA

David Canning
Department of Economics, Queen's University Belfast, University Road, Belfast, BT7 1NN, UK

SCIENCE'S COMPASS

Health Risks of GM Foods: Many Opinions but Few Data

In the mass media in recent months the debate about genetically modified (GM) foods has increased, and scientific journals have not been an exception. *Science* and other prestigious journals such as *British Medical Journal*, *Lancet*, and *Nature* have contributed to this broad debate, which was vigorous in 1999, particularly as a result of the stir caused by Arpad Pusztai's premature release of information to the popular media (before publication in the scientific press) about adverse effects in rats that ate GM potatoes [see, for example, *Science*, 21 Aug. 1998, p. 1124; 19 Feb. 1999, p. 1094; and 22 Oct. 1999, p. 656]. In the early months of 2000, however, the concern about the health risks of the transgenic foods seems relatively latent.

I reviewed the scientific information on the health risks of GM foods using the Medline database (available at http://www.ncbi.nlm.nih.gov/pubmed/). For the first search, I used "toxicity of transgenic foods" as the base phrase for the search, which gave 44 citations. Only one citation corresponded to an experimental study in mice (*1*), whereas seven were letters to the editors of various journals, comments, viewpoints, or mere opinions. Although they did not provide a single new experimental result, some of these pieces were written as if the authors were certain about the absence of health risks of GM foods. Finally, 36 of the 44 citations were not directly related to the main topic of the search.

In a second search, I used "adverse effects of transgenic foods" as the search phrase. This search gave 67 citations, of which only two appeared to be directly related to the subject I was interested in: one had been found in the previous search (*1*), and the other was a 38-day feeding study that evaluated whether standard broiler diets prepared with transgenic Event 176–derived Bt corn had any adverse effects on broiler chickens (*2*). Of the remaining 65 citations, 16 were comments, opinions, viewpoints, etc., but again without any experimental basis, whereas 49 were not directly related to health issues of GM foods.

For a third search, I used the phrase "genetically modified foods," which gave 101 citations. Only four citations corresponded to experimental studies in which the potential adverse health effects of GM foods were evaluated. Two of them evaluated the

safety of GM soybean consumption by rats (*3, 4*). Another citation was the controversial study by Ewen and Pusztai (*5*), in which the effects of diets containing GM potatoes were examined in rats (*5*). The fourth citation corresponded to a study of the effects of the insecticidal lectin GNA on human blood cells (*6*). Only two additional studies did I consider to be related to health risks in GM foods (*7, 8*). In contrast to this very scant number of experimental studies, 37 citations were again letters to the editor, comments, opinions, or briefs. Most of them were written by proponents of the safety of transgenic foods, and only a minority showed scepticism or were opposed to the indiscriminate consumption of GM foods. However, the common denominator of all 37 citations was the fact that the opinions and comments were not based on experimental data.

One of the more surprising results of this review was the absence of citations of studies performed by biotechnology companies. If, as I assume, safety and toxicity studies of GM foods have been carried out by these companies, why have the results not been subjected to the judgment of the international scientific community, as would be the course if such research were published in reputed journals?

To corroborate my findings with Medline (*1–8*), I performed similar searches in a second database, Toxline (http://igm.nlm.nih.gov/). Among the citations found, there were no new references concerning direct studies on the potential toxicity or adverse health effects of GM foods. The only possible exception was a few articles, mostly reviews, on the risks for allergic patients and the potential allergenicity of novel foods.

With respect to the above findings, I suggest to biotechnology companies that they publish results of studies on the safety of GM foods in international peer-reviewed journals. The general population and the scientific community cannot be expected to take it on faith that the results of such studies are favorable. Informed decisions are made on the basis of experimental data, not faith.

Jose L. Domingo
Department of Toxicology, School of Medicine, "Rovira i Virgili" University, San Lorenzo 21, E-43201 Reus, Spain. E-mail: jlldr@fmcs.urv.es

References

1. N. H. Fares and A. K. El-Sayed, *Nat. Toxins* **6**, 219 (1998).
2. J. Brake and D. Vlachos, *Poult. Sci.* **77**, 648 (1998).
3. G. G. Onishchenko *et al.*, *Vopr. Pitan.* **68**, 3 (1999).
4. V. A. Tutel'ian *et al.*, *Vopr. Pitan.* **68**, 9 (1999).
5. S. W. B. Ewen and A. Pusztai, *Lancet* **354**, 1353 (1999).
6. B. Fenton, K. Stanley, S. Fenton, C. Bolton-Smith, *Lancet* **354**, 1354 (1999).
7. B. G. Hammond *et al.*, *J. Nutr.* **126**, 717 (1996).
8. R. Schubbert, D. Renz, B. Schmitz, W. Doerfler, *Proc. Natl. Acad. Sci. U.S.A.* **94**, 961 (1997).

Scope of Olefin Polymerization Nickel Catalysts

In their report "Neutral single-component nickel (II) catalysts that tolerate heteroatoms" (21 Jan., p. 460), T. R. Younkin *et al.* describe the development of a family of polymerization catalysts that are tolerant of many functional groups and low-purity starting materials. Many of their observations are well in line with our results on bis(ylide)nickel- and palladium-based catalysts, which do not need a cocatalyst and work in the technologically relevant pressure and temperature ranges.

Our bis(ylide)nickel and palladium catalysts are well documented in scientific publications [for example, (*1–3*)] and the patent literature [for example, (*4–7*)]; a full list of references can be obtained from the author. Their structures in the solid states as well as in solution are characterized by specific combinations of intact and rearranged ylide ligands. They show high activity in ethylene polymerization even without any cocatalyst (*1*). The molecular weight of the polyethylenes produced can be controlled through the specific choice of the ligands (*2*). The ligands also control the formation from linear to branched products; for example, 57 short chain branches per 1000 carbon atoms have been reported for ethylene homopolymerization without the use of any comonomers (*3*). Long chain branching can be generated in ethylene homopolymerization with bifunctional Ni/Cr catalysts, again without comonomers (*3*). The catalyst family is further useful for a variety of polyermizations, including olefin (*2*) and nonpolar and polar cycloolefin (*6, 7*) (co)polymerizations. End-functionalized polyethylenes have been obtained with styrene, divinylbenzene, and related polar monomers (*4*). Bis(ylide)catalysts effectively tolerate polar functionalities (*1–7*), such as polar solvents and polar polymer solutions, including polyvinylalchole (*5*). The catalysts have even been shown to (co)polymerize polar monomers [(*3*) and German patent DE 3700196]. The tailoring potential and polar group tolerance of bis(ylide)catalysts has led to highly sophisticated, advanced materials for liquid crystal displays and nonlinear optics (*5*).

K. Aleksander Ostoja Starzewski
Bayer AG, Central Research Department, 51368 Leverkusen, Germany

References and Notes

1. K. A. Ostoja Starzewski and J. Witte, in *Transition Metal Catalyzed Polymerizations–Ziegler Natta and Metathesis Polymerization*, R. P. Quirk, Ed. (Cambridge Univ. Press, Cambridge, 1988), pp. 472–496.
2. ———, *Angew. Chemie Int. Ewd. Engl.* **26**, 63 (1987).
3. W. C. Kaska and K. A. Ostoja Starzewski, in *Ylides and Imines of Phosphorus* (Wiley, New York, 1993), pp. 485–568, and references therein.