

Sacrificing Dialogue for Politics?

THE RECENT STATEMENT OF VIENNESE

Cardinal Schönborn “clarifying” the Catholic position on evolution is disconcerting (1). Schönborn, who is a close ally of Pope Benedict XVI, declares that “evolution in the neo-Darwinian sense is not true” and that there is “overwhelming evidence for design in biology,” thus aligning the Catholic Church with the Intelligent Design movement.

The strategy is familiar. The sophistication of evolutionary theory is misrepresented, and the process is cartooned as solely consisting of random mutation and natural selection, thus concocting a facile state of disbelief in the audience. Ample reference is made to Church documents, which declare that an unguided process of evolution outside the bounds of divine

Herein we discern some intent that goes well beyond ignorance of scientific facts.

Schönborn’s statement shows how fragile the relations between science and religion still are and how tempting it is to sacrifice dialogue for politics. The Catholic Church—indeed, any major religion—should be a partner in much-needed reflections about the societal implications of science. As Austrian evolutionary biologists, we stand against the statements expressed by the Austrian Cardinal and shall continue a dialogue with those who are not bent on fundamentalism.

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“ Schönborn’s statement shows how fragile the relations between science and religion still are and how tempting it is to sacrifice dialogue for politics.”

—LAUBICHLER ET AL.

providence “simply cannot exist.” In this medieval logic, the existence of divine intentional design seems inevitable.

Many processes in nature appear to be guided, such as a stretched rubber band becoming as short as it can despite none of its many parts “knowing” ahead of time what that configuration is. Similarly, the evolutionary process rests on the dynamics of molecular and developmental interactions that collectively shape the outcomes of random mutation and selection in a nonrandom way. This weaving together of evolution and developmental processes provides the modern experimental and theoretical framework, grounded in Darwinian thinking, for explaining the organization of living systems.

Unlike a dogmatic Church, science offers an iterative method of observation and reason that has proven to be mankind’s most fruitful approach to truth. Cardinal Schönborn brands the scores of researchers that follow the scientific method of inquiry as ideologues, while proclaiming the Church as the “firm defender of reason.” This sounds like Galilei all over again, if it wasn’t for this last surreal move, which represents a sweeping attack on science in general at a time when so many domains of western society structurally depend on it.

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Reference

1. C. Schönborn, “Finding design in nature,” *N.Y. Times*, 7 July 2005, p. A23.

Paradigm Shifts Needed for World Fisheries

THE POLICY FORUM “ECOSYSTEM-BASED

fishery management” by E. K. Pikitch *et al.* (16 July 2004, p. 346) proposes ecosystem-based fishery management (EBFM) as a new direction for fishery management, reversing the order of priorities, to start with ecosystem considerations rather than the target species. EBFM has been recommended as a holistic management approach, mainly to solve industrial fishery problems (bycatch, habitat perturbation, etc.), by U.S. advisory panels (1–3). These recommendations largely ignore artisanal (small-scale) fisheries, which involve more than 50 million fishers around the world (4), a number constantly increasing because of high unemployment rates, poverty, and food scarcity. Industrial and artisanal fisheries cannot be lumped together, as they operate on different scales and require different manage-

ment solutions. For industrial fisheries, the top short-term management priorities are (i) reduction of fleet, ground facilities, and subsidies; (ii) moratoria on new entrants into the business; and (iii) administration of catch quotas (5, 6). In artisanal fisheries, the implementation of these tools is unrealistic, because of the large social and economic costs for developing countries and because there is not sufficient information about local ecosystems (7–9). Therefore, management would mainly be based on precautionary approaches. Alternatively, societal incentives (e.g., territorial user rights for fishers, co-management, and community quotas) have been shown to solve artisanal fishery problems, where due respect to traditions is a key driver (7, 10).

The world fishery crisis is a series of complex, multifaceted problems, embedded in different societies. New perspectives for rational management require paradigm shifts, including EBFM, but principally incentives for effective governance and sharing of management roles between government and local organizations (7). In our view, legitimizing the participation of fishers in the planning and surveillance of management measures is a promising short-term solution to current artisanal fishery crises, promoting compliance with regulations (7, 11).

Ocean zoning [e.g., marine protected areas (MPAs)] has also been suggested as a critical element for EBFM. This will be difficult to achieve in industrial and artisanal fisheries, due to high enforcement costs. Implementation of MPA zoning cannot be considered as a short-term solution to current fishery crises. Although we welcome EBFM and marine protected area approaches, we feel that there is a risk associated with overemphasizing them. Management options must be also used according to societal and cultural backgrounds. Sound fishery science is a necessary, but not sufficient, condition for the sustainability of marine resources.

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References

1. Ecosystem Principles Advisory Panel, “Ecosystem-based fishery management: A report to Congress by the Ecosystem Principles Advisory Panel” (U.S. National Marine Fisheries Service, Washington, DC, 1999).
2. Pew Oceans Commission, “America’s living oceans: Charting a course for sea change. A report to the nation” (Pew Oceans Commission, Arlington, VA, 2003).
3. U.S. Commission on Ocean Policy, “Preliminary report

- of the U.S. Commission on Ocean Policy, Governor's draft" (U.S. Commission on Ocean Policy, Washington, DC, April 2004).
4. F. Berkes *et al.*, *Managing Small-Scale Fisheries* (International Development Research Centre, Ottawa, Canada, 2001) (http://web.idrc.ca/es/ev-9328-201-1-DO_TOPIC.html).
 5. J. F. Caddy, *Rev. Fish Biol. Fish.* **9**, 1 (1999).
 6. R. Hilborn *et al.*, *Annu. Rev. Environ. Resour.* **28**, 359 (2003).
 7. J. C. Castilla, O. Defeo, *Rev. Fish. Biol. Fish.* **11**, 1 (2001).
 8. R. Hilborn, A. E. Punt, J. Orensanz, *Bull. Mar. Sci.* **74**, 493 (2004).
 9. R. E. Johannes, *Annu. Rev. Ecol. Syst.* **33**, 317 (2002).
 10. R. E. Johannes, *Trends Ecol. Evol.* **13**, 243 (1999).
 11. J. C. Castilla *et al.*, *Can. Spec. Publ. Fish. Aquat. Sci.* **125**, 407 (1998).

International Gaps in Science Publications

THE POLICY FORUM "INCREASING INTERNATIONAL GAPS IN HEALTH-RELATED PUBLICATIONS" by G. Paraje *et al.* (13 May, p. 959) shows clearly that the large majority of biomedical research is carried out in high-income countries. The authors do not make clear, however, that these countries comprise a small percentage of the world population (15%) and account for an even smaller share of the global disease burden (1, 2). The consequence is that the overall research portfolio of the world is inevitably severely distorted in favor of the diseases of the rich, such as cancer and heart disease, and against those of the poor, notably HIV/AIDS, malaria, and tuberculosis. But it also means that from the perspective of the rich countries, their major diseases can actually be under-researched, as cancer is in Europe (3) (particularly compared with the situation in the United States). Meanwhile, malaria turns out to be over-researched, relative to its burden, in all but two of the 14 World Health Organization world regions, the exceptions being southern Africa and some countries in the eastern Mediterranean region (this is notably so in the UK, which accounts for nearly 20% of all relevant papers but suffers little directly from the disease), but globally under-researched by a factor of about eight, with less than \$7 spent per disability-adjusted life year compared with \$60 on cardiovascular disease and over \$100 on diabetes (4). This distortion is yet another serious consequence of the unequal division of health-related research between the countries and regions of the world.

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References

1. World Health Organization (WHO), "World health report 2002" (WHO, Geneva, 2002) (available at www.who.int/whr/2002/en/).
2. G. Lewison, *Proceedings of the Tenth ISSI (International Society for Scientometrics and Informetrics) Conference, Stockholm, Sweden* (ISSI, Leuven, Belgium, 2005), pp. 585–594.
3. S. Eckhouse *et al.*, "European Cancer Research Funding Survey" (available at www.ecrmforum.org).
4. G. Lewison, I. Rippon, A. de Francisco, S. Lipworth, *Res. Eval.* **13**, 181 (2004).

THE STIMULATING POLICY FORUM BY G. Paraje *et al.* "Increasing international gaps in health-related publications" (13 May, p. 959) was widely discussed at my institution in Bangladesh. The observation of the widening gap in numbers of scientific publications between high- and low-income nations is not surprising, given the fewer numbers of scientists in the low-income countries and the constraints they face.

The authors correctly point to "brain drain" from low- to high-income countries. From my experience in Bangladesh, well-qualified local scientists generally prefer to remain in their home country if they can find meaningful employment in institutions where they can be productive.

Well-functioning institutions contribute to "brain gain," thus increasing the scientific and economic resources of a country as a whole. Ideally, these institutions in low-income countries should be connected to the international scientific community through Internet access, access to literature, and partnerships with international scientists from other institutions.

Unfortunately, many donor organizations have shifted toward "targeted project funding" rather than institution building. Many donors provide minimal or no indirect costs, and few are interested in funding capital items or buildings. Even fewer will contribute to endowments for institutions in developing countries, yet they give generously to these same items in the United States.

Building institutions where low-income country scientists can be productive is not easy, and there is no single successful model. Some countries like Korea and China have decided to support such institutions themselves. Most low-income countries do not have sufficient financial resources to do this, but they can facilitate the establishment of such institutions and can encourage donors to contribute, as has occurred in Bangladesh. More effort is needed to understand the factors that enhance sustainability of successful research institutions in low-income countries.

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Response

OUR ANALYSIS PROVIDED FURTHER EVIDENCE that scientific publications on a broad range of health topics, not just biomedical sciences, are disproportionately distributed and highly concentrated among the world's richest countries as well as within each economic category of countries, and that the gap in the output between low-income countries and the rest of the world widened between 1992 and 2001. Indeed, as Lewison and others (1,

2) have underlined, a major disequilibrium exists among countries and regions between research funding, capacity, output, and dissemination and burden of disease and population, referred to as the "10/90 gap" (3). Research priorities do and should reflect a range of social and scientific values, not only disease burden. But the magnitude and persistence of the "10/90 gap" clearly calls for a change in the way that priorities and investments in health research are made around the world involving policy processes, research infrastructure development, and social debate. Whether an optimal solution exists remains unclear. Would, for example, a 50/50 equilibrium ensure effective and efficient use of resources to improve health around the world?

Nevertheless, to move toward a more representative research enterprise and one that is eventually relevant to the majority of the world's population, research capacities need to be greatly enhanced, particularly in low-income countries. Sack's Letter highlights strong institutions as a key ingredient to this issue and raises the challenge that institution building requires partnerships among many actors who are jointly interested in sustained and longer term development.

Along these lines and in collaboration with networks of policy-makers and researchers in 13 low- and middle-income countries involved in the Health Research Systems Analysis Initiative of the World Health Organization, we have collectively identified key factors that contribute to an enabling environment for those managing, conducting, and disseminating research addressing health topics (4). These include: (i) range and breadth of research networks; (ii) transparency of the funding process; (iii) quality of work space and facilities; (iv) encouragement of collaboration; (v) opportunities to present, discuss, and publish results, including scientific journals, media, and national and international conferences; (vi) addressing priorities that are relevant at national or international levels; (vii) adequate salary and benefits to recruit and retain trained professionals; (viii) career nurturing; (ix) training and ongoing training; and (x) access and sharing of information.

Letters to the Editor

Letters (~300 words) discuss material published in *Science* in the previous 6 months or issues of general interest. They can be submitted through the Web (www.submit2science.org) or by regular mail (1200 New York Ave., NW, Washington, DC 20005, USA). Letters are not acknowledged upon receipt, nor are authors generally consulted before publication. Whether published in full or in part, letters are subject to editing for clarity and space.

On the basis of surveys in these 13 countries, we found, surprisingly, that better remuneration was not among the top priorities for improvement from the perspective of those working in these countries. Rather, transparency of the funding process, quality of work spaces and facilities, and training and ongoing training were consistently ranked as the most important areas for further strengthening. Similarly, financial investments alone, without changing attitudes and behaviors, are unlikely to yield results. All of these measures are related to well-functioning institutions and, more broadly, to a stable macro-environment.

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References and Notes

1. R. Horton, *Lancet* **361**, 712 (2003).
2. "The 10/90 Report on Health Research 1999" (Global Forum for Health Research, Geneva, 1999).
3. Made well known by the Global Forum for Health Research, this slogan initially describes the disequilibrium between global spending on health research and the diseases or conditions that account for global disease burden. The "10/90 Gap" has now been infused with many similar interpretations, capturing a range of inequities across high-income countries and the rest of the world.
4. World Health Organization (WHO), "World report on knowledge for better health: strengthening health systems" (WHO, Geneva, 2004), p. 82, box 3.8.

CORRECTIONS AND CLARIFICATIONS

Reports: "Spectral signatures of hydrated proton vibrations in water clusters" by J. M. Headrick *et al.* (17 June, p. 1765). The authors wish to acknowledge the pioneering contribution of H.A. Schwarz [H.A. Schwarz, *J. Chem. Phys.* **67**, 5525 (1977)] for his first report of the vibrational spectra displayed by small protonated water clusters. In particular, his identification of the strong 2660 cm^{-1} band with the H_3O_4^+ Eigen ion was confirmed in a size-selective study by Okumura *et al.* [M. Okumura, L.I. Yeh, J.D. Myers, Y.T. Lee, *J. Phys. Chem.* **94**, 3416 (1990)], and the authors' recent work supports their assignment of this band to the asymmetric stretch of the embedded H_3O^+ ion.

Perspectives: "Air pollution-related illness: effects of particles" by A. Nel (6 May, p. 804). In the right-hand panel of the figure on page 804, the scale bar should be 40 nm, not 40 μm .

TECHNICAL COMMENT ABSTRACTS

COMMENT ON "Slip-Rate Measurements on the Karakorum Fault May Imply Secular Variations in Fault Motion"

Erik T. Brown, Peter Molnar, Didier L. Bourlès

Mid-Pleistocene slip rates derived from cosmic-ray exposure ages for moraines offset by slip on the Karakorum Fault exceed modern values, a finding that led Chevalier *et al.* (Reports, 21 January 2005, p. 411) to hypothesize secular variation in fault movement. A more conventional interpretation of these widely scattered ages indicates lower slip rates and eliminates arguments for temporal variability in rates.

Full text at www.sciencemag.org/cgi/content/full/309/5739/1326b

RESPONSE TO COMMENT ON "Slip-Rate Measurements on the Karakorum Fault May Imply Secular Variations in Fault Motion"

M-L. Chevalier, F. J. Ryerson, P. Tapponnier, R. C. Finkel, J. Van Der Woerd, Li Haibing, Liu Qing

Correlation between surface exposure age clusters on the Manikala moraines and local/global temperature minima supports deposition during MIS 6 and 3-2, implying negligible surface degradation. Because it is improbable that the older moraine was emplaced before MIS 6, the slip rate on the Karakorum fault must be greater than 9 mm/yr.

Full text at www.sciencemag.org/cgi/content/full/309/5739/1326c

Funding Opportunity

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