

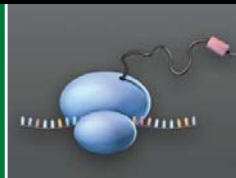
From fantasies  
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Antibiotic action

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## LETTERS

edited by Jennifer Sills

### Droplet Data Not New



CONTRARY TO THE IMPLICATION IN A. CHO'S NEWS OF THE Week story "Water droplets grow faster than expected" (24 April, p. 453), the results are not new. The reported relationship between the volume of an isolated droplet and time to the power of 3/2 is a result of "Maxwellian" diffusion-limited growth (1), first examined by James Clerk Maxwell in the 19th century (2). Also well known is the reported reduction in growth rate when the droplets are crowded together, a situation commonly found in clouds. This reduction occurs because each droplet depletes the surrounding air of water vapor, effectively maintaining the local vapor pressure at a value near equilibrium (3). The transition observed by Sokuler and co-workers occurs when the droplet growth is no longer limited by local diffusion to isolated droplets, but by larger-scale diffusion to the ensemble. The 3/2 law is familiar to cloud physicists, and the linear growth rate of crowded droplets on a substrate is well known to researchers who study "breath figures" or aggregate growth on a surface (4).

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### Cholera Vaccine Will Reduce Antibiotic Use

IN THEIR POLICY FORUM ("THE CHOLERA CRISIS in Africa," 15 May, p. 885), S. Bhattacharya *et al.* articulate important reasons for advocating vaccine development and deployment as a primary response to cholera epidemics in Africa and elsewhere. There is one more reason: Preventing cholera outbreaks through the use of vaccines also reduces the need to use antibiotics to treat the disease.

In parts of the world with suboptimal sanitation and water supply, antibiotics are widely used to shorten the period in which infectious bacteria are shed and thereby curtail transmission of *Vibrio cholerae* during epidemics. They

have also been misused as prophylactics in cholera epidemics. In the past four decades, Africa's cholera epidemics are frequently initiated by drug-resistant strains. Even more commonly, resistance to drugs of choice emerges during the course of the epidemic. When antibiotics are ineffective, the number of individuals infected, as well as mortality rates, can rise (1, 2). Moreover, the repertoire of resistance genes and elements in cholera bacteria is expanding, and some strains carry multiple genes conferring resistance to a single drug (3).

Effective vaccines offer longer-term protection than antibiotic drugs and therefore, in spite of higher delivery cost, would be more cost-effective in difficult-to-access or displaced populations, who are the most likely

victims of repeated epidemics. In Africa, where the infectious disease burden means that overall selective pressure for resistance is unavoidably high, cholera vaccines for epidemic deployment could help to extend the life of valuable antibacterials.

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### How to Improve U.S. Education

IN A RECENT NEWSMAKER INTERVIEW ("ARNE Duncan hopes a team approach will improve U.S. schools," J. Mervis, 10 April, p. 159), Education Secretary Arne Duncan responded to a question about whether there is a consensus regarding what students should know about science before leaving high school. He replied that "...across the board, we need to get clearer, higher, fewer standards." He is apparently unaware of the K-12 science learning goals developed in an unprecedented undertaking by the American Association for the Advancement of Science (AAAS) (1-3) or of those formulated by the National Academy of Sciences (NAS) (4). Duncan must understand that we simply do not need another definition of what students have to know before they leave high school in order to move ahead with substantial reform.

The windfall monies now available to the

#### Letters to the Editor

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Folding and bending DNA

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U.S. Department of Education (ED) and the National Science Foundation (NSF) can potentially put the United States on track to realize fundamental and lasting improvements in the quality and availability of science education. But the funds may well be wasted if they are invested in an array of panic-driven quick fixes. Thus, ED and NSF must work together to design a long-term plan of action that focuses on the attainment of the learning goals in the AAAS and NAS documents (1–4); interrelates programs for improving teacher preparation, redesigning school science curricula (5), and developing teaching materials and assessment instruments; carries out the serious cognitive research and data collection needed to inform those undertakings; and takes into account the lessons of the past, both positive and negative (6, 7).

Achieving these goals will not be easy, but it is possible and even necessary—and the leadership of AAAS and *Science* can be crucial to the success of this agenda. **F. JAMES RUTHERFORD**

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8. The author is a former Chief Executive Officer of AAAS.

## China Fights Against Statistical Corruption

PARTICULARLY IN THE CURRENT FINANCIAL crisis, many countries rely on statistics released by the Chinese government for production and trade of bulk commodities, exchange rates, and economic stimulus. However, the credibility of China's statistics has long been questioned. On 1 May, a new regulation, *Rules on Punishment for Violation of Laws in Statistics*, was put in effect by the Ministry of Supervision, Ministry of Human Resources and Social Security, and the National Bureau of Statistics (1).

Statistical corruption has been found in China for years, largely for two reasons. First, economic growth is a key factor determining the promotion of government officials. Statistical data and numbers are regarded as a reflection of economic growth, which is used to evaluate the performance of the officials.

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This is the so-called “numbers make leaders” phenomenon (“shu zi chu guan” in Chinese). Second, the statistical organizations are not independent entities in China. They are a part of the government and hence are vulnerable to government interference. Without specific laws and regulations to punish statistical corruption, government leaders can intervene in statistical reporting with low political risks. They may tailor statistics for different purposes, such as inflating statistical numbers that indicate economic achievements and decreasing statistical numbers for environmental pollution and damage (2). This is the so-called “leaders make numbers” phenomenon (“guan chu shu zi” in Chinese).

The previous Statistics Law in China has been in effect since 1983, but it was too vague to enforce. Although it stated the penalty for illegal acts, the law did not clearly specify the types of the illegal acts and the extent to which penalties should be imposed. In contrast, the new regulation lists four types of statistics cheating: revising statistics without permission, or making up statistics; forcing or ordering statistics departments or individuals to revise or make up statistics or refuse to report statistics; retaliation against individuals who refuse to issue false statistics; and retaliation against individuals who report statistics violations (3). The degree of punishment depends on consequences of the violations, and the punishments include a warning, recording a demerit, or even removing officials from their positions.

The new regulation is an important step in the fight against statistical corruption in China. Nevertheless, to eradicate illegal acts in statistical work, further actions are needed, such as reform of the evaluation system for officials and the establishment of independent statistical organizations. Without progress in these areas, the goal of an 8% GDP growth rate for 2009 announced by the Chinese government could be merely another number created by leaders.

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## Organics: Evidence of Health Benefits Lacking

MANY CONSUMERS CITE “HEALTH AND NUTRITIONAL concerns” as the primary reason for purchasing organic food (1). There are several hypotheses to explain why organic foods might be nutritionally superior to conventionally produced foods, including (i) the idea that nutrient uptake is enhanced because organic fertilizers release nutrients slowly, and (ii) the theory that conventional pesticides and herbicides may disrupt nutrient absorption or synthesis, potentially lowering nutrient levels in crops. However, systematic literature reviews over three decades, including a very recent one (2), have demonstrated neither consistent nor meaningful differences in nutrient levels.

Furthermore, almost all reviews and much of the original research report only the statistical significance of the differences in nutrient levels—not whether they are nutritionally important (3). To determine the latter, nutrient comparisons must be made on a per serving basis and then set against a standard, such as the FDA/USDA requirement that a nutrient must be 10% higher than it is in a comparison product to make the claim that the product has more of the nutrient.

Levels of phytochemicals—compounds found in plants that are not classified as nutrients but appear to play a role in reducing the risk of certain diseases—are frequently reported to be higher in organic foods compared with conventional foods. Although the production environment appears to affect the level of phytochemicals by as much as 30% [e.g., (4)], the genotype (variety) can vary the composition by a factor of three to ten, or more [e.g., (5)]. Therefore, cultivar selection may be as important or more important than the production method in increasing overall intake of these important compounds. However, data on phytochemical content are generally insufficient, and standards on which to base diet recommendations are lacking.

Studies demonstrate that it is the total amount of dietary phytochemicals, not the amounts of individual compounds in a single food, that is important in reducing the chronic disease risk (6).

As Magkos *et al.* (7) state, “the quality of a food product should be considered as the result of the general quality of its production system.” We can’t stress enough the many potential public health and environmental benefits from organic production methods and the consumption of organic foods (e.g., low pesticide residues and reduced soil loss). Given these important benefits, supporting unsubstantiated claims of nutritional superiority is an unwise and unnecessary argument for promoting dietary change. For now, we urge scientists, producers, and others to carefully “identify the boundaries of accurate messaging” (8) and not to mislead themselves and the public.

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## CORRECTIONS AND CLARIFICATIONS

**Reports:** “Avian paternal care had dinosaur origin” by D. J. Varricchio *et al.* (19 December 2008, p. 1826). Incorrect Akaike weights and evidence ratios were used in the comparison of clutch volume–body mass data of three nonavian dinosaurs (Troodon, Citipati, and Oviraptor) to four a priori models generated from extant archosaurs. Erroneous Akaike information criterion values were calculated using base 10 rather than the natural logarithm. The corrected Akaike weights for the four models are bird-paternal, 0.698; bird-maternal, 0.174; crocodile-maternal, 0.093; and bird-biparental, 0.036. Thus, clutch volume–adult body mass ratios of these dinosaurs are 4.0, 7.5, and 19.5 times more likely to fit the bird-paternal model than the bird-maternal, crocodile-maternal, and bird-biparental models, respectively. These corrected values do not alter but instead lend greater support to the original interpretation.

**Letters:** “Optimizing ecosystem services in China” by W. J. Mitsch *et al.* (24 October 2008, p. 528). The distance between the Three Gorges Dam and Chongqing city center is 600 km, not 300 km. Chongqing province and the site of our investigations, however, is well within 300 km of the dam. Flooding in the pool behind the dam is currently being investigated so that it will be lower than originally predicted 600 km upstream at Chongqing city.