terial, which was found "next to or touching the hind portion of the skeleton," and once without it. In both cases the phylogenetic position of *Rahonavis* was the same, clustering with *Unenlagia* plus *Archaeopteryx* and other birds. This shows clearly that the fore and hind limbs belong to the same animal, unless they represent two different kinds of animals with exactly the same evolutionary relationships to other groups (which would amount to nearly the same thing).

Critics of the dinosaurian ancestry of birds are quoted as characterizing *Rahonavis* as "a little dinosaur hindquarter, with a bird's forelimbs," or as "another dinosaur trying to hit it big as a bird." The kinds of analysis that Forster *et al.* carried out indicate that these critics are closer to the mark than they would like to be, because the overwhelming evidence indicates that birds did indeed evolve from dinosaurs (*2*). As evolutionary theory would predict, the most basal birds show a mosaic of retained theropod features and new avian characters.

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Science in Vietnam

I read with interest the recent informative coverage of "Science in Southeast Asia" (Special News Report, 6 Mar., p. 1465). However, I wish that Vietnam had been part of the survey. While Vietnam is poor compared with other Southeast Asian countries, it has great potential. After years of wars and isolation, Vietnam is only gradually becoming reintegrated into the world, but its scientists have been making their presence known internationally for years. Despite enormous difficulties, including severe constraints in funding and inadequate infrastructure for research, Vietnamese universities have managed to produce fine mathematicians, physicists, medical researchers, agricultural experts, and engineers, many of whom are highly respected in their fields. The newly created Vietnam National University is expected to play a critical role in the future development of Vietnamese science.

Vietnamese scientists currently working in industrialized countries, particularly North America and Europe, have made important contributions in computer science, mathematics, aerospace engineering, chemistry, and medical research. They have also participated in space exploration in the astronaut program.

The Vietnamese have a tremendous love of higher education and a tremendous passion for learning. However, they have received sporadic assistance from the industrialized world. In view of Vietnam's current reentry into the international community, it is now perhaps time for Vietnamese science to be given due attention.

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A Good Estrogen

Robert Service's article "New role for estrogens in cancer?" (Research News, 13 Mar., p. 1631) reminds us of the dark side of estrogen metabolites in promoting cancers. However, a major estrogen metabolite, 2-methoxyestradiol ($2ME_2$), represents the bright

side of the story.

It is the only metabolite of estrogen devoid of uterotropic, estrogenic, or tumorigenic activity in vivo (*1*, *2*) and is now emerging as a potential therapeutic for the treatment of angiogenic-based diseases. Recent studies have shown $2ME_2$ to be a potent nonspecific antimitotic agent in vitro and an effective oral anti-angiogenic and antitumor agent in vivo (2–5). It may be the first endogenous chemotherapeutic compound that is a physiological metabolite in humans.

$2ME_2$ is the product of the sequential hydroxylation and methylation of estradiol. The liver is the principle organ of hydroxylation, while the erythrocytes are perhaps the major site for methylation through the activity of a catechol-o-methyl transferase (COMT). The equilibrium of the reaction catalyzed by this enzyme favors the conversion of 2-hydroxyestradiol to $2ME_2$. Accordingly, the physiological plasma levels of the latter are one to two orders of magnitude higher than for 2-hydroxyestradiol.

In vivo studies have shown that $2ME_2$ inhibits the vascularization and growth rate of various tumors resulting in more than 60% inhibition of tumor size (*4*, *5*). Consistent with these observations, we have recently found that oral administration of $2ME_2$ is equally effective at inhibiting lung metastases in the experimental B16 melanoma model. Toxic effects such as hair loss, gastrointestinal disturbance, or inhibition of leukopoiesis commonly associated with conventional chemotherapy were not observed or reported in any of the in vivo experiments (*2–4*).

On a final note, the association of low levels of COMT with increased breast cancer incidence may reflect not only a higher concentration of potentially carcinogenic estrogens (*6*) but a decrease in $2ME_2$ concentration.

Yes, Virginia, there are some good estrogens after all!

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Causal Systems in Ecology

In his Research commentary "Ecological science and statistical paradigms: At the threshold" (*Science*'s Compass, 23 Jan., p. 502), Brian A. Maurer states that process models are essential in advancing understanding of causal systems in ecology. He points out the difficulties in parameter inference and model comparison that accompany such models and proposes that ecologists adopt likelihood-based methods to overcome these problems (see also E. Roe, Letters, 8 May, p. 807). While I applaud his call to "ecologists to adopt more sophisticated approaches and philosophies for data analysis," I find his central focus on likelihood as a solution to the problem of model assessment too narrow.

First, many interesting ecological process models are deterministic. Without an associated error structure or stochastic component, a likelihood cannot be defined. Second, even for those process models with stochastic elements, not all likelihoods are solvable. For example, a partially observed two-compartment linear birth-death model can have a computationally infeasible likelihood (*1*). Third, only nested model structures can be compared by likelihood methods (*2*).