LETTERS

How It Was

Readers point out that protein sequence databases were "pioneered" in the mid-1960s and that "many search and analysis programs" are now available. The behavior of nesting dinosaurs is further discussed (see also Letters, 14 June, p. 1571). The "debate" about tobacco industry money being used to fund research about "tobacco-related disease" continues. And an effort to provide "early warning" of "geomagnetic disturbances" that can disrupt electric power service is lauded.

Not the "Dark Ages"

Nigel Williams (News & Comment, 17 May, p. 946) quotes Mike Waterfield as saying, "you could get by without SWISS-PROT if researchers wrote their own programs to search different databases, but it'd be like going back to the Dark Ages." This misrepresents the state of the art.

Macromolecular sequence databases were pioneered by Margaret O. Dayhoff in the mid-1960s as the Atlas of Protein Sequences and Structure (which also included the first DNA database). It subsequently evolved into the Protein Information Resource (PIR), predating SWISS-PROT by more than 20 years. The PIR is now maintained by an international consortium, called PIR-International (*1*) which includes the National Biomedical Research Foundation (NBRF) in the United States (*2*), the Martinsried Institute for Protein Sequences (MIPS) in Europe, and the Japan International Protein Information Database (JIPID) in the Far East. SWISS-PROT for a number of years has relied heavily on data derived from the PIR to compile its entries, according to past SWISS-PROT announcements. Thus we consider PIR and SWISS-PROT to be complementary.

We strongly support the continuation of SWISS-PROT and regret its funding instability. However, reference to the "Dark Ages" is unfortunate because many search and analysis programs are already available on the Internet and the World Wide Web (*3*).

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Dinosaurs and Their Youth

In their report "Juvenile skeletal structure and the reproductive habits of dinosaurs" (3 May, p. 712), Nicholas R. Geist and Terry D. Jones conclude that juvenile dinosaurs were precocial (mobile and relatively independent) at hatching. This conclusion is not novel, but is expected because both crocodiles and ratite birds (the basal sistergroup to all other living birds) are precocial at hatching. Precociality is a primitive characteristic of Archosauria, as can be determined by its phylogenetic distribution within the group (*1*).

Geist and Jones state that the pelvic girdle of *Oviraptor* was well ossified as an embryo and that "the discovery [by us (*2*)] of eggs in close association with an adult *Oviraptor* has been interpreted as evidence of birdlike parental behaviour, including perhaps endothermy and incubation of eggs by adults." This misrepresents statements in our original paper. In our paper about the brooding theropod (*3*), we defined brooding behavior as "the behaviour of sitting on nests." In living birds, this behaviour is associated with thermoregulatory incubation; however, we explicitly caution that "[a]lthough strongly suggestive, this does *not* imply that brooding behaviour and endothermy are necessarily correlated" (italics added) (*3*, p. 776).

As pointed out by Geist and Jones, nest attending and brooding (which they left undefined) is widespread among tetrapods. They cite one example where "female crocodiles (*Crocodilus niloticus*) *often* rest their lower *throat* or *thorax* directly on the nest for the duration of the 90-day incubation period" (italics added). Birds (both precocial and altricial) sit in the middle of their nests, curl their legs up under themselves, and the eggs are manipulated into a neat pattern around the body. These behaviors are not found in crocodiles. Birds are living dinosaurs. *Oviraptor* is closely related to birds (*4*). *Oviraptor* fossils have been found not just in "close association" with nests, but in actual brooding positions over neatly arranged nests, identical to the pattern seen today in birds. In light of this evidence, we find it perplexing that Geist and Jones suggest that "the nesting behavior of dinosaurs was likely similar to that of modern crocodilians."

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5. We thank M. Novacek and D. Frost. Supported by NSF grant DEB-9407999.

Response: Norell and Clark dismiss the importance of our conclusion that all known juvenile dinosaurs were probably precocial. However, since 1988, when it was proposed that some dinosaurs were altricial (nest-bound) (*1*), several authors have tacitly accepted dinosaur altriciality without question (*2*). We also hypothesized in our report that dinosaur neonate pelvic ossification is a reliable indicator of maturity at hatching.

Norell and Clark object to our assertion that their previous statements linked brooding in *Oviraptor* with possible egg incubation and endothermy. However, Norell *et al.* have written previously that "very exceptionally, some extant ectotherms are also known to brood their nests . . ." and, consequently, that apparent brooding behavior in *Oviraptor* is "strongly suggestive" of a correlation between brooding behavior and endothermy (*3*, p. 776). In fact, nest-brooding, whether for thermoregulatory or protective purposes, is known to occur in many modern amphibians and reptiles (more than 100 species) and in birds. Brooding is likely to be a primitive archosaurian attribute and so is not "strongly suggestive" of endothermy.

The fact that modern brooding crocodilians do not "curl their legs up under themselves" in the avian fashion does not obviate our conclusion that there is little to differentiate brooding in dinosaurs from that in crocodilians. Modern crocodilians are relatively short-limbed, a condition that would make it difficult to curl their legs up beneath themselves. Nevertheless, both birds and crocodilians brood their eggs by resting their body directly on the nest, regardless of the position of the legs. Furthermore, investigations of nests now assigned to *Oviraptor* concluded that the eggs were laid directly in their final position without manipulation (*4*). To imply that the brooding behavior of *Oviraptor* is necessarily more bird- than crocodile-like seems without foundation.

Finally, Norell and Clark imply that much can be gleaned about *Oviraptor*'s reproductive biology because "birds are living dinosaurs." This may or may not be so (*5*). We merely point out that *Oviraptor* fossils present no significant evidence that precluded their reproductive biology from having resembled that of modern crocodilians.

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Tobacco Research

The article by Jon Cohen dealing with the Council for Tobacco Research (CTR) ("Tobacco money lights up a debate," Special News Report, 26 Apr., p. 488) is relatively reasonable. However, one error should be corrected.

Seventeen years ago, a CTR-sponsored study by epidemiologist Gary Friedman, published in the *New England Journal of Medicine* (*1*) indicated a higher rate of heart disease in smokers than in nonsmokers. Cohen's article states that "CTR took the unusual step of issuing a press release stating that the study had not made "any suggestion of cause and effect." We believe this statement may be attributed to Stanton Glantz *et al.* (*1*, p. 323) in reference to an internal memorandum of one of the tobacco companies.

At no time did CTR issue any public statement relative to the publication by Friedman. Indeed, CTR has always encouraged investigators to publish results of research, whether favorable or unfavorable to the tobacco industry. An unbiased survey of the more than 1000 investigators that CTR has supported will confirm that no effort has ever been made to direct research or the publication of results.

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1. S. Glantz *et al.*, *The Cigarette Papers* (Univ. of California Press, Berkeley, 1996).

Response: Glenn is correct that the document I referred to is not a CTR press release. I regret the error. Unfortunately, Glenn did not respond to repeated requests for an interview that might have clarified this point. Glantz, who quoted from the memo in the 19 July 1995 *Journal of the American Medical Association*, introduced it by writing that "CTR released the following public statement." He said he "surmised" that it was a CTR memo based on where it was in the collection of leaked documents he received. The document instructs the staff of an unidentified organization, which Glenn says is a tobacco company, that "[t]his is our statement when asked for comment on the paper published today in the *New England Journal of Medicine* by Friedman, a CTR grantee." The document says in part

> There isn't any suggestion of cause-and-effect. . . . This and so much else in the medical literature just shows that we have a great deal more to learn before we can reach any solid conclusions about smoking. It may or may not be hazardous, and that's where we are.

(The memo can be seen on the Internet at http://galen.library.ucsf.edu/tobacco/docs/html/1916.01/1916.01.html.)—**Jon Cohen**