

are about the same age or even older than the first known dinosaurs, such as *Eoraptor* or the herrerasaurids, seems improbable.

So where does *Protoavis* fit in? It could be a taphonomic assemblage of different animals. But there are some bony elements that clearly exhibit bird-like characters. The *Protoavis* evidence could also suggest either the presence in the Upper Triassic of a non-avian theropod or other archosaur with convergent bird traits, or the appearance of the avian clade more than 200 million years ago. Present-day evidence is much more consistent with the first hypothesis.

Although all three books fit in with the consensus that birds are flying dinosaurs, there are differences in their proposals about the origin of flight. There are two hypotheses to account for the origin of flight: "from the trees down" (usually associated with a non-dinosaurian ancestor of birds), and "from the ground up" (usually associated with a dinosaurian ancestor of birds). Shipman agrees with Dingus and Rowe in maintaining the consensus on the origin of flight, following the "from the ground up" hypothesis, suggesting that avian flight originated from a cursorial biped (a theropod dinosaur), whereas Chatterjee suggests a new synthesis, proposing a dinosaurian ancestor of birds and a "from the trees down" origin of flight. He considers some theropod clades, commonly thought to be highly cursorial animals, as arboreal ones. This requires new functional interpretations of some structures: for example, the stiffened caudal appendage must be reinterpreted as a climbing prop. Nevertheless, there are no features that clearly indicate an arboreal habitat for theropods such as ornithomimids, whereas nearly every feature indicates that they are extremely well adapted for high-speed running.

Shipman makes an outstanding analysis of the contribution of *Archaeopteryx* to discussions about the origin of flight. She considers the subject from the impartial point of view of someone from another research field. This allows her, after analysing all the hypotheses, to reach a conclusion based mainly on a functional approach: that birds come from a cursorial theropod ancestor.

Shipman's book is an accessible, yet precise, account. It provides a solid background to the importance of *Archaeopteryx* for understanding the origin of avian flight, and is suitable for specialists and non-specialists. Dingus and Rowe focus on dinosaurs, dealing with birds and the origin of flight within the context of the K/T boundary extinctions. They present much information, provide a good phylogenetic background and use familiar language. They construct a hypothetical, conceptual and methodological framework that could be assumed by a large part of the scientific community. Chatterjee takes a more specialist point of view. The other two books present a comprehensive

Fishing for solutions

"While fisheries around the world are in trouble, it's not too late to turn the tide," we read in *Faces of Fishing: People, Food and the Sea at the Beginning of the 21st Century* (Monterey Bay Aquarium, \$19.95). Bradford Matsen presents both the problems and potential remedies, in a book based on images collected for an exhibition held by the Californian aquarium.



survey of the most relevant alternative hypotheses, but Chatterjee's is different because most of the main hypotheses are his own and are not widely accepted. □

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Farming forecast

Climate Change and the Global Harvest: Potential Impacts of the Greenhouse Effect on Agriculture by Cynthia Rosenzweig and Daniel Hillel *Oxford University Press: 1998. Pp. 324. £49.50, \$65*

Peter D. Moore

The public expects science to be predictive, but most scientists are sufficiently aware of their own ignorance to avoid prediction wherever possible and to qualify it with wide error margins if speculation is unavoidable. Agricultural scientists are among those of whom most is demanded by politicians and the public, yet they face some of the greatest problems in prediction, as they deal with several levels of compounded errors.

They inherit the innate uncertainties of climate prediction and also have to scale up to global levels from small-scale experiments on the responses of crop plants to simulated sets of conditions. They then need to account for the simultaneous responses of weeds, pests and diseases to the new conditions before they can assess the outcome of change on global crop yields. As the geographical pattern of agricultural practice inevitably changes, there are also matters such as soil conservation, wildlife habitat protection and socioeconomic factors to consider, all of which differ from one area to another. Considering all of these variables together, it is a brave author who is willing to write a book about climate change and the global harvest.

A commendable feature of the book by Cynthia Rosenzweig and Daniel Hillel is their readiness to face the complex factors that will influence the agriculture of the future. Consider, for example, the consequences of altered attitudes to energy production resulting from efforts to avoid carbon emissions to the atmosphere. Energy-expensive agrochemicals will be avoided, reduced tillage agriculture will be demanded, biomass energy plantations may compete with food production, extra land may be flooded for hydro-development, and so on. Rosenzweig and Hillel take great pains to document the involvement of agricultural processes in the emission and control of greenhouse gases into the atmosphere and the consequent feedback effects of agricultural change.

The response of a crop to environmental change can be investigated in several ways. The use of controlled environment chambers has many advantages, such as precise factor control, but may not adequately simulate conditions of soil evaporation. Field experiments using open-topped enclosures have been more satisfactory, but even this approach has disadvantages, such as the difficulty in investigating the interactive effect of increased carbon dioxide at different temperatures. There is also the problem of scaling up from such data in a world of varied microclimate and soil conditions. Such soil variations may mean that the potential advantages of higher carbon dioxide levels for plant growth will not occur in many regions because of soil nutrient limitation.

Using recent experience of atmospheric and agricultural change to test the validity of models appears superficially attractive, and one can calculate the expected increase in global agricultural yield as a result of increasing atmospheric carbon dioxide levels from 280 to 360 p.p.m.v. (the observed change over the past 200 years) at 7.5%. The problem is that improved varieties of crops and enhanced input of nitrogen to soils from atmospheric pollution have also influenced

yields, so the crop response model cannot easily be tested from historical documentation.

Changes in pest populations further complicate the picture, as increased global temperatures will generally lead to higher levels of pest infestation in agriculture. Migratory pests that currently survive the winter in lower-latitude refugia, such as the sunflower moth and the corn earworm, may benefit from extended winter ranges and possibly also from easier transportation from one region to another with new atmospheric circulation patterns.

As well as considering the total global yield of agricultural production, Rosenzweig and Hillel investigate regional effects in relation to local environmental and economic conditions. Modelling suggests that the greatest potential increases in agricultural production will occur in Canada and Russia, with the strongest negative trends in equatorial regions, particularly Central America and South-East Asia. But the outcome is dependent on the extent of the temperature rise and, if the increase in global temperature reaches 4 °C, the impact could be negative throughout the world.

The authors use Egypt and the United States as case studies to examine the likely impact of global change on agriculture in specific areas. They demonstrate the flexibility of the United States in responding to new conditions and regard its agriculture as relatively robust but perhaps sensitive to the anticipated variability of a future climate. Egypt, which depends on irrigation for its agriculture, should be regarded as at risk. A rise in sea level would cause greater erosion and salination of the valuable lands of the Nile delta, and a rise in temperature and evaporation can have only negative effects. Much will depend on Egypt's efficiency in the use of its agricultural land and its limited water resources.

The authors conclude that uncertainties abound. They are cautious in their predictions, but their book must rank as the most integrated, informative and accessible account of the complexities of this subject. □

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Stress points

A Mood Apart: A Thinker's Guide to Emotion and its Disorders

by Peter C. Whybrow
HarperCollins/Picador: 1998. Pp. 340.
\$14 (pbk), £17.99 (hbk)

Stuart Sutherland

As anyone working in the field will tell you, our knowledge of the neural correlates of manic depression has vastly increased in recent years. We now have at least 20 drugs

that alleviate depression and several that both reduce mania and have a prophylactic effect on bipolar manic depression. We know — or think we know — which neurotransmitters are involved in affective illness. We also know much about the hormonal and neurotransmitter responses to stress, which are often, although by no means always, a precipitating factor in mental illness. And we have developed a psychological treatment for depression that actually works.

But despite these advances, a great deal remains opaque. The prototypes of most of the drugs were discovered by chance. We have no idea of the detailed neural pathways governing mood. We are uncertain of the aberrations in transmitter function that result in depression or mania. And we do not understand why stress should sometimes be beneficial, sometimes disastrous.

In his account of affective disorders, Peter C. Whybrow emphasizes the importance of stress. He argues that the physical threats with which the brain has evolved to cope were transient, whereas stress induced by social factors can be long-lasting and hence damaging. He repeatedly claims that homeostasis is disorganized by stress. True, the brain contains an incredible number of homeostatic mechanisms but, unless the way these mechanisms are affected can be specified, the use of the term "homeostasis" serves only to conceal our ignorance.

Although Whybrow knows his way around the brain's biochemistry, he is sometimes rather dogmatic. Perhaps he thought it would tax the reader too heavily if he mentioned explanations antithetic to his own. For example, he believes that depression is in part caused by underactivity in the monoamine systems, particularly that of dopamine, but many believe that overactivity is the cause. The drugs that ameliorate depression take several weeks to work and their efficacy may depend on a reduction of post-synaptic receptors in response to a sharp increase in amine activity. Moreover, Whybrow is sometimes cavalier with facts. He writes "Prozac affects only serotonin": in reality, it affects several neurotransmitters, and is the least selective of all the serotonin-specific reuptake inhibitors.

Unfortunately, the book goes more seriously awry when it deals with the psychological aspects of mood. The account of cognitive therapy is unsatisfactory. Whybrow believes that depression is associated with an "inaccurate" view of the world and of oneself, a view that is gloomier than is justified. In reality, the depressive's views are more accurate than those of normal people. The fact is — perhaps not surprisingly in this vale of tears — that people can be happy only if they are unrealistically optimistic. Again, he asserts that losing a mother or having a disturbed childhood can lead to depression in later life, but this is at best contentious.

Indeed, one authority recently wrote that the influence of child abuse on adult personality was "barely detectable".

The book has a rather ponderous style. For example, Whybrow writes of the action potential: "This efficient architectural innovation is essential to the increased speed of signalling that is a key element of survival behaviour", a statement that could have been made using half the number of words.

Whybrow follows current fashion by larding the text with anecdotes about himself, his friends and his patients. The inclusion of such largely irrelevant material is an insult to readers, as it assumes they cannot concentrate on a serious exposition without being constantly diverted by the human touch.

Having been rather critical, I should confess an interest: I am myself about to publish a book on mental illness, some of which overlaps with Whybrow's. I approached his book with the highest expectations, based on his eminence, and maybe I have overreacted to my disappointment; other readers may appreciate it more. Whybrow is extremely learned, as shown by the 70 pages of references and notes, which — at least for me — made considerably better reading than the text. Moreover, from time to time he makes some good points, for example by insisting that depression is not akin to sadness. And those of a more literary disposition may well enjoy the mixture of fact, speculation and emotional tales, some of which might make moving short stories. □

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New Journals

This year, *Nature's* annual new journals review supplement will appear in the issue of 10 September. Publishers and learned societies are invited to submit journals for review, as well as details of any eligible electronic journals, taking note of the following criteria:

- Journals must have first appeared during or after June 1996 and issued at least four separate numbers by the end of May 1998.
- Journals covering any aspect of science are eligible, although those dealing with clinical medicine and pure mathematics are excluded, as are newsletters and publications of abstracts.
- Frequency of publication must be at least three times a year.
- The main language is English.
- Deadline for submission is 5 June.

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