Illuminated view

WEAK binding processes are hard to analyse because the free ligand is perforce always in large excess over the bound. C. L. Poglitsch *et al.* (*Biochemistry* **30**, 6662–6671, 1991) now demonstrate the virtues of a new method which they use to quantitate the weak interaction between an IgG and an Fc receptor *in vitro*. The receptor is incorporated into liposomes, which are then deposited on a quartz plate and fused into a continuous bilayer. This is placed in contact with a solution of fluorescein-labelled antibody and examined by fluorescence, excited by a laser at a glancing angle to give total internal reflection. The light penetrates less than 100 nm into the solution and so excites only surface-bound fluorophores. Binding isotherms of enviable precision deliver an association constant of a mere $3 \times 10^5\ M^{-1}$.

Unnatural gas

COOL astrophysical clouds are known to contain all kinds of organic molecules, so it comes as a bit of a surprise to see J. H. Lacy *et al.* (*Astrophys. J.* **376**, 556–560; 1991) announcing the first detection of methane, the simplest saturated hydrocarbon, outside the Solar System. Many other simple hydrocarbons have been found, but the weakness of methane's molecular lines allowed it to elude detection until now. Lacy *et al.* distinguish both gaseous and solid methane (the latter presumably a mantle on dust grains) in the spectra of molecular clouds around young stars. The presence of either form is not hard to explain, but their coexistence is more problematic. There is less gas than would be expected if the grain mantles evaporate by stellar irradiation. The authors speculate that gaseous methane must be vulnerable to gas-phase reactions in the dense molecular clouds.

Rats' tales

RATS resistant to warfarin pay a huge price for the privilege. Warfarin is an anticoagulant, thought to work by inhibiting an enzyme called vitamin K epoxide reductase which is involved in the production of blood clotting factors. The drawback is that mutant enzymes are almost as unresponsive to vitamin K, their co-factor, as to warfarin itself. The result is that the protected rats are deficient in vitamin K. They are also smaller then their susceptible cousins, but expenditure of extra energy in patching up the defect may not be the reason. P. Smith *et al.* (*Functional Ecology* **5**, 441–447; 1991) note that a reduced version of vitamin K is essential for maintaining high concentrations of the bone growth promoter osteocalcin, and suggest that it is this aspect of vitamin K deficiency that stunts growth.

the known fungal species, much less those yet unknown. The International Mycological Institute at Kew, for instance, holds a reference collection of about 31,500 species, which occupy 1,456 metres of shelving in compactors. An equivalent collection of Hawksworth's global total of 1.6 million species would run to over 70 km of shelving. The need to computerize the data, preferably on CD-ROM disks with graphic and picture-storing capability, is evident, even though the costs are high in comparison with the traditions of this discipline[10] (but not in comparison with other areas seen as 'big science'). As for conservation of species endangered by habitat loss or other environmental changes, it is sufficient to note that *ex situ* collections of living fungal cultures include fewer than 12,000 species, or around one sixth of known species.

Fungi lack the appeal of the panda, or even of the average beetle, but they are key players in most ecosystems, especially as decomposers and soil-developers. Hawksworth discusses their significance in the evolution of organic diversity, suggesting that they were crucial to land colonization by plants, and — especially through the development of mutualisms — to the subsequent radiation of other groups, particularly vascular plants and many insects. Like Rodney Dangerfield, they deserve more respect. □

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PLATE TECTONICS

About turn for supercontinents

Chris J. H. Hartnady

THE supercontinent Pangaea, which existed about 200 million years ago, was formed by the (not much) earlier collision of two smaller land masses, Gondwanaland to the south and Laurasia to the north. Was there also an ancient supercontinental ancestor to these blocks; and if so, what did it (or they) actually look like? These are among the issues addressed in a series of related papers by Moores[1], Dalziel[2], and Hoffman[3], with fresh perspectives on the evolution of Gondwanaland and the configuration of its precursor supercontinent during the Late Proterozoic era (900–530 million years ago). The answers that are emerging may surprise — not least the suggestion that Gondwanaland arose when its predecessor "turned inside-out"[3] on the spherical surface of our planet. This suggests that continental rifting and accretion by continent–continent collision are two facets of the same plate-tectonic process.

The essential palaeogeography of Gondwanaland was established in 1937 by Du Toit[4], and a geological wall-map now exists of the continent[5]. A common view is that it originated by rifting of a unitary Proterozoic supercontinent[6], which also spawned its counterpart in the Northern Hemisphere, Laurasia. But the idea that, through most of geological time, a single primal supercontinent drifted more or less rigidly over the surface of the globe is open to serious challenge. Instead, the continuous operation of plate tectonics over the greater part of Earth history has probably led, via the so-called 'Wilson Cycle', to the episodic disruption and re-assembly of continental fragments into a number of varied mosaical configurations at different times[7]. Indeed, the alternative view of Gondwanaland's origin is that it formed not by rifting from a larger whole, but by a collision between the putative, smaller West Gondwanaland and East Gondwanaland blocks[8]. The high-grade metamorphic Mozambique Belt of East Africa and Madagascar is usually considered to be the zone of collisional mountain construction (orogeny) within which the cryptic suture between the two halves of Gondwanaland is concealed.

The hypothesis of a geological connection between southwest United States and East Antarctic ("SWEAT")[1] was inspired by an earlier matching of late Precambrian rocks between western Canada and South Australia on stratigraphic, metallogenetic and palaeomagnetic grounds[9]. Before their separation by sea-floor spreading, only about 50 million years (Myr) ago, continental East Antarctica was previously attached to the stable cratonic shield of Australia. Therefore, when the Pacific-facing margins of a combined East Antarctica–Australia block are reconstructed in their possible pre-Gondwana configuration against the conjugate western margin of the North America continental