been predicted almost three decades earlier by Marcus[5]. Others then synthesized and characterized even more complex systems, for example, bearing three or more organic donors and acceptors on a common covalent frame[6], or an organic donor tethered to an inorganic cluster[7] with backbones varying in physical character from rigid to flexible. The critical role of the precursor conformation in exciplex formation has also been demonstrated previously, for example, in van der Auweraer, Gilbert and de Schryver's study of alkanes of varying lengths capped by donors and acceptors[8]. What is novel about the work of Verhoeven *et al.* is its clear demonstration of conformational change induced specifically by the intramolecular electron transfer.

For this electrostatically driven folding to follow light-induced electron transfer, several criteria must be met: first, an energetic driving force sufficiently strong to cause light-initiated electron transfer over large distances from the donor to the acceptor moiety; second, dispersion of the molecule of interest within a nonpolar solvent where solvation of the directly formed charge-transfer state is less stabilizing than the coulombic attraction between the charged sites; and third, a molecular backbone sufficiently rigid to be fully stretched in its preferred ground-state conformation, yet maintaining enough flexibility to fold in response to the interaction of the opposite charges. Although these criteria may not be applicable to all cases of conformational change, they may be relevant in other systems. For example, conformational gating of ion transport in proteins[9] may be responsive to many of the same factors. □

Marye Anne Fox is in the Department of Chemistry, University of Texas, Austin, Texas, USA.

1. Brouwer, A. M. *et al. Chem. Phys. Lett.* **186**, 481–489 (1991).
2. Fox, M. A. & Chanon, M. (eds) *Photoinduced Electron Transfer* Vols A–D (Elsevier, Amsterdam, 1988).
3. Miller, J. R., Calcaterra, L. T. & Closs, G. L. *J. Am. chem. Soc.* **106**, 3047–3049 (1984).
4. Calcaterra, L. T., Closs, G. L. & Miller, J. R. *J. Am. chem. Soc.* **105**, 670–672 (1983).
5. Marcus, R. A. *J. chem. Phys.* **24**, 966 (1956).
6. Gust, D. & Moore, T. A. *Science* **244**, 35–41 (1989).
7. Resch, U. & Fox, M. A. *J. phys. Chem.* **95**, 6169 (1991).
8. van der Auweraer, M., Gilbert, A. & de Schryver, F. C. *J. Am. chem. Soc.* **102**, 4007 (1980).
9. Hoffman, B. M., Ratner, M. A. & Wallin, S. A. *Adv. Chem.* **226**, 125–146 (1990).

BIOGEOGRAPHY

Enemies doomed to associate

Jared M. Diamond

TAKE two species. If, when their distributions are mapped in chessboard fashion, they appear on different squares only, one might conclude that they are competitors; and if they consistently coexist on the same squares, one might think they are mutualists. But things are not so simple, because such patterns might well arise from the species' differing or coincident preferences for a particular habitat. That problem, for a long time a thorny one for ecological biogeographers, has been tackled by T. Schoener and G. Adler (*Am. Nat.* **137**, 669–692; 1991), who have now come up with a highly effective way of separating the effects of species interactions on species distributions from the effects of habitat variables.

The distinction matters especially in studies of guilds of potentially competing species. Precisely because competitors must be ecologically similar, their shared habitat requirements lead indirectly towards coincident distributions — the opposite of the direct effect of competition itself, which may lead towards complementary distributions. For example, two competing species of freshwater duck will both tend to be absent on islands without fresh water but present on islands with fresh water. Not surprisingly, most statistically significant associations among bird species of the Bismarck archipelago are positive, reflecting the familiar overwhelming effect of habitat requirements (M. Gilpin and J. Diamond, *Oecologia* **52**, 75–84; 1982). One would therefore expect that, if this dominant trend towards positive associations due to shared habitat requirements could somehow be stripped away, stronger evidence of negative associations due to competition would be unmasked.

Schoener and Adler's technique combines two elements. The independent variables are 16 continuously varying ecological parameters likely to influence species distributions, such as island area, isolation, maximum altitude, habitat or foliage diversity, and amounts of vegetation at various heights above the ground. The dependent variables are species codistributions, expressed in multiway contingency tables of the presence or absence of particular species (for example whether a given island supports species A and B, A but not B, B but not A, or neither). The database used for the test consists of published distributions of 40 species of diurnal lizards and resident birds on 52 Bahamian islands. In practice, Schoener and Adler construct two-, three- and four-way contingency tables (examining associations within sets of two to four species) for 23 guilds of lizard or bird species selected as being ecologically homogeneous (ground

RÉSUMÉ

Hopalong

ERRATIC hopping movements of water droplets on the warmed surface of solid cyclohexane provide much-sought evidence of microscopic forces at interfaces, report A. Steyer *et al.* (*Phys. Rev. Lett.* **68**, 64–66; 1992). The droplets were condensing from a stream of water-saturated nitrogen, and the surface was maintained just below 6.68 °C, cyclohexane's melting point. The authors were surprised to find the growing drops move, rotate and even jump. The explanation for these phenomena is in the forces created at a drop's edge by surface tension, which elastically deform the substrate structure. The heat of condensation released as the drop grows is just enough to melt the solid locally, allowing the elastic strain to be released in a quick flick. If a drop is pinned to a surface defect, it is likely to spin rather than jump. Until now, these contact forces had been talked about, but had not been observed on rigid surfaces.

Head gear

THE single-headed version of myosin, myosin I, is known to bind directly to lipid molecules, unlike the more common double-headed myosin II. T. D. Pollard and colleagues (*J. Cell Biol.* **116**, 367–376; 1992) have used the gliding filament assay to demonstrate that myosin I, when bound to pure lipid bilayers, is able to activate the movement of actin filaments. The new results provide an explanation for how myosin I can support motility of certain cells and organelles, and they suggest a mechanism for how the molecule is targeted to plasma membranes in *Acanthamoeba*, *Dictyostelium* and some vertebrate epithelial cells.

Milky ways

THE well-known but poorly documented advantages of mothers' milk are given a firm basis in a UK study reported in this week's *Lancet* (**339**, 261–264; 1992). A. Lucas and collaborators show that preterm babies whose mother provided breast milk (either by breastfeeding or by a tube) for the early weeks of life had a substantial advantage in subsequent IQ at 7–8 years of age. The authors adjusted for various social and economic factors, but genetic factors and differences in parental behaviour cannot be completely excluded. Lucas *et al.* believe that their data provide a strong indication that human breast milk contains one or more components that influence neurodevelopment. One of the important implications for infant care would be the reintroduction of milk banks, now generally fallen out of use in Britain, by which premature and other babies can be fed milk donated by lactating mothers rather than infant formula.