Structural biology

New role for Pauling's ribbons

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In 1951, Linus Pauling and Robert Corey proposed the existence of the α-helix and β-sheet — now known to be the two most common types of structural fold within proteins — by considering the stereochemistry of amino acids. They also proposed other protein conformations, which are less common, or even non-existent, *in vivo*. Roger S. Armen *et al.* suggest that one of the rarest of these is an intermediate in amyloid formation.

α-Helices can be left-handed or right-handed, but if amino acids alternate between these two orientations, the ribbons produced can form corrugated sheets, held together by hydrogen bonds. This α-sheet structure appeared in the authors' computer simulations of the acid-induced unfolding of four proteins, including lysozyme and prion protein, that are implicated in amyloid diseases — disorders in which proteins form insoluble 'amyloid' fibrils.

The protein regions that adopted α-sheet conformations are known to be important in fibril formation, suggesting a role for this ephemeral structure in amyloid assembly. Whether true or not, it shows that Pauling and Corey's model-building still illuminates research half a century on. **Christopher Surridge**

Particle physics

The *B*s have it

Preprint at http://arxiv.org/abs/hep-ex/0407057 (2004)

If physics were simple, matter and antimatter particles would mirror each other in every way. Their electrical charges are equal and opposite, they have identical masses, and they should decay at the same rate.

But in 1964, physicists found that a particle called a neutral *K*-meson decayed at a different rate from that of its antimatter counterpart. This 'charge parity (CP) violation' might explain why our Universe is built from an excess of matter rather than antimatter.

BaBar, an experiment at the Stanford Linear Accelerator, studies CP violation in particles called *B*-mesons, made by smashing together electrons and their antimatter counterparts positrons. In earlier studies at BaBar, and at a similar Japanese experiment called Belle, *B*-mesons were found to have a preference for existing in their matter rather than their antimatter form — an effect classed as indirect CP violation.

B. Aubert *et al.* at BaBar have now expanded on this result by counting the number of decay products formed from the *B*-mesons. They say that they found 910 examples of a *B*-meson decaying into a *K*-meson, but only 696 examples of the equivalent antiparticle process. This measurement is classed as direct CP violation, and is a much more subtle effect than previous experiments have tested for. **Mark Peplow**

Conservation biology

Young blood

Conserv. Biol. **18,** 1078–1087 (2004)

A popular conservation strategy is the reintroduction of species into areas where they were once indigenous. Previous wisdom suggested that such projects should use adults, to get breeding under way as early as possible. But the authors of a fresh analysis propose that this dogma should be turned on its head.

Using a computer simulation, Alexandre Robert *et al.* calculated the overall fitness of theoretical reintroduced populations seeded by either adults or juveniles. They found that the populations seeded by juveniles were less susceptible to the accumulation of deleterious mutations. To verify their model, the researchers then tested it against data from the successful real-life release of the griffon vulture (*Gyps fulvus fulvus*) into southern France, and found that their simulation mimicked the observed results.

The authors argue that future species-release projects should therefore use animals that are as young as possible. This will give time for selection to get to work before the animals begin breeding, resulting in a healthier population. The researchers acknowledge, however, that this is unlikely to be the case when using animals from captive breeding stock, as these populations are likely to be highly inbred and therefore unlikely to benefit from the purging effects of selection. **Michael Hopkin**

Biomedical materials

Hold on to your teeth

Adv. Mater. **16,** 1071–1074 (2004)

Titanium implants are widely used for bone replacement: they are strong, corrosion-resistant and don't provoke an inflammatory response. But they don't work well at the body's surface, where they make contact with epithelial tissue, because epithelial cells don't stick securely to titanium. The weak adhesion leaves room for bacteria to infect the interface. This creates problems, for example, in the use of titanium for the roots of artificial teeth.

Masaki Uchida *et al.* have found a way to improve the adhesion between titanium and epithelial tissue. They imitate the biomineralization process that secures the mineral component of shell to its soft organic tissue: here, proteins that glue the two surfaces together are immobilized in the mineral phase. Uchida *et al.* coat the surface of titanium with a composite of apatite — essentially, calcium phosphate, the mineral component of bone — and laminin, the adhesion protein responsible for binding real teeth to surrounding epithelial tissue. Apatite grows on titanium that is rendered reactive by treating it with sodium hydroxide and heat. When the mineral is grown from a laminin-containing solution, the protein becomes incorporated too, and human oral epithelial cells then grow readily on the composite's surface. **Philip Ball**

Microbiology

Bacterial bridge

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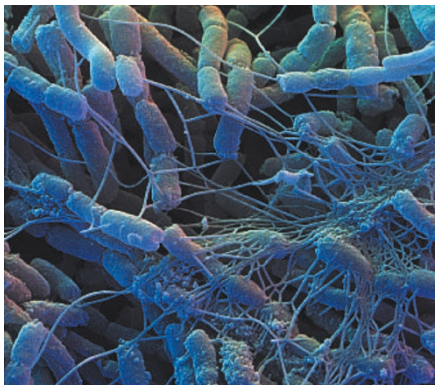
Streptomyces are soil-dwelling bacteria that are best known for producing many naturally derived antibiotics. Unlike most bacteria, *Streptomyces* (pictured) have multicellular developmental stages. Bacterial colonies start growing in wet soil, and then grow away from the colony surface into the air, forming aerial hyphae. From these aerial structures, spores are formed, allowing the bacteria to disperse.



D. SCHARF/SPL

A key player in the formation of hyphae was identified more than a decade ago in *Streptomyces coelicolor*. This peptide, called SapB, acts as a surfactant and releases the surface tension at the air–water interface, allowing hyphae to grow into the air. Through a combination of genetic and structural analysis, Shinya Kodani *et al.* now propose that SapB is a lantibiotic-like peptide. Lantibiotics are antimicrobial peptides, and many are amphiphilic, with hydrophobic side chains on one side and hydrophilic side chains on the other. SapB is also amphiphilic, helping to explain its surfactant capability.

Surprisingly, the authors found that SapB does not seem to have antimicrobial activity, suggesting that it must have key structural differences from true lantibiotics. But the involvement of a lantibiotic-like peptide in a critical developmental stage of *Streptomyces* raises the possibility that lantibiotics evolved from this peptide. **Joanne Kotz**