

MICROBIOLOGY

Starved cells turn on themselves

Bacteria are so essential to mammalian digestion that without them, some gut cells break down their own components to obtain energy.

Scott Bultman at the University of North Carolina at Chapel Hill and his colleagues studied the impact of gut bacteria on the metabolism of mice. They found that in mice lacking any bacteria, colon cells are energy deprived and undergo autophagy, or 'self-eating'. Putting bacteria that produce butyrate — colon cells' main energy source — into the guts of these mice returned the cells' metabolism to normal.

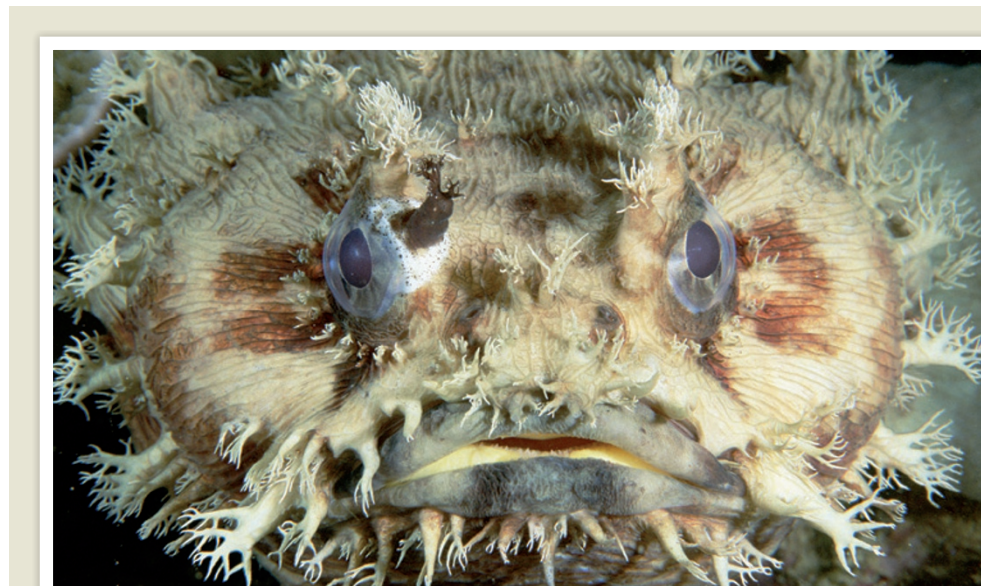
A decrease in butyrate-producing bacteria in the gut, perhaps caused by dietary changes, could compromise colonic function, the authors say. This might contribute to higher rates of inflammatory bowel disease and colon cancer. *Cell Metab.* 13, 517–526 (2011)

ANIMAL BEHAVIOUR

Strike a pose and hide

Cuttlefish evade predators by matching not only their colours and patterns to the background, but also their postures.

Roger Hanlon and his team at the Marine Biological Laboratory in Woods Hole, Massachusetts, presented the common European cuttlefish



ZOOLOGY

Warblers of the underwater world

Many birds, mammals and amphibians vary the frequency and intensity of their vocalizations to expand their vocabulary. Aaron Rice, Bruce Land and Andrew Bass at Cornell University in Ithaca, New York, show that fish also use forms of 'acoustic nonlinearity', such as frequency jumps and biphonation — the simultaneous expression of two independent frequencies.

The authors recorded and analysed the vocal calls of three-spined toadfish (*Batrachomoeus*

trispinosus; pictured), which produce 'hoots' and 'grunts' by vibrating their swim bladders. Around 35% of the fish's calls had at least one form of nonlinearity. Severing the animals' vocal motor nerve stopped them producing these effects.

The fact that fish make complex vocalizations previously found only in four-limbed vertebrates suggests that there is a major selection pressure to produce innovation in acoustic signals.

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(*Sepia officinalis*; pictured left) with separate backgrounds containing stripes at different angles: horizontal, vertical, and diagonal. The animals raised their limbs to match the angles of the stripes, but didn't respond to a blank background.

When placed next to artificial algae in the lab, the animal struck a pose to mimic its neighbour (right). Similar behaviour was observed in natural habitats. The authors suggest that visual cues are

important for such creatures to adopt cryptic body postures and achieve maximum stealth. *Proc. R. Soc. B* doi:10.1098/rspb.2011.0196 (2011)

DRUG DESIGN

Designer proteins target flu

Proteins that bind to the 1918 pandemic influenza virus have been designed using computer modelling.

The viral surface protein haemagglutinin is essential to the flu virus's infection of human cells, making it an attractive drug target. David

Baker at the University of Washington in Seattle and his colleagues computed 'hot spots' — protein residues that can interact with haemagglutinin — from the 1918 virus on the basis of properties such as the predicted strength of their interaction with this protein. They then used computer algorithms to search a set of 865 protein structures for ones that could incorporate these hot spots, and came up with 88 proteins able to acquire at least two of them. When expressed in yeast, two of these proteins bound to haemagglutinin. After additional optimization, the researchers solved the

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