Fish nature: Sometimes shy, sometimes bold

Would you be surprised if a soul too delicate and risk averse to dare a new brand of toothpaste pushed into dark alleys like a fearless terminator?

Think again, say two researchers who are out to revise the notion of shyness—and notions of individual differences within a species.

"[S]hyness and boldness are often regarded as general personality traits that are expressed across many situations," observe Kristine Coleman of the Oregon Regional Primate Research Center in Beaverton and David Sloan Wilson from Binghamton (N.Y.) University. However, that view of the traits as pervasive throughout life's travails did not hold up in tests of more than 100 pumpkinseed sunfish, the researchers report in the October ANIMAL BEHAVIOUR.

Roughly a quarter of the fish in one group that was tested consistently fled from a novel intrusion poking into their pond, a yardstick with a red tip, but these apparently timid individuals were no more likely than other fish to hang back from sampling unfamiliar food. And the quarter of the fish who proved bold diners were no more likely than the others to charge ahead and nip at the yardstick.

Mixing tendencies for shyness in one situation with boldness in another makes sense from an evolutionary point of view, according to the researchers. Cringing from the unfamiliar can be adaptive when facing something that bites but maladaptive if that something can be bitten into. "One response is not going to do for all the different situations you encounter in life," Wilson points out.

"I think [the finding] really does apply to humans," he adds. For example, he describes a scientist who's fearless in field work, navigating knife-edge precipices and rib-crushing crevices, but who practically expires from terror when giving talks even to small, friendly audiences.

The importance of context immediately strikes a chord with psychologist Jerome Kagan of Harvard University, who studies human shyness. Yes, theorists often treat as one pervasive characteristic the predisposition to approach or avoid novelty, he says, but "they're wrong. It's an error to treat it as a general trait."

Shyness and boldness "is the only pair of traits on which there appears to be intraspecies variation in almost every vertebrate species studied," he says. "There must be something very special here."

Let's not be biased by our own backbones, advises Jennifer Mather of the University of Lethbridge in Alberta. When she analyzes octopus behavior, she finds an invertebrate version of shyness and boldness, and she points out that researchers have noted similar behavioral variation among crabs.

Variation among members of a species intrigues Wilson. He's calling for theorists to retool views of natural selection to give individual differences a role.

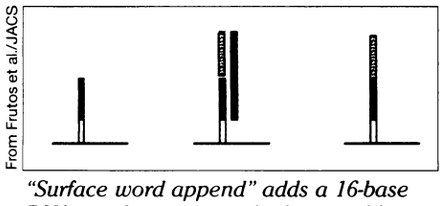
Old ideas, he says, had natural selection trimming away the less-fit individuals and leaving the best-fit to reproduce. "What we're replacing that with is the idea that there's not just one single type that's most fit," he says. "There are many types that are more or less maintained by balancing processes." —*S. Milius*

DNA computing tricks add up to progress

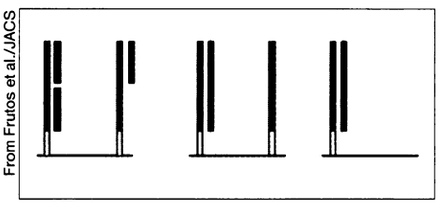
Certain mathematical problems thwart even the most powerful computers. Recently, scientists have been exploring DNA's potential to solve these stumpers. By coding data as sequences of DNA and biochemically manipulating them, scientists can orchestrate a series of operations much as a computer executes commands.

A team of researchers has now added two new operations to DNA's biocomputing bag of tricks—tools that they will need eventually to build a DNA computer. Anthony G. Frutos, Lloyd M. Smith, and Robert M. Corn of the University of Wisconsin-Madison report their innovations in the Oct. 14 JOURNAL OF THE AMERICAN CHEMICAL SOCIETY.

The researchers' approach to DNA computing is different from other groups' (SN: 7/13/96, p. 26). Instead of working with DNA in a solution, they attach to a gold surface many copies of DNA strands that are 16 molecular units, or bases, long. These 16-base "words" encode the problem's data.



"Surface word append" adds a 16-base DNA word to one attached to a gold surface (left). A longer, complementary DNA strand lines up the two words end to end (center). An enzyme links the words together, and the complementary strand is removed (right).



"Two-word mark and destroy" uses a variety of short strands of complementary DNA to label selected words attached to a gold surface (left). An enzyme links together pairs of DNA labels, and any single labels (center) are removed. A second enzyme then clips the unmarked words from the surface (right).

One of the new operations, called a surface word append, links a word to one attached to the surface. Machines that synthesize DNA can't reliably make strands longer than four words, Corn says, but this reaction could make the longer strands that are needed for computing.

The second operation, called a two-word mark and destroy, labels specific DNA strands two words long and removes others. This command will be important for reading the results of a computation.

"The group has been very careful to make sure [the operations] work and can be replicated," says John H. Reif, a computer scientist at Duke University in Durham, N.C. "They have prototyped, in beautifully controlled experiments, the capabilities of biomolecular computing." —*C. Wu*

Giant iceberg breaks off

Antarctica recently shed an iceberg bigger than the state of Delaware, but glaciologists regard the break as a natural event unrelated to any climatic warming.

The roughly rectangular berg measures 92 miles by 30 miles and splintered off the Ronne Ice Shelf into the Weddell Sea. Infrared-sensing cameras on board a U.S. satellite captured their first images of the block last week, according to the U.S. National Oceanic and Atmospheric Administration.

"As far as we can tell, it's just part of the natural life cycle of an ice shelf," says Christopher S.M. Doake of the British Antarctic Survey in Cambridge.

Ice shelves are floating sheets of ice connected to the margins of Antarctica. Doake predicted in 1996 that part of the Ronne Ice Shelf front would go in the next decade, noting that no major bergs had broken off this shelf in 50 years although the edge had advanced considerably. The recent calving brings the edge of the ice shelf back to the position it had in 1947, he says.

Glaciologists consider this event quite different from recent collapses along the Antarctic Peninsula, farther to the north (SN: 5/9/98, p. 303). There, measurements show a warming of 2.5°C in the past 40 years, reaching temperatures that destabilize the ice, causing several shelves to disintegrate.

The new berg did not raise sea levels because the ice shelf is already afloat. —*R.M.*