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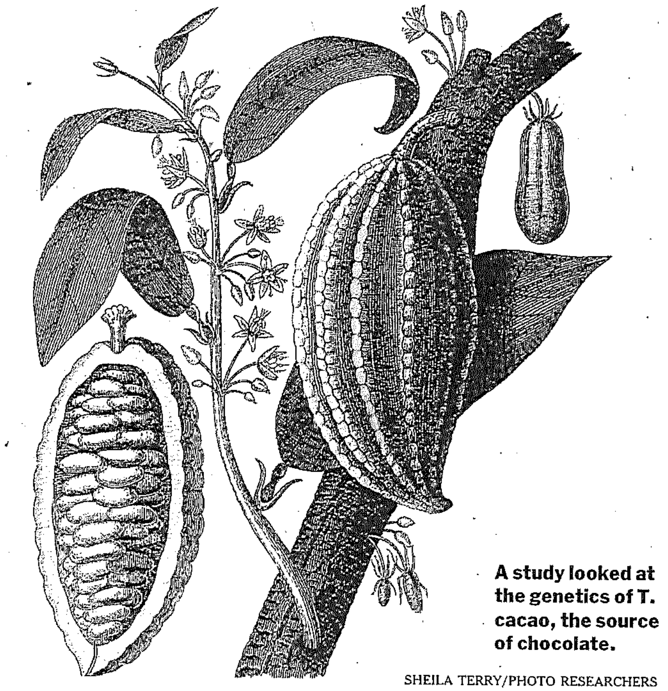
The New York Times



A study looked at the genetics of T. cacao, the source of chocolate.

SHEILA TERRY/PHOTO RESEARCHERS

Diversification of Cacao Is Traced to the Amazon

The production of cocoa, chocolate and related products is a huge worldwide industry, with many companies and some economies (Ivory Coast's, for one) dependent on the health of the cacao tree, Theobroma cacao.

With so much riding on one species, you'd think plant scientists would know all there is to know about it. But certain aspects of cacao, notably its genetic diversity, have been poorly understood. For decades, scientists have thought populations could be classified into one of three genetic groups.

A new study in the online open-access journal PLoS ONE changes this thinking. A team led by Juan C. Motomayor of the candymaker Mars and the United States Department of Agriculture looked at genetic markers in more than 1,200 cacao samples representing geographic regions around the world, and discovered there are 10 genetic clusters, not 3.

The findings suggest that the diversification of cacao occurred in the Amazon as populations became separated by ancient ridges called paleoarches. But the study is far from an academic exercise: the new classification will help in managing cacao cultivation and fighting diseases that can harm the trees.

Observatory | Henry Fountain

One Fish, Two Fish Red Fish, Blue Fish

Geographic isolation is a driving force in evolution. If there's a mountain, a body of water or other physical barrier between two populations of a species, then chances are good they'll diverge over time.

But members of a species can become isolated from each other in other, nonphysical ways — through the way they sense the world, for instance. Evidence for this kind of speciation has been incomplete, however.

Now, Ole Seehausen of the University of Bern and the Swiss Federal Institute for Aquatic Science and Technology and colleagues report strong ecological, genetic and molecular evidence for speciation among cichlid fish in Lake Victoria in Africa, based on how they perceive color. In two related species the females choose mates based on their coloration. In one, found in deeper parts of the lake, the males have red features. In the other, found in shallower waters, the males are blue. What's more, in some parts of the lake the two aren't really separate species, but rather are intermixed.

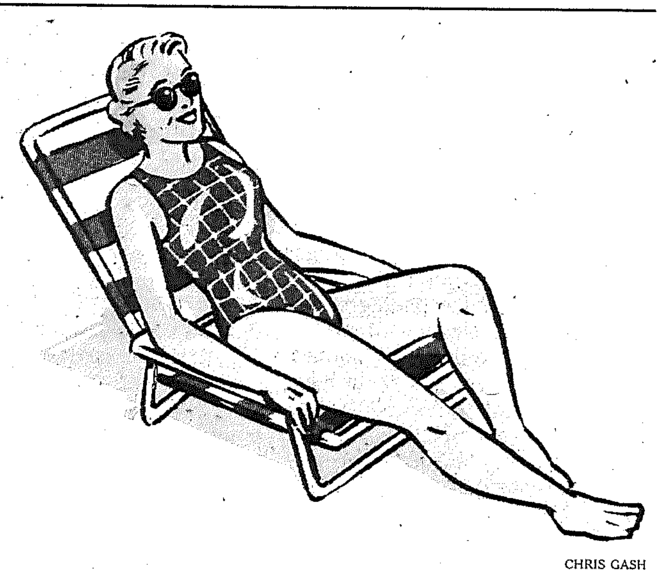
Lake Victoria's water is cloudy because of organic material. Tthat filters the light, removing the blue wavelengths so that as depth increases the light shifts toward the red end of the spectrum. "We wondered if perhaps the split of the original species into these two is driven by adaptations in their visual system due to light at different water depths," Dr. Seehausen said.

Their new research, published in Nature, shows that in the species with red males, over time, in a deeper, red-shifted environment, the gene responsible for color perception had changed to perceive red better. So females were more likely to choose red males.

They also found that in some extremely cloudy parts of the lake, the red-shift was so sharp and sudden that the water was essentially uniform in terms of the wavelength of light. In those areas, Dr. Seehausen said, there is really only one, intermediate species. "All the genes are there, but they are not differentiating along the depth axis, because there is really only one light environment," he said.

INKE van der SLUIJS

Color perception in cichlid fish like the Pundamilia pundamilia is evidence of speciation, a report finds.



CHRIS GASH

A New Flexibility With Thin Solar Cells

Photovoltaic cells, the basic building blocks of solar panels, are more efficient and less costly than ever. But manipulating cells (which are usually made of semiconductor materials) and incorporating them into different panel designs is not necessarily easy.

John A. Rogers of the University of Illinois, Urbana-Champaign, and colleagues have come up with a novel method for creating extremely thin solar cells that can be combined in flexible, even partially transparent, arrays. Described in Nature Materials, it could be called the rubber-stamp approach.

The technique involves creating a series of precisely spaced "microbars" on a block of single-crystal silicon. These bars, which have a thickness of a few micrometers, have doped regions that create p junctions, the main feature of mc photovoltaic cells.

Through an etching process, tl bars are undercut so they can be lifted off the remaining silicon us ing a block of rubbery material. They can be transferred to a sub strate of another material, and tl transfer-printing process can be repeated many times to build a cell. A metal grid is overlaid to cr ate electrical connections.

The technique may allow the fabrication of solar arrays with a variety of characteristics. For ex ample, the researchers say it would be possible to print the cel on rollable plastic sheets that would be easy to transport and ir stall. Or by printing the cells on glass in different densities, solar arrays could be incorporated int windows that have a specific leve of transparency.