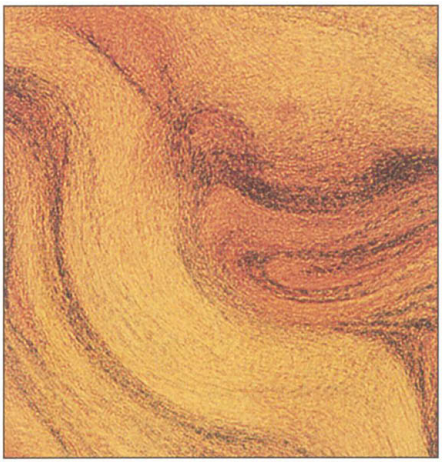

Swap meet. The *Chloroflexus aurantiacus* bacterium readily traded photosynthesis genes with other sun-loving microbes.

complex processes.

But that assumption "doesn't seem to be true," says W. Ford Doolittle, an evolutionary biologist at Dalhousie University in Halifax, Nova Scotia. The new work "clearly shows that photosynthesis genes have moved from one organism to another," adds Carl Bauer, a biochemist at Indiana University, Bloomington.

Five groups of bacteria use light as an energy source. To understand how photosynthesis genes could have evolved multiple times in these bacteria, Blankenship and others spent years studying the individual genes. But when bacterial genome sequences began pouring into public databases, they decided to take a global approach.

In the summer of 2001, graduate student Jason Raymond and his colleagues began to analyze the genome sequences of one organism from each of the five photosynthetic groups: a cyanobacterium, a filamentous green bacterium, a purple bacterium, a green sulfur bacterium, and a heliobacterium. Comparing the five genomes using several computer programs, including one called BLAST, they found 200 genes that were common to all.

Among those 200 shared genes, Raymond and his colleagues found about 50 photosynthesis genes. They compared the sequence differences of each gene among the five species; from those differences they built family trees that represented the relationships of the bacteria to one another. The approach is "very valuable," says Radhey Gupta, an evolutionary biologist at McMaster University in Hamilton, Ontario, because it takes into account all the available genetic information instead of just a few genes to determine which species are ancestral.

Had there been no gene swapping among the species, family trees based on each gene should have been the same. Instead, the researchers came up with 15 sets of relationships, the maximum possible with five species. "That suggested that different genes had different evolutionary histories," says Blankenship. These histories could differ only if the various genes had spent time in other organisms. "What this does is give us the first good data that genes were shuttled from one species to another," says Bauer.

The photosynthesis genes the researchers identified provided other clues to the microbes' photosynthetic past. For one, researchers learned about new support genes that might help repair or assemble photosynthetic machinery. Also, because photosynthesis requires many more proteins than the 50 genes can provide, it's likely that other genes have taken on double duty and help with photosynthesis. In looking for photosynthetic microbes' earliest ancestor, the best these data can advise, Blankenship thinks, is to lump together the cyanobacteria, green filamentous bacteria, and heliobacteria. "It's going to be very hard to pin down whether any one group was the first" to do photosynthesis. But this doesn't bother Doolittle. For him, "to find that [photosynthesis] is very extensively patched together from pieces is very exciting."

–ELIZABETH PENNISI

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WILDLIFE RESEARCH

New Rules Ease Specimen Shipments

CAMBRIDGE, U.K.—To the relief of scientists, an international trade body has decided to eliminate much of the red tape that has hindered the shipment of biological samples for research on endangered species. Although its action last week is not binding for individual nations, scientists say it will raise awareness of the pressing need for improved handling of the material.

The strict regulations of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) aim to prevent smuggling of animal parts. But as a side effect, they also hamper research on endangered species. Scientists often wait weeks or even months before being allowed to send blood, hair, or feathers from the field back to their home labs—no matter how urgent the need for diagnostic tests. The first proposal to simplify the procedure was rejected 2 years ago at the last CITES meeting in Nairobi (*Science*, 28 April 2000, p. 592), but it has since been refined in the organization's committees.

The new resolution, adopted during the parties' meeting in Santiago, Chile, lays out what kinds of samples, quantities, and purposes will qualify for a simplified and expedited permit. Biological samples must be "urgently required in the interest of an individual animal" and have a "negligible impact on the conservation of the species concerned." Every country participating in CITES must provide a list of eligible institutions. The proposal covers shipments of blood, secretions, hair, feathers, and tissues but excludes reproductive tissues—ova and sperm—and embryos. Nevertheless, the proposal had encountered strong opposition from countries such as Mexico, Brazil, and China, which feared that it could allow uncontrolled access to genetic resources.

"This is astonishingly far-reaching," beams elephant researcher Thomas Hildebrandt of the Institute for Zoo and Wildlife Research in Berlin. The proposal, he says, will greatly simplify the process of obtaining samples.

Even so, the declaration is just a recommendation to participating countries, warns Thomas Althaus of the Swiss Federal Veterinary Office, one of its authors. Many countries such as Thailand and the United States impose their own restrictions. But according to Hildebrandt, "the resolution gives us a stronger tool to pressure the authorities" to adopt compatible rules.

–PHILIPP WEIS

Philipp Weis is an intern in the Cambridge, U.K., office of *Science*.

Can't take that home. The new CITES rules won't ease the rules for transporting sperm.