Serendipitous clue to photosynthesis

Two years ago, an undergraduate at Indiana University was assigned an exercise to isolate photosynthetic bacteria from soil and pond water. He made a mistake, and the experiment was ruined, leaving about 30 flasks in which the photosynthetic bacteria had not developed. Just as his instructors were about to discard the flasks, they noticed a green film growing in the bottom of one of the containers. The film was composed of organisms that had been present in soil the student had dug from outside the biology building. The microbes were isolated and tested, and the researchers say that the organisms are a previously unidentified form of bacteria, ones that may be descendants of the primitive microbes that were the earth's first photosynthesizers.

The development of photosynthesis, the process by which organisms convert light into usable energy, was one of the most important events in evolution. It is widely believed that the earliest microbes did not use or produce oxygen, and lived in an oxygen-free environment. As eons passed, some microbes learned to modify the photosynthetic process, and the blue-green and green algae, which produce oxygen as a by-product of metabolism, evolved. Until then, many scientists believe, there was no free oxygen in the earth's atmosphere.

The researchers, professor Howard Gest and his assistant, Jeffrey L. Favinger, both of Indiana University in Bloomington, call the bacteria *Heliobacterium chlorum,* which means "sun green bacterium." It differs from known photosynthetic bacteria in several critical ways, Gest told SCIENCE NEWS. The main distinction involves the chlorophyll molecule, which is formed by four rings of atoms. One ring has a side branch of two linked carbon atoms. In previously known photosynthetic bacteria, this side branch also contains one oxygen atom.

In *Heliobacterium,* the oxygen atom is missing. "That is consistent with the notion that this could have come from a line of cells that was around a long time ago when there was no oxygen on earth," Gest says.

The microbe is even more sensitive to oxygen than other photosynthetic bacteria, so much so that its growth is totally inhibited in the presence of traces of oxygen. Finally, the chlorophyll-containing membrane in the *Heliobacterium* lacks the kinds of intracellular membranes that are typical of other photosynthetic bacteria. Gest says that this suggests that "there may be a more primitive localization of chlorophyll."

In an announcement issued by the National Science Foundation, Gest and Favinger said that the discovery of the bacteria may lead to better understanding of the origin of photosynthesis. Gest says that samples of the organism have been sent to other microbiologists, and hopes that further studies yield "molecular fossils" of metabolism that are surviving in the biochemistry of this microbe.

—C. Simon

Test for depression: Physician beware

The dexamethasone suppression test, or DST, a blood test often used by psychiatrists to diagnose and manage cases of serious depression, has taken its lumps in the past year (SN: 5/21/83, p. 326). The American College of Physicians now says that the test is of "unproven value" in diagnosing nonhospitalized patients with mild to moderate depression. The announcement appears to be designed to discourage the use of the DST by internists, who often see depressed patients in their practices.

This latest caveat for clinicians, which appears in the February ANNALS OF INTERNAL MEDICINE, cautions that the test is far less accurate at detecting mild to moderate depression than it is at identifying severely depressed patients. Underlying medical problems can distort DST results, as can many commonly prescribed medications and psychiatric disorders, such as mania and acute psychosis. The college's statement also warns that a negative DST result does not always rule out a diagnosis of severe depression.

In normal people a dose of dexamethasone acts to suppress the release of cortisol by the adrenal glands. Many depressed people are thought to continue to pump out high levels of the hormone.

Enthusiasm for the routine use of the DST may be waning, but three reports in the February AMERICAN JOURNAL OF PSYCHIATRY signal a continued interest in its research value. Psychiatrists at the University of North Carolina in Chapel Hill report that 18 severely depressed patients with a positive DST improved much less after release from a psychiatric unit for one year than did 13 similar patients with a negative DST. Researchers at the Dandenong Psychiatric Centre in Dandenong, Australia, say that 7 of 23 schizophrenic patients who were also depressed had elevated cortisol levels, although the entire group had the same symptoms. And according to University of Kansas in Kansas City investigators, the test also identified 14 out of 20 severely depressed children aged 6 to 12.

The researchers have not yet tested whether depressed patients with elevated cortisol levels respond better than depressed patients with normal DST results to antidepressant drugs. *— B. Bower*

New 3-D process for computer images

"I was in a Mexican fast-food restaurant getting something to bring home to my wife when I looked at a video game and saw things in the screen that confused me —there appeared to be a bit of depth. That got me thinking about how I might design computer-generated 3-D images," explains Richard Steenblik, a research engineer at the Georgia Institute of Technology in Atlanta.

That was two years ago. Last month Georgia Tech applied for a patent on Steenblik's process for conveying three-dimensional depth to computer-generated or -modified images. A simple version of the process will be commercially unveiled later this year when Mattel Electronics — the first licensee — begins marketing a 3-D video game for its Intellivision computer system.

How does it work? "I can't disclose the actual operating process," Steenblik says, because at present "we are only protected by trade-secret laws." Moreover, he says, "It is so simple that to say anything about the details would give it all away." That's not quite true, however. One can surmise that it relies on viewers wearing special glasses to read the 3-D cues that have been computer encoded into the displayed images. But aside from its use of glasses, Steenblik's process bears little resemblance to the more familiar anaglyph process used to make 3-D movies.

With anaglyph, stereo vision is accomplished using two superimposed images: one for the left eye, another for the right. This superimposition makes anaglyph images blurry to the unaided eye, and the red/green glasses worn to filter out the superimpositions can lead to eyestrain. With Steenblik's process, glasses are clear and only one image is displayed, so even without glasses, viewers see images crisp and in color. With the simplest version (being used by Mattel), a single, maximum-discernible depth is preset by the glasses' fixed lenses. More sophisticated versions permit viewers to literally dial the degree of depth useful, starting with a 2-D image. Mass produced, even the dial-a-depth glasses might cost as little as $3 each, he believes.

Steenblik says his process "is compatible with virtually all computer-graphics equipment ... in most cases, using it will require no hardware modification." Even the necessary software changes in a computer's display program should amount to "virtually nothing," he says. Though color can help cue depth, the process will work in black-and-white. Among its many possibilities, Steenblik foresees the process opening the way for both the generation of 3-D images from a single binocular-microscope view, and for a form of 3-D television. *— J. Raloff*