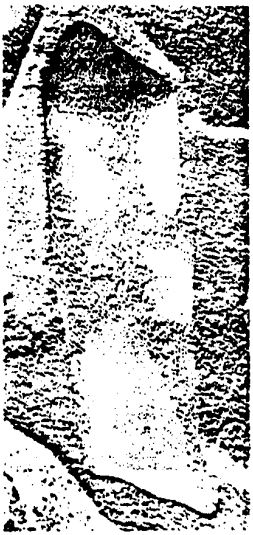
director of CVRI; Dr. Harold P. Klein, director of Life Sciences at Ames; Dr. Robert Bogomolni and Dr. Richard Lozier, both of UCSF and working at Ames, and Dr. Janos Lanyi of Ames.

H. halobium has been known for about 100 years, and is responsible for pink eye in salted fish and the red in red herring. It also causes the pink to purple color that can be seen at the edges of bodies of salt water where the salt concentration has reached the 2.5 to 3 molar (M) level the bacterium requires (normal salt water is about 0.2 M).

Dr. Stoeckenius told *Industrial Research* that possibilities for practical applications of the bacterium itself were "overemphasized," and that the "bug" itself would most likely not find use in desalination, fertilizer production, or photovoltaic production of electricity.

He did note, however, that studies of the structure and mechanisms of *H. halobium* should reveal important knowledge about ion pumping, nutrient transport, cell membrane structure and function, and protein structure.

It is also possible, he added, that studies of the photovoltaic operation of the purple pigment could lead to improved photovoltaic devices, as well as new knowledge about the workings of the eye and sight in general.



PHOTOMICROGRAPH OF BACTERIUM
smoother areas are purple membrane

Perhaps the most immediate benefit from the studies of *H. halobium* will be its possibilities for use in genetic engineering, said Dr. Stoeckenius. Because of its unique requirements for an environment of high salt concentration and high temperature, the bacterium is a natural for biological containment (see January 1976, p. 45, and February 1976, p. 25).

"It would excel for that use," said Dr. Stoeckenius. It cannot survive at the comparatively low temperature and salt concentration of the human body." □

Pseudomonas strain expected to bug PCBs

One of the most unpleasant and costly pollutants to emerge in recent years has been the family of polychlorinated biphenyls.

PCBs, used in manufacturing processes for products as diverse as transformers and printing inks, are toxic to both humans and animals. Fish in freshwater rivers have been

particularly affected by PCBs in industrial effluents.

The extraordinary stability of the oily organic chemicals has increased the problem. But now Dr. Dickson Liu, a biochemist at the Canada Center for Inland Waters, Burlington, Ontario, has devised a double-barreled technique for splitting PCBs into harmless fragments.

The method involves physics and biochemistry. Waste waters containing PCBs are first exposed to ultrasound, which vibrates the organic chemicals into millions of tiny globules. This gives the PCBs an extremely large surface area, which is retained by the addition of an emulsifying agent.

Liu then introduces a specially developed strain of *Pseudomonas* bacteria into the mixture. The bacteria consume the organic chains of the PCBs at appropriate points, thus rendering the chemicals harmless.

Results to date have been spectacular. Concentrations of even the most resistant PCBs have been reduced by the bacteria from 300,000 to 19 parts per billion, well below the federally mandated standard of 5,000 ppb. So far, the technique has proved itself on a small scale, but Liu is now developing an industrial-scale operation.

A genetically modified strain of *Pseudomonas* was developed by *I*R's 1975 Scientist of the Year, Dr. A.M. Chakrabarty of General Electric, to digest most of crude oil and render it non-polluting (see January 1976, p. 45). □

ELECTRONICS

minicomputers monitor oil tankers

ADVANCED technology developed in new U.S. Navy ship programs is beginning to find its way into commercial use and promises to be the start of many new applications for high technology devices.

An example is the new marine trend analysis system being built by Litton Industries' Automated Marine Systems Divisions, Woodland Hills, Cal. It is expected to have major impact on future operation of large oil tankers.

In a paper presented earlier this year to the British Institute of Marine Engineers, marine expert B. K. Batten of Lloyd's Register of Shipping predicted the planned