

the blue, green and yellow wavelengths. Thus the efficiency of the three classes of algae in the manufacture of carbohydrates is enhanced.

The three classes are brown algae, dinoflagellates and diatoms. "These are almost the only classes of phytoplankton that live in the high seas," says Dr. Strain. "And they are also very important in coastal areas and in freshwater."

The Argonne team began by isolating 15 to 20 milligrams of each of the two chemical substances that make up chlorophyll *c*—magnesium tetrahydro and hexa-dehydro pheoporphyrin *a*₅ monomethyl esters (chlorophyll *c*₁ and *c*₂); they used chromatographic absorption, a technique that relies on the varying speeds with which chemicals will move through a column of a special, finely divided, polyethylene compound to isolate the chemicals.

After crystallizing the chemicals, the researchers then studied their chemical composition and structure with infrared absorption, mass spectrometry and nuclear magnetic resonance. "We had to use the results of all three of them to deduce the molecular structure of these highly complex chemicals," says Dr. Strain.

The work required was tremendously painstaking, each technique providing small pieces of the total. Nuclear magnetic resonance, for example, is especially useful in determining the chemical relationships of hydrogen atoms and helped distinguish between the two chemicals. Infrared spectrometry provides clues as to the nature of chemical bonds and mass spectrometry gives further clues through the measurement of the ratio of masses to electrical charges.

The two chemicals are closely related, differing from each other by only two hydrogen atoms. Both substances were completely separated and purified by the Argonne chemists.

The three chlorophyll *c* algae are the primary producers of food in the high seas, and are part of the first step in the food chain in coastal and freshwater areas. In addition, they produce a significant amount of the oxygen needed for replenishment of bodies of water and the atmosphere and act as a sink for atmospheric carbon dioxide. "They have an extremely important role in maintaining the ecological balance," says Dr. Strain.

He believes the discovery, the culmination of five year's work at Argonne, will have important practical significance. For one thing, he says, pollutants, especially heavy metals and toxic organic compounds, harm aqueous ecosystems by interfering with photosynthesis. Knowledge of the structure of chlorophyll *c* will probably help in understanding these processes. □

Getting ocean sciences together

In proposing creation of a National Oceanic and Atmospheric Agency in January 1969, the Commission on Marine Science, Engineering and Resources clearly stated the case for an independent organization.

"... The size and scope of the program," its report said, "are such as to require that NOAA, at least initially, be an independent agency reporting directly to the President, rather than an agency of one of the existing departments. . . ."

"The case for independent status is compelling. An independent agency can bring a freshness of outlook and freedom of action difficult to achieve within an existing department. Its greater public visibility would draw stronger interest and support. The head of an independent agency would be better able to organize the agency's activities to achieve the multiple purposes of a national ocean program. . . . Furthermore, no existing department now has sufficiently broad responsibilities to embrace the full scope of functions proposed for NOAA. . . ."

But when President Nixon announced on July 9 the creation of NOAA, the new agency was given not independent status, as proponents hoped, but instead a home within the Department of Commerce.

Nixon said it is one of his principles that in Governmental reorganizations, separate new agencies should not be formed unless absolutely essential. This was a circumstance he found to exist in the case of pollution-control activities, which concern every department of Government, but not in the ocean sciences. Placing NOAA in Commerce, he said, would cause the least dislocation. Commerce's Environmental Science Services Administration will represent about three-fourths of NOAA's initial activities.

Despite the less-than independent status, the supporters of a better-organized ocean effort tend on the whole to be cautiously approving of the proposal for a Commerce NOAA.

The major objective they had in mind has been fulfilled—a centralization of many of the Federal ocean activities to improve coordination and provide more political muscle. One commission member goes so far as to say privately that the plan goes much further than NOAA backers dared hope after the dark times earlier this year (SN: 3/14, p. 267), when Cabinet agency opposition and White House silence instilled fears that nothing might happen.

These difficulties tend to make supporters feel they were lucky to get any

ocean-agency consolidation at all.

The head of the Marine Science Commission that proposed NOAA, Ford Foundation Chairman Julius A. Stratton, returned from a vacation trip this week and will not comment formally until he has had a chance to study the Administration proposal in detail. But his preliminary impression, he says, is generally favorable. He regards it as a major step toward a stronger and more cohesive ocean effort, although a critical matter will be how thoroughly the Commerce Department reorganizes itself internally to incorporate the new agency.

The vice chairman of the Stratton Commission, Dr. Richard E. Geyer, head of the oceanography department at Texas A&M University, terms the plan an effective compromise. "We would have preferred to see an independent NOAA," he says, "but on balance I am pleased with it. I am reasonably happy with the idea."

The board of directors of the National Oceanography Association, strong supporters of the NOAA concept, reaffirm their preference for an independent agency but term the Nixon proposal a workable compromise that merits support.

NOAA will consist of the Environmental Science Services Administration, already in the Department of Commerce; the Bureau of Commercial Fisheries, the marine sport fish activities of the Fish and Wildlife Service, and the Marine Minerals Technology Center of the Bureau of Mines, all from the Department of the Interior; the National Sea Grant Program, from the National Science Foundation; the Army Corps of Engineers' Great Lakes Survey and the Navy's National Oceanographic Data Center and National Oceanographic Instrumentation Center, and the National Data Buoy Development Project of the U.S. Coast Guard.

The main difference in composition from the original NOAA idea is that the Coast Guard itself stays in the Department of Transportation. NOAA will be established 60 days after Nixon's July 9 announcement unless Congress overrides the plan, which it is not expected to do.

The activities to be incorporated in NOAA will give it about a \$270 million budget and 12,000 employees. It is not a superagency—even the Stratton Commission had no intent of funneling into NOAA the bulk of the strong marine programs of the Navy and the NSF, for example. But its creation is considered to be a solid step toward putting the organization of Federal marine affairs in order. □