CHEMISTRY

From papers delivered at the 172nd national meeting of the American Chemical Society in San Francisco

A surprising chlorophyll complex

The first determination of the detailed structure of a protein complex containing chlorophyll produced a big surprise—the chlorophyll molecules were not stacked together in large arrays as anticipated but were held in little bunches by a sack-like protein molecule. The discovery is reported by Brian Matthews and Roger E. Fenna of the University of Oregon's Institute of Molecular Biology.

The results were obtained through an X-ray crystallography examination of the photosynthetic bacterium *Chlorobium*. The complex consists of three protein sacks joined at their mouths, each containing seven chlorophyll molecules. Though bacteria do not have the still larger chlorophyll complexes, called chloroplasts, that are typical of higher plants, the researchers believe that protein sacks will be found in all plants' cells.

This discovery could radically change the understanding of photosynthesis, which would probably involve complicated reactions between the chlorophyll and the protein sack.

Fuel scheme combines coal and oil

Oil refining could be combined with coal liquefaction to make the United States virtually self-sufficient in transportation fuels, according to William K.T. Gleim, senior research associate at the University of Southern California and formerly with Universal Oil Products Co. Combining the two processes would save expensive fuels and do away with the need for catalysts, he says.

Coal can be split into two fractions by dissolving one in oil. What is left is a low-grade residue from which hydrogen could be extracted and which could be burned as industrial fuel. The hydrogen could be used to convert the oil and dissolved coal fraction to transportation fuels, with the burning residue supplying the energy.

Other schemes for coal liquefaction involve liquefying the residue as well as the oil-soluble fractions. This, says Gleim, would be more difficult than his process, since coal is such a "geological garbage dump."

Treating the total United States production of 10 million barrels per day of crude oil with one million tons of coal would increase the yield of refined oil products by about three million barrels daily, Gleim says. "This could almost eliminate the United States' deficiency in transportation fuels."

Antigerm, self-bleaching fabrics

A new treatment that gives fabrics built-in resistance to bacteria growth, and may eventually make them self-bleaching, appears to be nearing commercial availability. Tyrone L. Vigo, Clark Welch and Gary Danna of the Southern Regional Research Center of the U.S. Department of Agriculture, New Orleans, described the process.

Fabrics to be treated are first dipped into solutions containing hydrogen peroxide and either zirconyl or zinc acetate. Heating then apparently causes the peroxide to form polymers with the metallic compounds, which are bound to the fibers. This coating releases the peroxide slowly. Cotton fibers do best, retaining their antibacterial effectiveness after 50 launderings.

The earliest applications of the new technique—developed in just a year—will probably be in treating towels and sheets for hospitals, to prevent the spread of infection. Eventually, however, clothes that inhibit body odor and fabrics with self-bleaching and stain-removing properties are foreseen.

ZOOLOGY

Black widow on the attack

One of the most virulent and best studied spider venoms is that of the black widow spider. It has been found to be six times more potent than the venom of the cobra and 15 times more potent than the venom of the prairie rattler, making it the most dangerous of all animal poisons. Fortunately the spider is small and is not able to inject as much venom as snakes do.

The black widow toxin, scientists have found, attacks nerves where they meet with muscle, leading to an overproduction of the nerve transmitter acetylcholine and muscle spasms. But precisely how does the toxin bring about a flood of acetylcholine? An answer is provided in the Sept. 10 SCIENCE by Alan Finkelstein of Albert Einstein College of Medicine and Lee L. Rubin and Mu-Chin Tzeng of Rockefeller University. The toxin binds irreversibly with lipids in the membranes of nerves, opening channels in the membranes. Such an opening could very well allow acetylcholine to pour from nerves in large amounts and hence trigger muscle spasms.

The spiny lobster lineup

Many animals assemble in stable aggregations or formations while either stationary or moving. Schooling of fish, herding of mammals, flocking of birds, swarming of insects seem to provide protection against predation. Other advantages of formations relate to thermoregulation, mating efficiency, finding food, learning and reduction in aggression.

The reason that spiny lobsters queue up British style—in a single line—while migrating has now been determined by Robert G. Bill and William F. Herrnkind of Florida State University. By queuing, lobsters sustain less drag per individual. This queuing behavior, the researchers conclude in the Sept. 17 SCIENCE, conserves energy and is a consequence of the evolutionary role of migration in this particular species.

The sex life of birds

Light and courtship are known to stimulate sex hormones and reproduction in both male and female birds. But precisely how do these environmental and behavioral factors interact to increase the birds' hormone levels? Mei-Fang Cheng of the Institute of Animal Behavior at Rutgers University studied the sex life of ring doves to find out.

Light exposure regulates both the synthesis and release of sex hormones from the hypothalamus and pituitary, he reports in the Sept. 9 NATURE. These sex hormones, in turn, then switch the sex hormones in the body on and off. Courtship, on the other hand, stimulates the sensitivity of the pituitary sex hormones to the effects of the hypothalamic sex hormones.

Other environmental variables, such as rainfall and temperature, are also known to influence the sex life and reproduction of birds, but precisely how they increase the birds' sex hormones remains to be determined.

Fossil mollusks on the 'half shell'

Glycoproteins preserved in 80-million-year-old mollusk shells have been identified and characterized by S. Weiner, H.A. Lowenstam and L. Hood of the California Institute of Technology. As the researchers report in the August PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, they compared the amino acid sequence of these sugar-proteins to those in the shells of a living species in the same superfamily and have found a particular repeating amino acid sequence in both. However, differences in the amino acid compositions of the fossil and contemporary shells suggest evolutionary changes.