biological science

Gathered from the American Institute of Biological Sciences last week at Burlington, Vt.

MOLECULAR BIOLOGY

Plant antigens; animal antibodies

Animal antibodies may be used to study the evolutionary relationships among plants.

The taxonomic relationships were established among eight different species of the pine tree, genus *Pinus,* by analyzing the antibodies formed in animals which had been inoculated with material from the different species of trees.

Pine seeds were collected from the cones of each species of pine tree and purified to produce an antigen suitable for injection into rabbits. Following a series of injections, using a different animal for each of the eight tree antigens, the animals were bled and their serum analyzed for the presence of antibodies. Because the animals' immune response produces an antibody that is different for each antigen, it is possible to identify a particular antigen by its reaction with antibody-containing serum, or antiserum. When the rabbit serum was incubated with some of the material with which it was originally injected, the antibody combined with the antigen and produced a visible plumping, or precipitation. Evolutionary closeness between species is indicated by the degree of partial precipitation of each antiserum-antigen combination.

Serologic typing has also been used extensively to indicate the taxonomic relationship of animals, and has been particularly useful in species determination of animals whose morphologic traits provide insufficient specificity.

Dr. D. R. Campbell of Bloomsburg State College in Pennsylvania reported the experiments.

ENDOCRINOLOGY

Microbes work on hormones

Increasing levels of steroid hormones are being found in municipal and industrial waste as the result of expanding use of hormones in oral contraceptives and other medical and research applications.

Scientists are becoming concerned about their long-range physiological effects, their persistence in sewage and the ability of conventional waste treatment to oxidize these compounds.

Dr. Henry Tabak, U.S. Department of the Interior, conducted studies to determine the extent to which natural sex hormones and the synthetic hormonal constituents are decomposed in both raw and treated sewage. In the laboratory it was shown that hormones are attacked by the bacteria present in raw sewage, but that the microbial action subsides after a short time. The synthetic hormones proved less susceptible to bacterial degradation.

In an experiment with steroids placed in culture media inoculated with carbon-activated sludge and garden soil, a greater amount of hormone was decomposed. Further activity was enhanced by mechanical means, such as aeration and agitation, but not until more carbon and culture media were added did complete oxidation of the synthetic hormones take place.

CANCER

Selenium in diet

Low concentration of selenium in the diet of animals is reported to inhibit tumor formation.

Dr. R. J. Shamberger of the Roswell Memorial Park Institute, Orchard Park, N.Y., applied carcinogenic material to the skin of two groups of mice. The experimental group was fed one part per million of selenium in the form of sodium selenite, and a control group was fed a selenium deficient diet.

The experimental group showed a "significant" reduction in the number of skin tumors, whereas the control group showed a high rate of tumor formation.

A similar relationship has been observed between selenium occurrence in the U.S. and the geographic pattern of human cancer mortality. In areas of high selenium, there is a relatively low human mortality from cancer, and conversely, in areas where little selenium is found, mortality from cancer tends to run higher. A similar inverse relationship has been observed between human blood levels of selenium and death figures from malignant tumors.

Studies are continuing to establish how selenium gets into the food chain and how it inhibits tumor formation in animals.

Selenium is a nonmetallic element similar to sulfur and is found with it in ores and certain soils. It and its compounds resemble arsenic in toxicity. However, selenium has been described as both poisonous and necessary to life.

OIL POLLUTION

Hydrocarbons, phenols, tars

Carcinogenic hydrocarbons have been found in plankton living in the bays and near coastal waters of the world's great industrialized countries.

According to Dr. Paul S. Galtsoff of Woods Hole, Mass., "observations on storage of carcinogenic compounds found in oil-polluted water are biologically significant." Dr. Galtsoff summarized the finding of many scientists identifying hydrocarbons, phenolic compounds, coal tar wastes and gas wastes as offending pollutants, which become concentrated in the living communities of sea life.

"The important question," says Dr. Galtsoff, "is the fate of the compounds in the flesh of plankton feeders which remains unanswered and needs to be investigated."

Another effect of hydrocarbons upon various acquatic animals, he suggests, is the disruption of vital behavioral patterns which may play an important role in decreasing populations of many species. Recent studies on the behavior of acquatic animals show that chemical attraction and repulsion play a role in finding food, escape from predators, selection of habitat and sexual reproduction.

Further study of oil pollution problems, Dr. Galtsoff urges, should become increasingly concerned with the by-products of bacterial action on oil and the accumulation of these products in the sea and their effect on the welfare of man.