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Arctic Health Research Center, U.S. Public Health Service

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ARCTIC HEALTH RESEARCH CENTER,

U.S. PUBLIC HEALTH SERVICE • Robert L. Rausch

A program of research in Alaska was initiated by the United States Public Health Service in 1948, with the establishment of a field station in temporary facilities located at Anchorage. This station, officially designated the Arctic Health Research Center in May 1950, was founded largely as the result of surveys of health conditions in Alaska conducted during 1946 and 1947 by two committees representing the American Medical Association. The reports of these committees led Congress to pass a special appropriation bill to support the investigation of health problems in Alaska.

Six research sections were set up within the first year. The first investigations began as early as January 1949, and all of the sections had become operational by 1950. With one exception, the identity of the original sections has been maintained; the program of the former Bacteriology and Parasitology Section was, in general, encompassed by the Epidemiology Section, established in 1954. Besides the latter, the sections comprise the following: Entomology, Environmental Sanitation, Nutrition and Metabolic Disease, Physiology, and Zoonotic Disease. The Physiology Section became temporarily inactive in 1962. In all, the Center employs about 80 full-time personnel.

Of utmost importance to the success of the research program is the reference library, which now contains more than 21,000 catalogued items concerning biology, medicine, and related fields. The collection includes many early publications that deal with exploration in Alaska and other northern regions. Currently, more than 500 periodicals, mainly technical journals, are received. Much use is made of microfilms and photostats in obtaining otherwise unavailable publications. While maintained primarily for the investigators at the Center, the library is widely used by others, including federal and state employees, students, and private individuals.

The sectional programs frequently involve close collaboration with other

agencies, especially the Alaska Native Hospitals of the Division of Indian Health, U. S. Public Health Service; the U. S. Fish and Wildlife Service; the U. S. Department of Agriculture; the U. S. Atomic Energy Commission; the Alaska Department of Health and Welfare; and the Alaska Department of Fish and Game. The Arctic Research Laboratory, Office of Naval Research, located at Barrow, has frequently provided logistic and other support for field work in arctic Alaska since 1949.

As indicated by their designations, some of the sections are concerned exclusively with biological problems, and all are involved to some degree in biological research in the broader sense. The major programs are reviewed briefly here.

The entomological program has been devoted to long-term research on the biology and taxonomy of the biting Diptera, with particular emphasis being placed upon mosquitoes, blackflies, and *Culicoides* spp. Some effort was made initially to develop methods of control of certain species in urbanized areas, but this work has not been pursued in recent years. The major accomplishments of the Entomology Section include the development of methods to obtain adult blackflies from pupae maintained under laboratory conditions, elucidation of the life histories of several species of blackflies and mosquitoes and the description of new species, and discovery for the first time of the immature stages of certain species of snipe flies (*Symphoromyia*) and their habitat. Much has been accomplished toward an inventory of biting flies and their distribution in Alaska. In 1963, preliminary studies were made of the application of standard trapping techniques to insects which may be vectors of ARBO viruses.

Biological research within the Environmental Sanitation Section has been concerned primarily with problems relating to the establishment and function of oxidation ponds for the stabilization of raw sewage. An essential part of this work has been basic limnological in-

vestigations in various types of fresh-water habitats. Major contributions have also been made in the taxonomy of the Chrysophyceae, with the description of several new species. In collaboration with other specialists, new data on desmids, including the description of new species, have been obtained as well. Systematic accounts of phytoplankton in certain bodies of water have been completed, with emphasis placed upon the study of periodicity of planktonic algae during ice-free and ice-bound seasons. In connection with local investigations of fresh-water fishes as a major food resource, an effort has been made to evaluate the efficacy of traditional methods of preservation as means of reducing the risk of infection by various parasitic helminths transmissible to man. Basic studies have been conducted on the aquatic phase of the life cycle of certain diphylobothriid cestodes. Some preliminary work has been done on the geographic distribution of *Gonyaulax* toxin (mussel poisoning) in clams regularly utilized for food.

The investigative program of the Epidemiology Section includes epidemiologic surveys and observations on outbreaks of disease in isolated, aboriginal populations in Alaska. While clinically oriented, such basic studies on host-parasite relationships provide information on the natural history of disease in a manner no longer possible in the more complex societies at lower latitudes. Data are being assembled on ethnic differences in susceptibility to infection by various microorganisms. Some of the work of this section involves the investigation of arthropod vectors and the role of various vertebrates as reservoir hosts of diseases such as tularemia, ornithosis, and brucellosis.

Personnel of the Nutrition and Metabolic Disease Section have made every effort to take advantage of disappearing opportunities to gain knowledge about aboriginal conditions. One long-term project has been to determine the composition and nutritional value of the food resources utilized by populations in

A nest of the snowy owl, *Nyctea scandiaca*, in May before the Alaskan tundra became snow-free. This large clutch was produced during a year when lemmings were abundant, and a lemming can be seen in the lower righthand corner of the nest.

The arctic ground squirrel, *Citellus undulatus*, digs a system of burrows on bluffs, sand dunes, and terraces and hibernates during the winter.

selected villages existing under different ecological conditions (e.g., villages of the tundra in the Kuskokwin River region, arctic coastal villages, inland villages). The voluminous data resulting from the nutritional survey are now being analyzed and prepared for publication. In order to determine the effects of diets consisting almost exclusively of fish, detailed observations have been made on experimental animals fed specially prepared diets. The effects of freezing upon cell biochemistry have been investigated through study of enzymatic activity in the mitochondria of hepatic cells. A detailed investigation has been made of microcytic anemia, a commonly occurring condition in the Eskimo populations of certain regions. The occurrence of hereditary methemoglobinemia has been studied, and it has been established that this disorder is caused by an enzymatic defect; a practical laboratory test for the detection of the enzymatic deficiency has been developed. Various metabolic disorders, including diabetes mellitus, are currently under consideration.

The Physiology Section, inactive since 1962, has been concerned primarily with adaptation of man and other animals to

cold climate. The projects of this section have included the investigation of respiratory metabolism in arctic invertebrates, the study of effects of cold on temperature levels and rate of heat loss, determination of metabolism in invertebrates and fishes at various environmental temperatures, and studies on hibernation in mammals. Among the invertebrates, detailed studies are being conducted on the taxonomy and distribution of calanoid and harpacticoid copepods. Considerable effort has been directed toward evaluation of adaptability to cold (i.e., cold tolerance) in Alaskan Eskimos and Indians and in selected representatives of other racial groups. Much information has been acquired on the migration and ecology of birds in arctic Alaska.

The Zoonotic Disease Section is concerned primarily with diseases and parasites transmissible from other animals to man. Several such diseases are prevalent in more remote regions where there is a high degree of dependence upon wild animals for food, where dogs are used for transport, and where poor sanitary conditions are the rule. Long-term investigations in progress since 1949 have dealt with trichinosis, alveolar and cystic hydatid disease, *Dipyllobothrium*

("fish tapeworm") infection, and others. More recently, similar studies on the natural history of rabies in wild Canidae, on brucellosis in reindeer, and on ornithosis have been initiated. Particular effort has been devoted to taxonomic studies to determine the relationships of mammals and their parasites to palaearctic forms, since many species are common to both Eurasia and North America. Faunistic surveys of vertebrates, especially mammals and birds, and their parasitic helminths have been conducted, yielding much new information on the distribution and ecology of these animals. Life cycles of various species of helminths, particularly cestodes, have been elucidated, and a number of species have been described.

The productivity of research under conditions prevailing in Alaska is evidenced by the more than 500 publications that have emanated from the Center in the past 15 years.

There are plans to transfer the Arctic Health Research Center to Fairbanks in 1968, where permanent facilities located on the campus of the University of Alaska will be occupied. No basic changes in the research program of the Center are anticipated.