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THE TERMINOLOGY OF SEAWEED COLLOIDS[1]

By Dr. C. K. TSENG

SCRIPPS INSTITUTION OF OCEANOGRAPHY

SINCE the outbreak of the war, there has been a considerable interest among some of the United Nations in investigating and developing their seaweed resources. The principal stimulus, in most instances, has been an agar shortage. In 1940, America had a single agar factory, which made 24,000 pounds of agar. There are now four factories[2] actively engaged in this industry with a combined production capacity of about 200,000 pounds per annum. The principal agarophytes are *Gelidium cartilagineum* from California and Baja California, Mexico, and *Gracilaria confervoides* from Beaufort, N. C.[3]

The interest shown in agar does not stop there; it extends to related seaweed colloids capable of serving as substitutes for agar. One of these is carrageenin, generally known in commerce as Irish moss extract. Its principal source is carrageen, better known as Irish moss (*Chondrus crispus*), which is now obtained in large quantities from Massachusetts and Maine in the United States and from the Maritime Provinces in Canada. The name carrageen is also applied to *Gigartina stellata* (*G. mamillosa*), commonly harvested together with the *Chondrus* and used similarly. Previously the production of Irish moss extract was rather small, since most consumers preferred to buy the seaweed and make their own extract. In recent years, there has been a great demand by various industries for a highly purified, standardized product

[1] Contributions from the Scripps Institution of Oceanography, New Series No. 259.

[2] There are three more factories, still in the pilot plant stage, but expected to produce agar soon.

[3] C. K. Tseng, *Food Industries*, 17: 140, 1945.

an extensive literature on mosquitoes to which Dr. Headlee's book is among the latest contributions. Dr. Headlee is well qualified to write with authority on this subject because of his long association with all aspects of the mosquito problem in New Jersey, including those of leadership and initiative in organizing control work. His book is designed to furnish exactly the type of information that is needed by entomologists, mosquito control workers, sanitary engineers, public health officials and others, for a basic, intelligent understanding of mosquito problems and their solution.

There is a very short chapter on the value of mosquito control, followed by a larger one on the structure and classification of mosquitoes, including keys for the separation of adults and larvae. One set of keys involving the use of microscopic characters is designed for the laboratory, and another, involving characters that can be seen by the use of the eye and a hand lens, is intended for field use. This is a distinction that should appeal to field workers. Chapter 3 is devoted to the mosquito fauna of New Jersey and the numerical abundance of New Jersey species over a ten-year period, 1932 to 1941. Chapter 4, which occupies approximately 60 per cent. of the book, is concerned with mosquito biology. In this chapter will be found complete descriptions of the adults and larvae, together with information on the habits of the adult and early stages, life histories and distribution, including the author's numerous observations, for 37 species. The importance of this chapter is augmented by numerous illustrations including those of external anatomical details.

Chapter 5 deals with the influence of environment on mosquitoes, such as temperature, water, food supply, natural enemies, the attraction of mosquitoes to man and mosquito flight. The remaining 6 chapters describe the history of mosquito control in New Jersey; the principles and detailed methods of control for various types of breeding places; the use of larvicides and equipment, and specific directions for successful work; mosquito repellants; mosquito control laws of New Jersey; and the economic effect of mosquito reduction.

Dr. Headlee has incorporated in this book the results of his observations and research and the sound, practical facts that have been distilled and tested by him over many years. Its wealth of information on all phases of the problem should appeal greatly to all who are engaged in mosquito control work. There is only one section of the book in which, I think, the subject is slightly overemphasized. This is the last chapter of six pages on the economic effects of mosquito reduction, wherein large gains in taxable values are attributed solely to mosquito reduction. I have no doubt about mosquito control playing an important part in bringing about these tax valuation increases, especially along the Atlantic coast of New Jersey where the resorts are located, but I do not believe that the enormous increase in that portion of New Jersey lying within the New York metropolitan area was due entirely to mosquito reduction. I think that economic conditions had a hand in the increase also. According to Monograph One of the "Plan of New York and Its Environs," there was from 1900 to 1922 an increase of 321 per cent. in the number of light chemical industries in the New Jersey part of the metropolitan area and an increase of 253 per cent. in the number of heavy chemical industries. According to Monograph Two, during the same period there were increases in the number of various types of metal industries in metropolitan New Jersey, ranging from 130 to 355 per cent. These movements to Metropolitan New Jersey took place both before and after 1915, the date after which mosquitoes were scarce in that area. The reasons given for moving to New Jersey include more space, better rail and water transportation facilities, more and cheaper labor, isolated locations for chemical industries, cheaper land, etc.

The title of Dr. Headlee's book indicates that it applies mainly to New Jersey, but this is misleading, as many of the conditions under which mosquitoes breed in New Jersey are duplicated in various other adjoining states. As a matter of fact, of the 37 species of mosquitoes found in New Jersey, five occur as well in northeastern America, four are found in the southeastern states and 28 species are found all along the Atlantic Coast, some in many inland states. From this it is apparent that the usefulness of this book extends far beyond the boundaries of New Jersey. The impact of war has demonstrated again the need for knowledge of the biology, taxonomy and control of the Culicidæ as well as of other arthropods, and I am sure that Dr. Headlee's informative work will meet with the favorable reception that it deserves.

HARRY B. WEISS

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