

From The Minutes of the Eastern Association  
Meeting  
Random Observations and Hypotheses Concerning  
Relations of Fish and Mosquitoes

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By Mr. John T. Nichols,  
Curator of Recent Fishes  
American Museum of  
Natural History, N. Y.

Mr. Nichols' paper sets forth his observations on Florida, and on Long Island, especially in the area about Moriches Bay, which is near his summer home at Mastic.

An instance of the effectiveness of Gambusia in providing for the control of mosquito breeding in Florida "river" is reported, and it is indicated that the immediate effect of salt marsh ditching on Long Island is to give small fishes, mostly Fundulus, access to isolated pools where they destroy the larvae.

The importance of having present numbers of fish of the proper size is emphasized. An experiment is reported where the numbers of Lucania, a small fish that was present in fresh water creeks on Long Island, was much increased by stocking the stream with large mouth bass, which reduced the number of brook picker which had previously been preying on the Lucania. For several years thereafter, the numbers of mosquitoes were reduced.

For the last several years there have been less mosquitoes in the Moriches Bay region, and this is attributed to the recently installed ditching all along the south shore of Long Island. The author states, "These observations are too cursory and too little critical to prove one or another hypothesis. They merely serve to emphasize the conviction that successful control

of mosquitoes, or any other animal, should rest on understanding of the existing balance of life, and where possible, work with not against it."

Dr. Glasgow emphasized the relationship, so well illustrated by Dr. Nichols' paper, which exists in all kinds of pest control work which depends upon natural enemies.

Mr. VanDerwerker remarked in Union County there are many permanent fresh water pools that are stocked with fish, and that are posted to be sure that they are sprayed. The permanent ponds and pools which dry up during the summer usually do not cause much difficulty, but where swamp areas are overflowed as the result of rains, and the water surface increases to many times its original area, the natural enemies are inefficient to cope with the resultant mosquito breeding. Extensive use must be made of artificial control methods.

A discussion took place concerning the changes which have occurred since the inlet broke through from the Ocean into Moriches Bay.

Mr. Nichols said the center of the bay, and the channels were always quite salt, though there was no ebb tide, but only a rise and fall depending upon the wind. The marsh bordering the bay, as indicated by the vegetation and the mosquitoes, was distinctly salt, but fresh water fish were found near the edges of the marsh in the creeks, and fresh water vegetation appeared at the head of the marsh.

Dr. Glasgow remarked that the waters of the bay had become much more saline since the inlet had become established. Previously the marsh had been more affected by rains than by tides, and when flooded was much the same as a fresh water marsh.

Mr. Smith expressed the hope that Dr. Nichols continue his observations of the fish life in this tation, and give us in the future an outline of change that might take place. He added that distinct change had been noted on some marshes, for example, where marsh elders had become established, birds were now nesting in the elders.

Mr. Stage described a population survey that had been made on a 200 acre marsh at Portland, Oregon with the aid of Boy Scouts. The Survey was intended to determine the relation of mosquito work to ducks and pheasants. There were a number of nests found, and only rarely had one been tramped down by the men. Children and growing boys were found to have killed many of the young. It was also found that flood waters of the Columbia River had damaged many more birds' nests than could possibly have been damaged by mosquito work.

Dr. Headlee stated that since 1900 the value of fish as a mosquito control agency had been fully recognized, the only question had been what kind, and how best use them. The whole scheme of mosquito control on the open salt marshes is dependent upon opening up the marshes by sufficient ditching so that the salt water minnows can penetrate to all portions of the marsh to consume the larvae as fast as they appear. On the marshes adjacent to great centers of human population, the control exercised by the fish is not sufficiently complete and the tides are fenced out by dikes, any residual water being sprayed to destroy mosquito breeding therein.

Observations on Some Relations of Mosquito  
Control Ditching to Marsh Birds

By Mr. Aretas A. Saunders,  
Fairfield, Connecticut.

Mr. Saunders' paper states that many species of

is frequent the salt marshes, but most of them may be found elsewhere as well. The species of birds in Connecticut which are strictly dependent upon salt marshes and which evidently cannot live elsewhere are specified as Clapper Rail, Rallus longirostris, Seaside Sparrow, Spizella maritima, and the Sharp-tailed Sparrow, A. acuta. Destruction of the salt marsh or any great change in it will cause them to leave it and disappear from that vicinity. Examples of such changes are the filling in and developing of salt marshes for shore real estate, and the converting of marshes into parking places for shore resorts. It is indicated that the ordinary filling of salt marshes to provide an ebb and flow of tide in the ditches and the abolishment of pools of stagnant water has no detrimental effect on these species of birds.

A very important food of various birds is a salt marsh snail of the genus Melampus. The importance of avoiding the burning off of salt marsh grasses and consequent destruction of large numbers of these snails is stressed.

The salt marsh ditches are reported to be helpful to bird observer, for several species of birds are apt to be found along or in the ditches, for example, the three species previously mentioned.

An example of a complete change in both plant and animal life on a salt marsh is described. In this instance, a high salt marsh was drained by a very wide deep ditch and the change occurred in a few years.

Certain birds are indicated as probably helpful in the control of mosquitoes. The Barn Swallow, Hirundo throgaster, and the Purple Martin, Progne subis, are listed as among these. If structures were placed on the salt marshes to attract these birds, it is likely that mosquito control, and the increasing of beautiful and valuable birds would be aided.

Mr. Saunders indicated that where salt marshes partly filled by hydraulic means, the salt marsh grass generally disappeared to be replaced by Phragmites. This latter growth, long billed marsh wrens and red winged black birds would nest. He also said that much damage was done to nesting birds when marshes were burned, and that burning also destroyed the snails on which birds feed.

Dr. Headlee said that in New Jersey the farmers formerly burned off all of their marshes to improve hay. He inquired if there was any time of the year when burning could be practiced without damage to the snails and added that he had found snails at the surface of the marsh when it was wet, and half inch to several inches below the surface when the marsh was drier. He also added that there seemed to be a great number of biting houseflies. Stomoxys calcitrans, which species is known to breed in decaying seaweed on the beaches, since the farmers have generally stopped burning off the meadows.

Mr. Stage said the same fly had been found breeding in windrows of fermenting grasses on the Gulf Coast beaches, in rotting celery waste in Florida, and in rotting peanut litter in Georgia.

Dr. Stearns commented that he had opportunity to observe muskrats on a marsh that was burned each year and which the Delaware Station has rented for experimental purposes for the past 8 years. This marsh has a rat population as high or higher than unburned marshes nearby. The greatest number of houses appears to be in areas of panicum though there are feed areas of Scirpus and of Spartina cynosuroides nearby. This area is burned only because the owner burns the balance of his land. This year the rented area was burned on April 3, the owner having burned the rest about 10 days earlier. In general, Delaware marshes are burned just after the

trapping season, which ends March 1st on open marshes March 10th on inclosed marshes.

Mr. Hart called attention to a discussion on marshing which appears in the record of the Toronto meeting of the North American Wild Life Conference.

Mr. Smith remarked that it is unwise to burn off places where mosquito ditching machines are to be used, as traction is reduced and the chance of the machine becoming mired is increased. However, on the sections where hay is being cut, it is impracticable to prevent farmers from burning, for they have found they can increase their hay yield by burning.

#### The Relationship of Mosquito Control to the War Effort

By Mr. H. H. Stage,  
Bureau of Entomology and  
Plant Quarantine,  
U. S. Dept. of Agriculture,  
Washington, D. C.

Mr. Stage reported on the work being done by the U. S. Army, the U. S. Navy, the U. S. Public Health Service, and the U. S. Department of Agriculture.

In the Army an extensive program of malaria control having the desired effect, as illustrated by the comparison of figures on malaria case rates, in 1918 the rate was 7.5 per 1000, and in 1941 it was 1.8. Total cost of the work in 1941 amounted to about \$1,500,000.

In the Navy, although the amount of work done was less, a similar favorable comparison of malaria rates exists. One instance is reported where the civilian rate outside a large southern base is five times as high as the rate within the base.

The Public Health Service has underway a very important program of malaria control in the southern states, the program being directed at the control of malaria immediately outside the reservations of the armed forces.

The Bureau of Entomology and Plant Quarantine has streamlined its research program, and is giving all possible aid to the Army and Navy in solving insect problems. Work is under way on a general insect repellent for use against mosquitoes, chiggers, dog fleas, sand flies, and the Bureau has been called into consultation regarding the construction of a large ship-yard in the middle of a salt marsh area, and the construction of the Alaskan Highway. Mr. Bradley has been loaned to the U. S. Public Health Service to coordinate malaria mosquito inspection and control.

Lt. Darvin E. Hoppert said that provision was made for anti mosquito work in Army reservations. The Chief Engineer has allotted funds to the District Engineer to be made available to Post Utilities Officers when Post Surgeons apply for funds with which to institute mosquito control works. He added that the men with mosquito control experience who are officers in the Sanitary Corps were required to perform other duties besides the direction of mosquito control work.

Plans for An Investigation to Determine the  
Meaning of Catches of Anopheles quadrimaculatus  
in Electric Light Traps

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By Dr. Thomas J. Headlee  
State Entomologist,  
New Jersey Agricultural  
Experiment Station,  
New Brunswick, N. J.

Dr. Headlee outlined a plan for the comparing of catches of malarial mosquitoes in light traps, with

places that can be secured by other means. An area of not one square mile should be selected with a known breeding place of malarial mosquitoes near its center. An electric trap, and at least two nail keg traps should be operated. Collections of adults in resting places should be made, and the breeding places should be examined carefully for larvae. All observations should be made at least weekly, and careful records should be kept. Data covering weather conditions should also be secured. If malaria is present in the district, complete figures concerning its abundance and distribution should be had. The coordination of these data should indicate the significance of the Anopheles quadrimaculatus catch in light traps in terms of numbers of this species on wing. Similar studies should be made elsewhere.

In the discussion following the foregoing paper, it appeared that Dr. Williams of the United States Public Health Service has planned a study of the effectiveness of the N. J. Mosquito Trap as a sampler of Anopheles quadrimaculatus, and that Dr. Stearns of Delaware plans some work along this line.

Dr. Headlee stated that Mr. Jobbins is using modified light traps to measure An. albimanus, the principal malaria carrier in Panama.

Dr. Stearns indicated the study in Delaware will be in the vicinity of Fort Dupont, where there are several known, large anopheline producing areas. Mechanical traps and barrel traps will be run at various localities and various distances from the breeding areas. Also, all feeding and resting places will be inspected as well as keeping track of larvae production. The principal difficulty seems to lie in measuring the influence of the feeding and resting places on the trap catches.

Dr. Arturo Luis Berti commented that in using animal baited traps it had been noted that catches would

decline each successive day that the trap was operated in a particular location, but that as soon as it was moved even a few feet, the collections increased again to the original density. The cause of this is so far unknown. Dr. Berti also expressed considerable interest in the small sprayers using aerosol, which were described by Mr. Stage.

### Speed Sprayers

Dr. Ginsburg described a new type of power sprayer that is available. It utilizes an air propeller to propel the spray material in a fine mist for long distances. It should be ideal for use in misting with larvicides to protect out-door gatherings of people from mosquitoes.

Mr. Thompson remarked that he had seen the speed type sprayer in action and that it seemed to show promise for such work as Dr. Ginsburg had mentioned, as well as for its usual type of service as an agricultural sprayer. He suggested the application of repellents through steam lines and air hoses, about industrial plants or shipyards where mosquitoes were reducing the workers efficiency, such as the shipyard mentioned by Mr. Stage. He also expressed the need for caution in using any chemical preparation as a routine treatment for materials not now looked upon as toxic when used occasionally, may prove to be objectionable if used frequently and in large quantities.

Mr. Van Derwerker remarked that he had had occasion to apply N. J. Mosquito Larvicide through the air conditioning system of an industrial plant, and had secured good results.

### Mosquito News

Mr. Van Derwerker said the next issue of Mosquito News would appear in June. He added that the response

The membership had been gratifying to the appeal for contributions, and many articles had come in. Articles had been solicited from workers outside the membership, and the response had been good. A desire to receive the book regularly had been expressed by workers.

After considerable discussion, Dr. Ginsburg moved that the President appoint a committee to plan additional distribution of Mosquito News, to a selected list of not over 50 key libraries and institutions, the committee to be authorized to send the most recent issue, and back issues if they are wanted. Dr. Glasgow seconded the motion and it was passed unanimously.

### Virginia Inspection

A letter was read from Mr. Perry W. Ruth, inviting the Association to inspect the mosquito work being done in Virginia and Norfolk, and setting forth in detail the proposed schedule. The group could leave New York via train at 10 P.M., traveling overnight to Cape Charles, where a boat could be boarded early the next morning for a trip across Chesapeake Bay to Norfolk. Mr. Ruth would provide transportation around Norfolk and return the group to the boat in the evening at the close of the inspection. The return trip could then be made overnight. By this scheme, auto transportation would be reduced to a minimum, and only one full day would be missed from regular business. It was the consensus of opinion that the trip should be made on June 19.

### Brief Biological Notes on Mr. John T. Nichols and Mr. Aretas A. Saunders.

Mr. John Treadwell Nichols was born at Jamaica Plain, Massachusetts in 1884. He received the Bachelor of Arts degree at Harvard in 1905, and has since been on the staff of the American Museum of Natural

History; as Assistant, Department of Ichthyology, 1913; Assistant Curator, 1913-1919, Associate Curator, 1913-1928; and Curator of Recent Fishes, 1928 to date. Mr. Nichols is a member of many scientific societies, including the American Association for the Advancement of Science, the American Society of Ornithologists and Herpetologists (of which he was Honorary President in 1937); the American Ornithological Union; the Nuttall Ornithological Club; the Biological Society of Washington; the Linnaean Society of New York; and others. His principal interests are fish and birds. Mr. Nichols has lived many years on Long Island with a summer home at Massapequa overlooking Moriches Bay. He is an enthusiastic field naturalist, and has an exceptionally thorough knowledge of the animals and plants of Long Island salt marshes and the adjacent upland.

Mr. Aretas Andrews Saunders was born at Avon, Connecticut, in 1884. He received the degree of Bachelor of Philosophy at the Yale School of Forestry in 1907, after which he served as Forest Assistant, U. S. Forest Service, 1908-1913, in the Montana Rocky Mountain region. Since then he has taught biology; from 1913-1916 in Union High School of West Haven, Connecticut, and from 1916 to date in Central High School of Bridgeport, Connecticut. In summers, Mr. Saunders has worked and taught, in 1914 and 1915 as Ornithologist and Biologist at the Flathead Lake Biological Station, Flathead Lake, Montana; from 1921-1926 as Field Ornithologist, for the Roosevelt Forest Wildlife Experiment Station; and from 1927-19 , as Teacher of Biology and Field Naturalist, at the Alleghany School of Natural History, Alleghany State Park for the New York State Museum. He is a member of the American Ornithological Union, the Cooper Ornithological Club, and the Wilson Ornithological Club. His chief interests are Ornithology, Ecology of birds; Behavior of Wild Birds under natural conditions; and Bird Songs. Mr. Saunders is an all round field naturalist, with

years of practical field experience. Notable among his publications is his New York State Museum book No. 7, entitled "Bird Song", which enjoys the distinction of having been reprinted in Braille for the blind, under auspices of the Library of Congress. Saunders has lived for many years close to the North Shore of Long Island Sound, and has an exceptionally intimate knowledge of the plants and animals, and the physical characteristics of Connecticut salt marshes, as well as of upland habitats of Connecticut, of the Adirondack Rockies, and of New York State.

### Report on Eastern Association of Mosquito Workers Inspection Trip to Norfolk, Virginia

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By Perry W. Ruth  
Bureau Mosquito Control  
City of Norfolk

On the morning of Friday, June 19, it was our pleasure to welcome back to Norfolk a group of the Eastern Association of Mosquito Workers who had accepted our invitation to make another inspection trip in this area. They had been accompanied all the way from New York by a strong contingent of our Naval forces, and while this unexpected war time courtesy was greatly appreciated it did cramp their quarters somewhat and reduced their breakfast rations, but we were able to make up the latter deficiency later on.

We had arranged for ample transportation and were well out of terminal traffic and at the comparative quiet of our field head-quarters where coats were shed, experiences were exchanged and pressure was generally relieved in preparation for a sight-seeing swing around the various points of interest we had chosen as most typical of our problems in this war construction localities. Each man received a descriptive itinerary with a sketch of the area showing the location of our various camps.