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"ALKALI POISONING" OF DUCKS FOUND TO BE A BACTERIAL DISEASE

Federal Department of Agriculture Specialist's Report on Recent Studies Indicates Botulism as the Cause

That "alkali poisoning" of waterfowl, a malady that has killed literally millions of ducks and other wild fowl in Western States during the past two decades, is not due to the toxic action of "alkali" but instead to a malady of bacterial origin, is the opinion now held by scientists of the Biological Survey, of the United States Department of Agriculture, who have been working on the problem in collaboration with specialists of the Bureau of Animal Industry. More specifically, the duck sickness is a form of botulism, caused by the poison elaborated by a bacterium known to science as Clostridium botulinum, type C. This decision has been reached after two seasons' investigation of the problem in southern Oregon and northern California.

This study, reported on briefly in Science, December 26, 1930, was prompted by the growing conviction of recent years that factors other than alkali might be to blame at one or another of the widely scattered points at which this malady had appeared. In some of the places where countless thousands of waterfowl had perished, alkali, though present, was in such negligibly weak concentrations that its direct toxic affect on wild fowl seemed improbable.

At other points also where alkaline salts appeared in quantities that might be great enough to be a source of danger if consumed by birds, waterfowl mortality was insignificant or unheard of. Attempts to reconcile circumstances such as these as well as attempts to produce true symptoms of the disease by the experimental feeding of natural and synthetic 'alkali' met with such frequent failure in this recent study that the previously rejected idea of a bacterially produced disease was reconsidered. Further impetus was given to study along this line by circumstances occurring in the course of the past season's field experiments that pointed strongly to the correctness of a bacterial theory.

There still remains much to be learned, and final statements will have to await the results of additional laboratory and field work. Experimental work has shown that duck sickness symptoms including all the reactions characteristic of that disease may be imparted to healthy, nonimmune birds by feeding certain body tissues of birds that had died of the sickness after these tissues had undergone a period of incubation. The product of this process of incubation is highly toxic.

The uniformity with which duck sickness symptoms may be produced through this means has not been equalled in other experimental work of the investigators. Not only have these results been obtained from specimens collected in southern Oregon and northern California but material collected at the Bear River marshes in Utah has given similar results and to that extent gives evidence of a similarity of the trouble at these two points.

Specialists of the Bureau of Animal Industry have taken up in the bacteriological laboratory the chain of evidence brought in from the field. Cultures of muds from infected areas, and of the tissues of birds themselves, have yielded results that fully corroborate theories entertained by field workers. It has been definitely shown that the western duck disease is a form of botulism, caused by the poison elaborated by Clostridium botulinum, type C. About ten years ago this type of the botulinus germ was discovered in this country in the larvae of the green fly, Lucilia caesar, and since then a number of outbreaks of botulism caused by that organism have been reported in several parts of the United States among domestic chickens, ducks, and swans.

Ducks affected with this disease exhibit symptoms of marked weakness of the leg, wing, and neck muscles. In the early stages there is unsteadiness in walking, inability to fly, a tendency to move the head from side to side and backward, and failure of the nictitating membrane of the eye to function. Later the bird assumes a prone position and is unable to rise, the neck muscles gradually lose their power, and the head droops to the ground. The breathing is slow and often accomplished by opening the bill. Death may ensue in from a few hours to several days after the onset of symptoms.

Experiments conducted during the past year demonstrated that the disease could be reproduced at will by the artificial feeding of culture filtrates of Clostridium botulinum, type C, recovered from the mud and water from an area of Tule Lake, where the affection was prevalent. The same type of botulinus organism was also recovered from several species of wild fowl (mallard and pintail ducks and a gull) that had died of the disease.

Combative or preventive measures that suggest themselves would apparently be the same as those employed to remove excessive alkali, namely, the maintenance of deep, fresh water and the elimination of areas of mud flats with their decaying animal and vegetable matter during periods of hot weather.

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