ACUTE CONJUNCTIVITIS IN THE SOUTH

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Along the southern border of the United States, a severe form of conjunctivitis, generally known as "sore eyes," exists during the warm months of the year. This disease affects many thousands of children annually, and in certain places is the chief cause of school absences and a major public health problem.

Since October 1947, we have been studying the disease first in Hidalgo County, Tex., and more recently in Thomas County, Ga. The investigation has been a joint enterprise of the National Institutes of Health and the Communicable Disease Center, using the services and personnel of both these branches of the Public Health Service with the cooperation of State and county health departments.

This disease is not new but has been observed for many years by various physicians. Dr. Carl E. Rice of the Public Health Service, in the course of a survey on trachoma in Texas in the early 1930's, had observed it and distinguished it from trachoma. Similar conjunctival disease has been reported from southern California by Schneider in 1927 and in Georgia by Bengtson in 1933. Because it occurs so frequently, is self-limited, and leaves no serious sequelae, it thus far has not attracted much concern in comparison to other diseases which, though more serious in outcome, may not be so prevalent.

Clinically, the disease begins with watering and irritation of one eye soon followed by vascular injection, pain, and purulent discharge. On the second or third day, the lids may be edematous and the other eye may become affected. In a few severe cases, the conjunctivae are severely inflamed, sometimes with ecchymoses, and the patient is incapacitated by the pain and swelling. The condition usually continues about a week, but may persist for as long as a month or 6 weeks. It frequently recurs, and some children are reported by their parents to be attacked every month or so.

Our first investigations in Hidalgo County, Tex., were directed toward determining the cause of the infection. From the affected eyes of 24 of 45 patients studied bacteriologically, a small gram negative bacillus belonging to the *Hemophilus* group was cultured in large numbers. Similar organisms also were seen in smears of the secretions. No evidence of the presence of a virus or other microbiological agent was obtained by examination of stained smears of the conjunctival scrapings and secretions, or with material that was taken to the laboratories of the National Institutes of Health in Bethesda, Md., in the frozen state and inoculated into monkeys, rabbits, mice, and embryonated eggs.

Despite the frequent occurrence of the hemophilic organism, the question remained whether this bacillus by itself could induce conjunctivitis or whether it was incidental or accessory to an undetected cause. Through the cooperation of the Department of Corrections, District of Columbia, eight adult human volunteers were inoculated with a broth culture of a strain that had been isolated from a 7-year-old school child. In six volunteers acute conjunctivitis, clinically resembling that seen in Texas, became manifest in less than 24 hours, and an organism indistinguishable from the one used for inoculation was recovered from the affected eyes.

Preceding the inoculations the organisms were observed to be sensitive in the test tube to streptomycin. These patients were treated topically with streptomycin; clinical improvements promptly followed; and 24 hours later, the bacteriological cultures were negative.

Following the establishment of the evidence that this organism caused the disease in humans, and could be effectively treated with streptomycin, further bacteriological studies have been undertaken in Texas and are now under way in Georgia. Although occasionally other pathogenic organisms are recovered from affected eyes, organisms belonging to the *Hemophilus* group have been found consistently. After considerable study, we were able to separate the *Hemophilus* strains into two groups. One group consisted of strains of *Hemo-*

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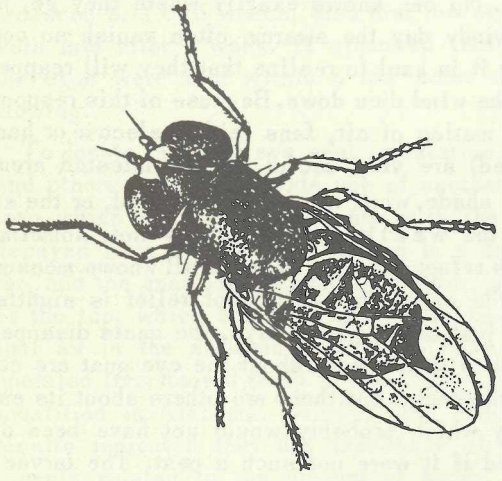
philus influenzae (Pfeiffer's bacillus) nearly all of which were nontype-specific. The other group consisted of strains which resembled *H. influenzae* in certain respects but differed from it in others, and corresponded to the original descriptions of the Koch-Weeks bacillus. These two organisms have been confused in the literature and textbooks and have been the subject of much controversy. Our detailed studies of these two types of *Hemophilus* have established cultural and serological methods of differentiation which may help in elucidating the epidemiology and pathogenesis of the disease.

An important problem is the mode of transmission. Most physicians and others who have had experience with it in these areas feel that the eye gnat, *Hippelates pusio*, is important in the transfer of infection from one individual to another. These



The adult eye gnat, *Hippelates pusio* (after Hall).

gnats are particularly abundant during the spring and fall and seem to be especially common in agricultural areas. They are attracted by the moist mucous membranes of man or animals, especially the eyes. Frequently they become lodged in the conjunctival sac and are a source of great annoyance. Around and on the lids of infected eyes they often swarm in large numbers and, of course, in infants they are continually clustered about the eyes. These insects are not blood sucking or biting flies; and if they serve as a vector, it is probably by a mechanical transfer of the causative organism. To date there is no experimental evidence on this mode of transfer and, furthermore, its importance, if established, will have to be considered in relation to other possible avenues of spread. The disease is especially prevalent in families in crowded, unhygienic surroundings where the opportunity for transfer of infectious material by fingers, clothing, or towels is ample. It may be that both means of transfer play a role in the spread of the disease.

It is of interest to note that a similar and probably identical disease is world-wide in distribution though limited largely to warm climates. In Egypt it is endemic, and there are numerous reports of epidemics of acute conjunctivitis from various parts of Europe. It is also present in Central and South American countries. It is interesting to speculate whether the disease at one time had a wider distribution in the United States. Weeks in 1886 described many cases in New York City and environs which corresponded to those seen in Texas; but insofar as can be determined, this disease now is seen rarely, if at all, there or in any part of the central United States.

The observations on the use of streptomycin in the experimental disease encouraged the employment of it in the clinic on naturally occurring cases. The antibiotic was used as a 0.1 percent solution in physiological saline and instilled directly onto the conjunctiva while the patient was in the clinic. For comparison, a 0.25 percent solution of zinc sulfate was used similarly on another group of patients. In both groups the treatment appeared to be effective as judged by clinical improvement and failure to recover organisms after treatment. The recent reports of the use of aureomycin by Braley and his associates add another therapeutic agent to the treatment of conjunctivitis caused by hemophilic organisms. There are of course other antibacterial agents which also have acquired favor with physicians. It appeared to us, however, that the method of administration was of extreme importance. When care and effort by the nurses was taken to make sure the therapeutic solution was properly instilled, the results were much better than if the parents were trusted to administer it as best they could.

The control of the disease would appear to depend on the solution of the problem of mode of transmission and also a better understanding of the pathogenesis and epidemiology of the disease based upon careful etiological studies. In the meantime, proper use of therapeutic agents at hand will do much to relieve the disability caused by the infection.