

sera tested, 9 gave a reaction in the lowest dilution. With 5 of the sera of domestic ducks, reactions in serum dilutions of 1:2 to 1:16 were obtained. Tests with the sera of the wild fowl were completely negative. No attempts to recover virus were made. The results suggest that infection with ornithosis occurs in domestic turkeys and ducks while game birds, at least in Michigan, are relatively free of the infection.

Summary. Complement-fixation tests with the virus of meningo-pneumonitis in Michigan revealed that 61 of 100 pigeons reacted with the antigen; 41 of them in dilutions of 1:32 or greater. Pigeon serum fails to give the cross-reaction with lymphogranuloma venereum antigen which is commonly seen with human serum.

Reactions of variable intensity were obtained with 22 of 109 sera from domestic turkeys, with 5 of 24 sera from domestic ducks and, in the lowest dilution only, with 9 of 45 chicken sera.

No reactions were observed with the sera of 90 wild fowl.

The authors wish to express their appreciation for aid in obtaining blood samples from the various sources to Dr. H. J. Stafseth, Michigan State College; Dr. Stanley Whitlock, Michigan Department of Conservation; Mr. W. F. Van Dien, Director of Michigan State Game Farm; and Dr. J. G. Molner, Deputy Commissioner of Health, Detroit, Michigan. The psittacosis antigen was kindly furnished by Dr. K. F. Meyer of the Hooper Foundation, San Francisco; the lymphogranuloma antigen by Dr. Clara Nigg of the Squibb Institute, New Brunswick, New Jersey, to whom we express our thanks.

13777

Sinus Gland Extirpation in the Crayfish Without Eyestalk Removal.

FRANK A. BROWN, JR. (Introduced by C. Donnell Turner.)

From the Department of Zoology, Northwestern University, Evanston, Illinois.

In view of the increasing volume of literature pertaining to endocrine activities of the crustacean sinus gland, it is unfortunate that the only simple and sure method of removal of these glands from the body has involved the removal of the total eyestalk. The eyestalk constituting the most important light receptor of the organism, contains, in addition to the sinus gland, several important nerve ganglia, the x-organ, and other possible endocrine sources. For this reason the usual removal of so much additional tissue with the glands leaves

the interpretation of the results of eyestalk removal somewhat uncertain, to say the least. Furthermore, such a function as control of retinal pigment migration, which is believed by a number of endocrinologists to be normally under the control of the sinus gland, has not yet been confirmed by such a crucial experiment as gland extirpation since this latter has also always involved removal of the effector mechanism as well. Nearly every recent investigator in crustacean endocrinology has at one time or another attempted to remove the sinus gland while leaving the rest of the stalk intact. The only published attempt to date¹ dealt with the highly transparent shrimp, *Palaemonetes*. The technic developed in this case was not sufficiently satisfactory to be used as a routine laboratory method, and furthermore could not be used successfully upon the great majority of crustaceans whose exoskeletons were relatively opaque.

The simple technic described below has been devised to extirpate the sinus glands from crayfishes without eyestalk removal, and, in fact, with little apparent disturbance to the remaining functions of the stalk including vision. The operation can be performed rapidly, and after a little practice, bilateral extirpation of the glands in an animal can be accomplished in less than 5 minutes. With such speed, large numbers of animals may be operated in a relatively short time.

The method is as follows: The animal from which the glands are to be removed is first secured to the stage of a low magnification dissection microscope by means of rubber bands in order to leave both hands of the operator free for action. The animal is readily orientated beneath the rubber bands into nearly any desired position. The operator then holds a capillary glass aspirating tube in his left hand and a pair of 3C watch-maker's forceps in his right. With one point of the forceps, the eye is punctured approximately at point A (see Fig. 1) in the relatively thin cornea and the forceps point forced completely down through the eye. The eye is then carefully torn along the line A-B. The cornea of the eye at C and the visual elements of that region are carefully drawn away with the forceps and aspirator tube. The blood and diffusing pigment which immediately flow into the wound are also drawn out. As the fluids are aspirated, a concavity (D) is produced, and the sinus gland (E) comes into view at once, or it may easily be brought into view by teasing the region gently. The gland is then readily removed in one piece by means of the forceps. Since the gland is of a charac-

¹ Brown, F. A., Jr., Ederstrom, H. E., and Seudamore, H. H., *Anat. Rec.*, 1939, **75**, Suppl., 129.

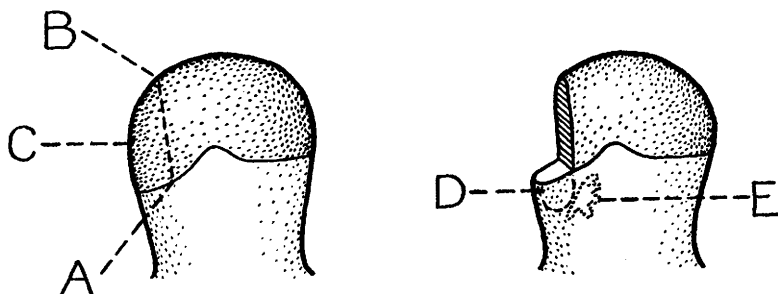


FIG. 1.

Dorsal view of the left eyestalk of *Cambarus immunis* showing incisions made for sinus gland removal and the approximate location of the gland.

teristic bluish-white tint and has a texture quite different from the surrounding tissue of the stalk it may be thoroughly removed even though the gland breaks into several pieces due to clumsy initial treatment.

This method of sinus gland removal gives a far lower percentage of operative deaths than does eyestalk extirpation. In several series, each involving sinus gland removals from 10 animals, I have had 100% survival from the operation itself. Animals from which the sinus glands have been removed in this manner behave outwardly much more normally than do animals without eyestalks. Their posture and responsiveness appear quite normal, and even vision appears not to be radically disturbed. The wound heals quickly, even though no precaution is taken to prevent bleeding.

These operated animals, judging from the brief experiments which have been performed to date, appear to show the lowered vitality and increased molting rate which certain published data^{2, 3} indicated should result from the removal of only the sinus glands.

² Brown, F. A., Jr., and Cunningham, O., *Biol. Bull.*, 1939, **77**, 104.

³ Kyer, Donald L., *Biol. Bull.*, 1942, **82**, 68.