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MISCELLANEOUS.

Cement-glands and Origin of Egg-membranes in the Lobster.

By FRANCIS H. HERRICK, of Adelbert College.

THE cement-glands have hitherto escaped detection in the lobster (*Homarus americanus*), and consequently the origin of the gluey secretion in which the eggs are immersed at the time they are laid, and by means of which they are attached to the body, has never been accurately determined.

Cano's valuable studies ("Morfologia dell' apparecchio sessuale femminile, glandole del cemento e fecondazione nei Crostacei Decapodi," Mittheil. Neapel, Bd. ix.) have called attention to the much-neglected cement-glands of the Decapod Crustacea.

Erdl, in 1843, described three egg-membranes in the egg of the lobster, and regarded the outermost of these as a secretion-product of the oviduct. Bumpus also ('Journal of Morphology,' vol. v. no. 2) attributes the "varnish-like layer," which surrounds the ovum of *Homarus* at the time of oviposition, to a secretion which probably comes from the columnar cells of the oviduct. Lereboullet just escaped the discovery of the cement-glands in 1860, but correctly stated that the cement-substance came from beneath the skin of the underside of the abdomen. The true cause of this secretion was first recognized by Braun in 1875, and the subject has been recently investigated in a large number of Decapods with great clearness by Cano.

When the lobster-embryo is about to hatch it is invested by three membranes, from which it escapes to enter upon its first free-swimming larval stage. The outermost of these is the membrane of attachment. Within this is the chorion, which is now nearly absorbed. This is exceedingly delicate, and is often carried away with the former in the process of hatching. The innermost membrane does not belong to the egg, but to the embryo, which it closely invests. The casting-off of this membrane forms the first moult, and unless it is successfully thrown off the larva dies. The earlier embryonic cuticles, which are formed in the long course of embryonic life, are entirely absorbed at the time of hatching.

The secondary egg-membrane, or membrane of attachment, completely separates from the chorion at the time of hatching, except at one point, which is often opposite the thread-like stalk, with which the outer capsule of the egg is continuous. The outer membrane, which is less elastic than the chorion, is subjected to a high degree of tension, until it finally bursts, splitting into two symmetrical halves along the vertical longitudinal plane of the body of the embryo, beginning at the hinder end and coming off over the head and tip of the abdomen.

When the chorion or primary egg-membrane is removed from the

ripe egg by means of hot water, it appears to be covered with small rounded areas, which are possibly the impressions of the follicular cells. No distinct pores could be detected in it, but when wrinkled it appears to be vertically striated, which may argue in favour of their presence.

For some time before oviposition the pleopods appear to be filled with a milky-white substance. This appearance is caused by the distended condition of the cement-glands, to the activity of which the secretion which forms the secondary egg-membrane is due. If the cuticle is removed from a pleopod at this time the tissue is seen to be studded with very minute, round, whitish bodies—the cement-glands. They are most abundant over the posteriorly directed sides of the laminae, and extend up into the stalk. It is noticed also, in a lobster “in berry,” that it is upon this side of the swimmeret that the eggs are mostly attached. I have found the glands in the five anterior pairs of pleopods only; but it is possible that they may occur in the telson, the uropods, and epimeral regions. The glands occur singly or in clusters, and are closely crowded along the thickened edges of the laminae.

Sections show that the gland is composed of a very delicate sheath of connective tissue and a simple epithelium consisting of tall pyramidal cells. The polygonal base of each cell occupies the periphery, at which a large round nucleus is situated, and the apices of the cells meet near the centre of the gland, the lumen of the organ being at this time very slight. It is almost impossible to detect in sections the opening of the gland to the exterior, but it is quite probable that each gland opens separately. Cano describes these glands in numerous forms as bottle-shaped structures, the necks or ducts of which open to the exterior through pores in the cuticle. Pores can be shown to exist in the lamina of the pleopod by removing the tissue by caustic potash and distending the cuticle with water; but pores of the same kind also exist in the appendages of the male, where no cement-glands occur. I cannot at present say how the pores are distributed on the surface of the cuticle, but it is probable that they are not confined to any particular area.

If the glands are examined shortly after oviposition, they show a remarkable change in structure. The glands are enlarged and the epithelial cells have the appearance of degeneration, their nuclei presenting every stage of fragmentation, from the condition of minute chromatin-particles, which fill almost the entire gland, to deeply stained round granular masses, which are much larger than ordinary nuclei. Under these conditions cell-outlines are very dim and the lumen of the gland is not open.

It seems quite probable that the peculiar gland-like structures which I have described in the immature ovary of the lobster (see these Circulars, no. 88) are concerned with the growth of the ovarian eggs. Numerous follicular cells enter these growing ova at an early stage, and gradually become converted into food-products. Their nuclei break up into very small vesicles, and finally lose all

their nuclear characteristics, when their degeneration is complete.—*Johns Hopkins University Circulars*, vol. xii. no. 106, p. 103.

Cleveland, Ohio,
March 21, 1893.

Notes on some Mexican Coccidæ *.

Las Cruces, New Mexico, U.S.A.,
June 21, 1893.

Later studies make it desirable to add a few words. In *Pulvinaria lutea* I remarked on the long bristle on the inner side of the femur. I now believe that this is on the end of the trochanter, as is seen in other species. The trochanter appears to be unusually long and its articulation with the femur difficult to observe. From this correction it follows that the femur itself is shorter than I supposed. The *Ceroplastes* on *Artemisia* was expected to prove identical with one from New Mexico, which has been named *C. artemisiæ* by Dr. Riley, but not described. However, I sent some to Dr. Riley, and hear from him that they are distinct—which is curious, since they live on the same genus of plants in the same zoological subregion. My insect, which is curiously irregular in form, will be called *C. artemisiarum*, sp. n. The other "*Ceroplastes*" alluded to, on a spiny shrub, has a glassy rather than waxy scale and 7-jointed antennæ, wherein it agrees not with *Ceroplastes*, but with the New-Zealand genus *Inglisia*, Maskell. I call it, therefore, *Inglisia nivea*, sp. n.

T. D. A. COCKERELL.

Las Cruces, New Mexico, U.S.A.,
June 24, 1893.

Mr. Robert Newstead, to whom I sent specimens of *Pulvinaria lutea*, remarks that in structure the ovisac agrees not with true *Pulvinaria*, but with the closely allied genus *Lichtensia*, Sign. At the same time he kindly sends me specimens of *L. viburni*, Sign. (the only known species of the genus), which were found at Llandaff, Wales, by Mr. B. Tomlin. *P. lutea* and *L. viburni* differ very greatly in superficial appearance; but, as Mr. Newstead states, they show some generic points in common. Detailed comparisons will be made, and reported on in some future paper.

T. D. A. C.

* [The above notes reached us too late for insertion with the paper in our July number.—Eds.]