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FACTS ABOUT THE "LOBSTER PEARL"

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THROUGH the kindness of Dr. H. M. Smith, of the U. S. Bureau of Fisheries my attention was recently called to reports of the discovery of a "lobster pearl," which had a wide circulation in the newspaper press.

In an article credited to the New York *Times*, Mr. Herman Meyer, a pearl dealer in New York, to whom this object had been sent for examination, is reported to have described it as follows:

> As best I can see, the pearl has none of the laminated structure of a pearl produced by a shell. But, while it seems one homogeneous mass, at the same time it is as much a pearl as a lobster can produce, and as true a pearl for a lobster as is a regular pearl for a shell. Lobsters are not in-layers, and the inside meat of a lobster does not move as does the inside of a pearl shell. In my opinion it is a lobster pearl.

In reply to a letter of inquiry on the subject, Mr. Alfred Eno, of Jamaica, New York, gave this account of the finding of the "pearl":

> In July, 1907, accompanied by F. W. Denton, of Hollis, Long Island, I was eating dinner at the Orient Point Inn, Orient Point, L. I., and besides other things, we had some lobsters which had been caught in Plum Gut, off the end of Orient Point, the day before. Mr. Dunton broke open one of the claws of the lobster he was eating, and in biting into the meat, his teeth came in contact with a hard substance

Mr. Eno kept this "hard substance" as a curiosity, and two years later sent it to the dealer in New York, who, as related above, pronounced it to be a true pearl.

The following further details were given to me in a letter by Mr. Meyer:

> The pearl was about 7 millimeters in diameter; nearly round, not smooth; the color was a light manilla, about that of the inside of the shell after boiling. The hardness was about 3; the texture was solid,

without layers, and the fracture was waxy but not brittle nor conchoidal. It had no place where it seemed to be attached to anything, and it had no lustre beyond that of beeswax. To all appearance it seemed the same material as the inside of the claw, without crystalline structure and without layers. Every appearance of the pearl and the manner of the finding, and the two men who found it indicated that it was not a fake. I deal with many of these things, almost daily, and could have determined that fact.

Later through the courtesy of Mr. Eno, I was able to make a careful examination of the so-called "pearl," and to secure the photographs, which are here shown. While my findings, which will be now given in detail, do not support the view expressed above—that we are dealing with a true pearl-like body in any proper sense—they in no way detract from the biological interest of the object, which is without doubt unique.

Description.—The body called a "pearl" is chiefly remarkable for its form, for when seen from one side or pole it has the appearance of a nearly symmetrical sphere, 11 millimeters in diameter (Fig. 1). That it is not in reality regular, but has a long axis at right angles to a flattened side, is better seen by reference to Figs. 2 and 3, in which the object is represented four times its natural size. Its absolute weight is 0.9785 gram.[1] It is of a light buff color, and in all essential respects resembles the shell of any lobster's claw, when seen from the inside, and in the dried state (Fig. 4).

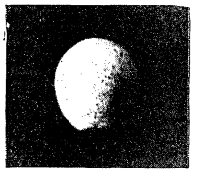

FIG. 1. The "lobster pearl," seen from side parallel with axis of ingrowth. Natural size.

The surface of the body is neither chalky nor waxy, but shines faintly, and has a distinct punctate or granulated appearance. The flattened pole or side, which bears the marks of a knife, and was evidently once rougher than now appears, represents, without any

[1] For this determination, as well as for the specific gravity of the "pearl," and shell of the lobster's claw, I am indebted to my friend Professor H. W. Springsteen, of Western Reserve University.

doubt, the original "stalk" or bond of union with the rest of the shell. Close to this base rises a crest one third of an inch long (seen to left of star in Fig. 3), and from this a rather conspicuous furrow diverges and passes diagonally up one side of the mass. In this furrow close to what we regard as the base of attachment, lies a large hair-pore (over star), which is visible to the eye, and into which a needle-point can be easily thrust, while around this base a dozen smaller but quite similar hair-pores can be readily detected with a magnifying glass.

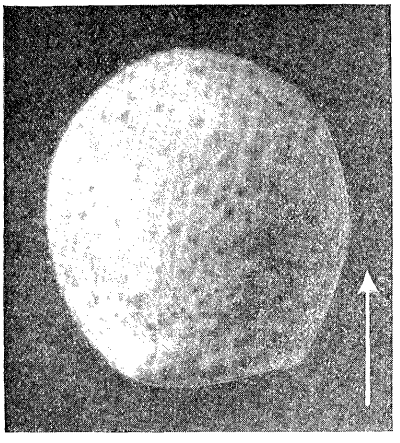

FIG. 2. Sphere, seen from same side shown in Fig. 1, showing elevations corresponding to the tegumental glands. Arrow marks the direction of the ingrowth. Four times natural size.

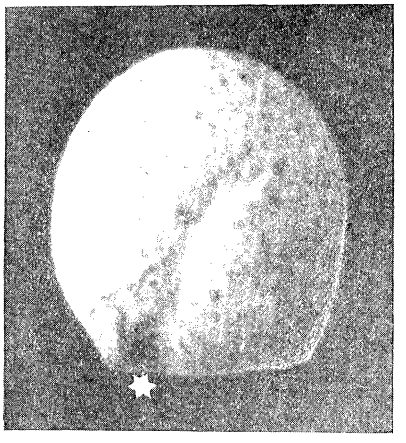

FIG. 3. Sphere, seen from the side opposite that presented in Fig. 2, showing an oblique groove running up from the base of attachment. Large hair-pore near the base is over the star.

The punctuate or granulated surface of the body (Figs. 2 and 3) is seen upon microscopical examination to be due to minute elevations, which are thickly and rather uniformily distributed. Each of these elevations is crater-like, having what appears like a central pore, from which radiate very fine creases or striæ.

The shell of the lobster, although apparently a solid armor, is very sensitive, for it is virtually a strainer, being penetrated in its every part with multitudes of

minute vertical canals, which give passage to either sense-organs (sensory setæ, bristles or "hairs"), or to glands (ducts of the tegumentary glands), and thus put the soft and sensitive skin in direct relation to its outer environment. The pores of the tegumental glands open on crater-like elevations similar to those described above, but lie far below the limits of visibility to the naked eye. These glands themselves are usually not over .15 millimeter in longest diameter, and while the length of their ducts is not commonly more than .15

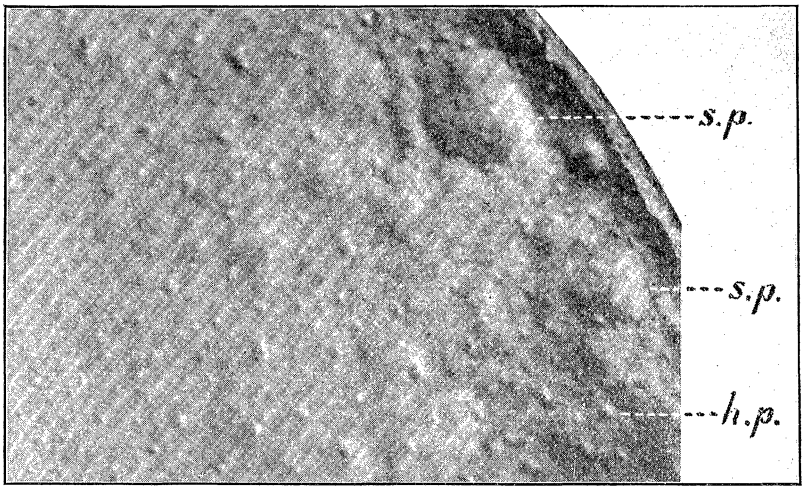

FIG. 4. Photograph of the inner surface of the shell, from the lower side of the toothed claw, showing "blisters" (*h. p.*), which represent the hair-pores. The larger elevated areas (*s. p.*) near the margin are sieve-plates, which give passage to hundreds of setæ. Four times natural size.

mm., plus the thickness of the shell at that point, their diameter is only .008 mm. The hair-pores, on the other hand, are sometimes visible, being .15 mm. in diameter or larger, while many are much smaller than this, and when the shell from the under side of the big claws is seen from the inside, they are found at the summit of large blister-like elevations (Fig. 4), though too small to show in the photograph. In other places, as in the shell from the upper side of the big claws, the pores of

this type usually lie at the bottom of corresponding depressions. We consider that the minute elevations on the surface of the so-called pearl mark the positions of tegumental glands, the only other possible conclusion being that they represent extremely minute and no longer functional hair-pores. In any case they prove that the structure of this body tallies with that of the rest of the shell.

It may be added that between the conspicuous "craters" of the more prominent and functional hair-pores (on the inner surface of the shell of the big toothed claw), innumerable smaller granulations occur which do not appear to belong to functional setæ or to glands, while along the lower outer margin of this claw, where the setæ are bunched, each elevated area has the appearance of a sieve, bearing hundreds of holes. Two of these areas, which correspond to very marked depressions on the outside of the shell appear at the upper right hand side of Fig. 4 (*s. p.*), close to the outer margin of the toothed claw, and near its tip. The magnification, however, is not sufficient to show the pore-canals. The hard shell of the lobster is further vertically striated and horizontally laminated, and the same laminated structure can be seen at the base of the body in question, where a knife has been applied.

The specific gravity of the sphere was found to be 1.45, and that of a part of the dried shell of a toothed claw (from upper surface of propodus, near the hinge-joint of a large hard-shelled individual) was 1.43.

It is thus evident that in color, texture, structure and specific gravity, the body under analysis agrees with the shell, being peculiar only in its form, and in the position which it occupied in the meat of the claw. It is not a "pearl" in any sense, but an integral part of the shell, to which it was joined at its short stem or base, until the claw was broken open by the finder.

Origin.—It is safe to say that no proper pearl can be formed in a crustacean, and presumably in no other

arthropod, since the hard shell is a differentiated portion of the outer ends of the epithelial cells themselves and in direct organic connection with them, except under the peculiar conditions which determine the molt. The shell of a pearl-secreting mollusk, on the other hand, is a true secretion product, to which deposits are successively made by epithelial cells having a different relation to the shell, which is never cast off. Assuming that a foreign body could by any means find lodgment between the hard and soft parts of a lobster's skin, it would not be free to move as is the case with a grain of sand inserted beneath the mantle of a bivalve mollusk, and if it did not immediately set up a process of regeneration at the point of lesion, the foreign body would be surely lost at the succeeding molt.

If the shell of the claw to which this spherical body pertained had been preserved, its origin could have been traced with greater certainty, but all things considered, it seems to be a vagary of the process of regeneration, due in all probability to some peculiar injury, leading to an ingrowth or pocketing of the skin at that point, instead of to the usual protuberance. It represents a permanent ingrowth of a part of the shell, started in all probability when this was soft, and not later smoothed out or effaced at any subsequent molt. While it would be impossible to prove that this body was not formed, as we see it, during the interval between two molts, it seems quite possible that it has survived more than one casting of the shell, in which case we should have a succession of "pearls," similar to this one, but probably forming a progressive series as regards their size and solidity.

A cruder suggestion would be that this sphere represents one of the grinding tubercles or "molar teeth" of the crusher claw, like the large proximal and usually symmetrical tubercle of the dactyle, pressed into the meat of the claw in some unaccountable manner, and not later restored to a normal condition. The presence of

tegumental glands, assuming that these have been correctly identified in the body in question, might lend some support to this idea, for the tubercles are formed by fusion of the sharp teeth, near the apex of each of which a tegumental gland is seen to open, up to the fourth and to even later stages of development before the adult types of claw have been differentiated. I

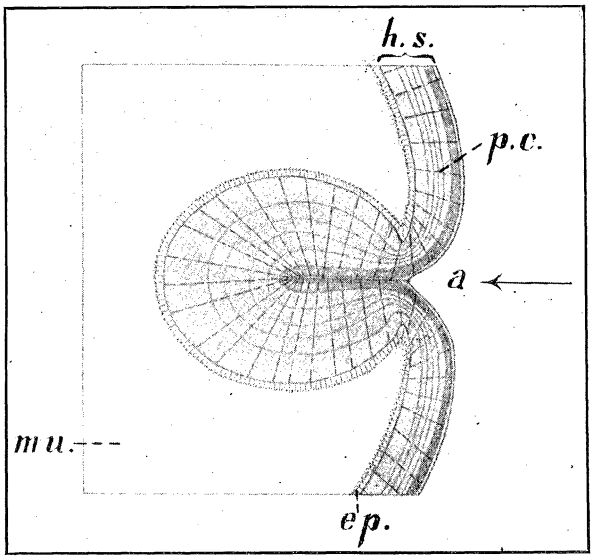

FIG. 5. Diagram to illustrate the origin of the "lobster pearl," the axis of ingrowth being marked by arrow. The horizontal laminæ of the shell, and the vertical canals (hair-pores or capillary ducts of the tegumental glands) being only roughly indicated; *a*, area of ingrowth; *ep*, chitin-forming epithelium of soft skin; *h. s.*, hard shell; *p. c.*, canals penetrating shell; *mu*, muscles.

am inclined, however, to regard the body as the result of regeneration, due to injury, in the way suggested above.

Reduced to the simplest expression, the ingrowth and shell proper bore the relations shown in Fig. 5, where the axis of invagination is marked by the arrow. The ingrowth involves in succession the soft skin (dermis and chitin-secretin epithelium), the calcified non-pigmented and pigmented strata, and the thin outer enamel layer of the hard shell, but the superficial area of in-

growth (marked *a*) may be represented here as extended too far below the surface. The relations, however, are the same, whether this pocket is deep or shallow, and no attempt is made to express any possible mechanical conditions which might determine the inward rather than outward direction of such a fold.