

Sub-Class Calcarea.

Order Calcispongiae.

- i. Sub-Order Homocœla, with the families Asconidæ, Homodermidæ, and Leucopsidæ.
- ii. Sub-Order Heterocœla, with the families Syconidæ, Syllidæ, Leuconidæ, and Teichonidæ.

Sub-Class Silicea.

Order Hexactinellida.

- i. Sub-Order Lyssacina, with the families Euplectellidæ, Asconematidæ, Rossellidæ, and Hyalonematidæ.
- ii. Sub-Order Dictyonina, with the families Farreidæ, Euretoidæ, Melittionidæ, Coscinoporidæ, Tretodictyidæ, and Meandrospongidæ.

Order Chondrospongiae.

- i. Sub-Order Tetraxonia, with the families Rhizomorinidæ, Anomocladinæ, Tetracadinidæ, Corticidæ, Pachystrellidæ, Plakinidæ, Oscarellidæ, Geodidæ, Stellettidæ, Thenidæ, Tetillidæ, and Tethyopsyllidæ.
- ii. Sub-Order Monaxonida, with the families Tethyda, Sollasellidæ, Spirastrellidæ, Suberamatidæ, and Suberitidæ.
- iii. Sub-Order Oligosilicina, with the families Chondrillidæ and Chondrosidæ.

Order Cornacuspongiae.

- i. Sub-Order Halichondrina, containing the families Spongillidæ, Homorhaphidæ, Heterorhaphidæ, Desmacidonidæ, and Axinellidæ.
- ii. Sub-Order Keratosa, with the families Spongidæ, Aplysinidæ, Hircinidæ, Spongelidæ, Aplysillidæ, and Halisarcidæ.

These families and major groups are all characterized, as are the sub-families recognized. In each the more important genera are mentioned. The article concludes with a nearly exhaustive bibliography of the literature of recent sponges, no less than sixteen hundred and fifty-four titles being enumerated. The bibliography previous to this (that of D'Arcy Thompson, 1895) contained five hundred and fifty-one titles. In this connection the student should consult the *errata* given by Von Sars in the *Zool. Anzeiger*, No. 254.

Notes on the Otenidium of *Unio aberti* Conrad.—In January of the present year a gentleman resident in Kansas sent me several living specimens of *Unio aberti* Conrad, just then collected from the Missouri River, in that State. One of these specimens proved to be a female, the ctenidia of which were surcharged with developing young. It was particularly interesting, however, because of the modification of the branchial uteri, which has been hitherto observed but once in any species of *Unio*.



Dr. Lea, in a paper read before the American Philosophical Society in early November, 1827, described both the shell and soft parts of *Unio irroratus*, a species then first made known. This paper was published, with figures, in vol. iii., *Transactions American Philosophical Society*, Plate V., 1827.



FIG. 1.—Explanation: "a, mouth; b, great anterior muscle; c, superior right branchiæ; d, great posterior muscle; e, inferior right branchiæ; f, right oviduct; g, foot."

about half-way up the branchiæ, and somewhat posterior to the centre. The number of these sacks in my three specimens consists of eight in two and seven in the other." In Fig. 1 is given a copy of Mr. Lea's figure of this structure, seen in external view.

Now, it is evident that these "sacks" instead of being appendages to, are really the elongated chambers of the ctenidia, functionally active as brood-pouches. The properly so-called oviduct of *Unio* is not well known, though the position of the genital opening leading from the gonads—whether they be ovaries or spermaries—is well known. The terms oviduct, as used by Mr. Lea, and ovaries, as commonly applied to the surcharged ctenidia, are, therefore, not only incorrect but misleading.

Hitherto the peculiar feature noticed in *Unio irroratus* has not been found in any other species in the genus, but it now finds an instructive counterpart in Conrad's species. As shown in Fig. 2, the anterior chambers of the ctenidium, *i*,—all of which are filled with young,—are directed ventrad and backwards in a flowing curve; but as the median chambers become filled they are recurved and thrown outwards. This recurring gives to the ctenidium the appearance which Mr. Lea described as a "depressed cone." The final result is an irregular intercoiling and crowding of the more posterior chambers, which are less than one-half the diameter of the anterior ones. The chambers are, without exception, very long cylindrical distally closed tubes, with a somewhat less diameter at point of origin than at extremity. Their walls, which are exceedingly thin and readily ruptured, are further somewhat protected by a transparent and

somewhat gelatinous membrane, which ctenidium and serves to aid in holding the chambers together.

In this specimen the young found in the most posterior chambers. It was observed that they were discharged through the genital opening of the branchial cloaca and pass thence, being mixed with the cœlomic fluids, into the chambers, often distending them to four and five times their normal diameter. Furthermore, in nearly all the species of *Unio* which have come under our personal observation, the anterior median chambers of the ctenidia appear to be first charged with ova. The process continues, successively extending towards the posterior extremity of the outer branchiæ until,

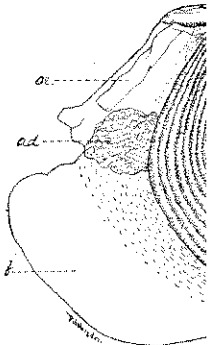


FIG. 2.—Explanation: "a, angular labial palps; b, adductor muscle; c, cylindrical chambers of ctenidium; d, portion of medial chamber; e, mantle, folded on ctenidium; f, foot; g, foot."

in most if not all species, both nearly entire external ctenidia and brood-pouches. My observation has been the same, to a certain degree at least, in other conditions, for I have taken specimens of *Unio* the year with the young in all stages of development.

It may not be out of place here to mention such as is found in the glochidium larva of many species of *Unio*. The glochidium of certain related species—*e.g.*, *U. rubellus*, *U. radianus*, *U. parvulus*, and *U. penicillatus*—is not chitinous, and lasts, at least in the Ohio Rivers, throughout the life of the individual.

An unfortunate duplication of species ought, perhaps, to be mentioned here. *Unio aberti*, from the Verdigris River, described by Mr. Leconte, appeared in the *Acad. of Natural Sciences*, vol. v. p. 10. *Unio aberti*, from the Verdigris River, described by Mr. Leconte, appeared in the *Acad. of Natural Sciences*, 2d series, vol. ii., Pl. XX

before the American Philosophical Society, 1827, described both the shell and the animal, a species then first made known to the world with figures, in vol. iii., *Transactions of the American Philosophical Society*, Plate V, Fig. 1, p. 327. The general physiological character of the ctenidium, as thus peculiarly modified, appears to have been fully understood by Dr. Lea, but its structural relation appears to have been misinterpreted and to have been regarded as an appendage of the branchia, and hence as being morphologically distinct. He thus writes, pages 270-271, "In those I observed an appendage in the form of a depressed cone, attached to the branchia on either side, and on a very slight examination fully satisfied me these were the oviducts. . . . The 'sacks' containing the ova are inserted into the branchia and somewhat posterior to the oviducts in my three specimens, as in the other." In Fig. 1 is given a representation of this structure, seen in external

view, "sacks" instead of being appended to the chambers of the ctenidia, as in the original. The properly so-called oviducts, though the position of the genital organs—whether they be ovaries or oviducts. The terms oviduct, as used by Mr. Lea, applied to the surcharged ctenidia, is correct but misleading.

As noticed in *Unio irroratus* has been observed in the genus, but it is not the case in Conrad's species. As shown in the figures of the ctenidium, *i*,—all of which are directed ventrad and backwards, the anterior chambers become filled towards the posterior. This recurring gives rise to the result is an irregular intercoiling of the chambers, which are less in the anterior ones. The chambers are cylindrical distally closed towards the point of origin than at the distal end, are exceedingly thin and rounded at the distal end, and are protected by a transparent

slightly gelatinous membrane, which invests the entire ctenidium and serves to aid in holding the chambers in place.

In this specimen the young found in the anterior chambers were in a more advanced stage of development than were those in the most posterior chambers. It would appear that the ova are discharged through the genital opening into the innermost branchial cloaca and pass thence, being fertilized *in transitu* and coming with the cœlomic fluids, into the outer cloaca, whence they fill the chambers, often distending them to four and sometimes five times their normal diameter. Furthermore, in nearly all of the specimens of *Unio* which I have come under my personal observation, the anterior chambers of the ctenidia appear to be first charged with ova. The process continues, successively extending towards the posterior extremity of the ctenidia until, in most if not all specimens, both nearly entire external ctenidia function as brood-chambers. My observation has been that the process of development is, to a certain degree at least, independent of temperature variations, for I have taken specimens of *Unio* at all seasons of the year with the young in all stages of development.

It may not be out of place here to note that no byssus organ, such as is found in the glochidium larva of *Anodonta*, has ever been observed by me in the examination of numerous embryonic forms of many species of *Unio*. The byssus which is seen in certain related species—*e.g.*, *U. rubellinus*, *U. acutissimus*, *U. confusus*, *U. parvulus*, and *U. penicillatus*—is gelatinous in nature and is chitinous, and lasts, at least in the Coosa and Cahawba Rivers, throughout the life of the individual.

An unfortunate duplication of species on the part of the writer might perhaps, to be mentioned here. In 1850, in *Proc. Phila. Acad. Nat. Sci.*, vol. v. p. 10, Mr. T. A. Conrad described *Unio aberti*, from the Verdigris River, Arkansas. The final description, with figures, appeared in the *Four. Phil. Acad. Nat. Sci.*, 2d series, vol. ii., Pl. XXIV., Fig. 1 (1851). Two

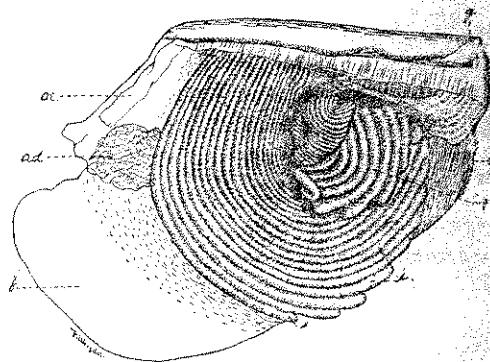


FIG. 2.—Explanation: *Oe*, oesophagus. The triangular labial palps have been removed. *ad*, anterior adductor muscle, in transverse section. *f*, foot. *i*, cylindrical chambers of the ctenidium. *ip*, incurved portion of medial chambers. *h*, siphonal tentacles. *g*, mantle, folded on itself above, to show junction of ctenidium.

years later, in 1852, Dr. Lea described the same form under the name of *U. lamarchianus*, with figures, in the *Trans. Am. Phil. Soc.*, 2d series, vol. x., Plate XVII., Fig. 20. His figure is imperfect in that the characteristic roughened surface with more or less depressed folds is not shown, though mentioned casually, in the description. This circumstance, added to the fact that then I had not seen either the description or figure of Conrad's species, led me into the error of redescribing in 1885, as new, this same species under the name of *U. popenoi*, the specimens coming from the Fall and Verdigris Rivers, Kansas. *Vide* "Bulletin Washburn Coll. Lab. Nat. Hist.," vol. i. No. 2, pp. 48, 49, Pl. II., 1885. There is no reasonable doubt, however, but that the last described form is the female of *U. aberti*,—Conrad's description and figure being based upon the half-grown male form. The synonymy will therefore stand as follows: *Unio aberti*, Conrad (1850). *Unio lamarchianus*, Lea (1852). *Unio popenoi*, Call (1885).—*R. Ellsworth Call.*

Zoological News.—**WORMS.**—Miss A. M. Fielde, of Swatow, writes to the Philadelphia Academy (*Proceedings*, p. 115, 1887) describing some observations made on the life-history of a Chinese liver-fluke. One snail examined by her was the host of at least ten thousand young Distomæ, while another individual had the liver almost wholly replaced by a Redia of the same parasite.

Mr. A. G. Bourne gives (*Proc. Zool. Soc. London*, 1886 [1887]) a preliminary account of some Indian earth-worms belonging to the families Perichætidæ and Moniligastridæ. Eight belong to the genus Perichæta, one to Perionyx, and seven to Moniligaster. The species of Perionyx (*P. saltans*) has the power of leaping into the air when touched. Bourne says that the huge earth-worm mentioned by Darwin as occurring on the Nilgherries turns out to be a species of Moniligaster described by Perrier as *M. deshayesi*.

The first part of the fourth volume of Bronn's "Klassen und Ordnungen der Thierreichs" has appeared. The volume will be written by Dr. A. Pagenstecher. The present part gives an historical account of the literature of Vermes, and contains three plates illustrative of the Dicyemidæ, the figures being taken mostly from the papers of Whitman and Van Beneden.

CRUSTACEA.—Bernhard Rawitz has a paper (*Arch. f. mikr. Anat.*, xxix.) on the green gland of the crayfish. The article treats wholly of histology, and contains no comparisons or morphological suggestions. The most important point brought out is that the gland consists, in reality, of two (not one) convoluted tubes, the two uniting a short distance behind the external opening of the common duct.

FISHES.—Miss Rosa Smith has described a balloon-fish (*Tetraodon setosus*) in the *Bull. Acad. Nat. Sci. Philad.* (vol. ii.). It is based on a dried specimen from Mexico.

BATRACHIA.—At the meeting of the Zoological Society of London held June 7, 1887, Prof. G. B. Sowerby showed that in some of the anurous Batrachians the structure which appears to correspond to the glottis, and which, in some species, becomes an organ of voice.

REPTILIA.—Prof. O. P. Hay gives (*Jour. Acad. Nat. Sci. Philad.*, x. pt. 2) a preliminary catalogue of the Reptilia of Indiana. Seventy-seven species are mentioned.

BIRDS.—W. E. Bryant publishes, in the *California Academy of Sciences*, some additions to the list of birds from Guadeloupe Island. There were previously mentioned several species and sub-species.

The ostrich in the Cincinnati Zoological Garden, Mr. Charles Dury, in an account of the death of a bird broke its leg in an attempt to lay an egg. An ordinary ostrich-egg measures about five by six inches, but this one consisted of a normal egg. Around this there were about twenty leather-like membranes measuring about thirteen by eighteen inches.

MAMMALS.—Dr. Ch. Lütken, of Copenhagen, has discovered the habitat of the rare *Chiropodomys* in the Copenhagen Museum having received it from Hintenzorg. He also says, on the authority of the city museum of Genoa, that the same locality has several specimens of the same locality.

F. E. Beddard publishes an account of the anatomy and the brain of the Soudanic rhinoceros in the *Proceedings of the Zoological Society of London*.

The second "Cunningham Memoir" of the Zoological Society is by Prof. D. J. Cunningham, and treats of the curve in man and apes, as well as of the topography of the anthropoid apes. It is illustrated with some of them colored.

A preliminary notice of a paper by Oldfield on "Homology and Succession of the Teeth in Mammals" appears in No. 254 of the *Proceedings of the Zoological Society*. The author presents an outline of a scheme of classification of the teeth, into which all mammals except the Ede-