. Lea. D, C.
e enumerated in a second paper.

NEW AUSTRALIAN CHITON.

H. A. PILSBRY.

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with acute dorsal keel and straight side-
small flesh-pink spot at each beak, and
lateral areas, the central areas clouded
ed with green bars.
ked, the beaks hardly projecting on
terior margins of valves, which, at the
Central areas with a narrow, smooth
and triangular in valve ii), the pleura
nded, longitudinal ribs on each side,
er than the ribs; *inner one or two ribs*
n of valve. Lateral areas well raised,
doubled on some valves), *which widens*
f triangular pits; traces of somewhat
liagonal slope, and the posterior border
ılations corresponding to the denticles
i with about 20 radial narrow grooves,
ves of lateral areas, these do not extend
led by a smooth area. Valve viii with
slope behind it very concave; anterior
h pitted radial grooves.
e valve callus. Girdle clothed with
nded in contour, and measuring about
width, faintly striated toward inner
oother toward outer edge.
; angle of divergence 98°.
ednall).
oxi somewhat, but differs in the pecu-
l areas. Its nearest ally is a still un-
ecies collected by Mr. Bednall. The
ably be found subject to variation, as

SOME NOTES ON THE GENITAL ORGANS OF UNIONIDÆ, WITH REFERENCE TO SYSTEMATICS.

BY DR. V. STERKI.

It is generally known that in a group of Unionesomprising a great part of our species, such as *ligamentinus* Lam., *rectus* Lam., *suboratus* Lea, *parvus* Barnes, *nasutus* Say, *rangianus* Lea, *alatus* Say, etc., the females have the posterior part of their *outer branchiæ* peculiarly transformed into "branchial uteri," and also that in consequence of this, in almost all instances the shells of the female specimens are distinctly and decidedly dilated downward at the posterior end, so as to be distinguished from the males at first glance. The degree of difference between the sexes is, however, very different among the several species, but it is constant. For convenient reference in the following, this group is designated as A. There is another group, say B, in which *all four branchiæ* are charged in their totality with embryones, as already shown by Lea for some species,[1] but do not show such marked transformation and change in colors as those of the former group, and cause also no such striking differences in the shape of the mussel, according to the sexes. Examples of this group are: *U. subrotundus* Lea, *pustulosus* Lea, *aesopus* Green, *undulatus* Barnes.

There are some facts of peculiar interest in connection with this grouping. The first is that the animals are propagating at certain seasons quite different for the two groups, as the writer has ascertained by examining thousands of specimens during the last four or five years. In group A the branchial uteri are charged with embryones from late summer to the beginning of winter, and probably in most through the winter, while in early summer they are empty, the embryones having been discharged. At that time the ovaries of the females are charged with ova, and the testes of the males with spermatozoa, while the latter are missing, or quite scarce, in the time from late summer to winter, in which time the embryones attain their maturity in the branchiæ.

In group B, just the reverse is true. During the fall, *i. e.*, about from August, and probably winter, the branchiæ are empty, containing no embryones, while the ovaries are filled with ova, and the

[1] Yet Huxley, in his valuable "Man. Anat. of Inv. An.," says: "In Unio and Anodonta the young are hatched in the outer gill pouches of the parent . . . ."

testes with the white, creamy sperma (rarely of a different color.) During early summer, the branchiæ will be found filled first with developing ova and then with embryones, which are discharged about in July; at that season the ovaries and testes are sterile. There are slight variations as to the time, but the general rule is as stated.

This radical difference in the season of producing ova and sperma, and maturing the embryones, coincident with the differences of the location and formation of the uterus sacs is highly interesting, the more so as they are in harmony with the differences in the shells, and thus seem to furnish systematic characters of a high order. In group A the mussels are generally more or less elongated, or at least longitudinal, that means with a small angle of torsion of the axis,[2] the hinge-teeth are moderately strong, and the epiconch is of a vivid color, as a rule, with numerous rays. In B, the mussels are, as a rule, shorter, the axis-torsion is more considerable, the hinge and hinge-teeth are stronger and of a different shape, and the epiconch is generally of a more uniform, dusky color.

Yet there seem to be some real or apparent exceptions, and dissident members of both groups. In *U. lens* Lea and *ellipsis* Lea the propagating organs are of exactly the same type as in group A, and also bound to the same season. In the former, which has often been mistaken for *U. circulus* Lea, the male and female mussels are very different, the latter being strongly dilated downward posteriorly—Lea's figure represents a female specimen well; the shell is also not heavy. In *U. ellipsis* the female mussel is also dilated and more full posteriorly, though not so marked, yet, as a rule, recognizable; the lighter color and green rays of the younger approaches it to group A, and more so, in the writer's opinion, the formation of the posterior mantle edge, which is of the same appearance as in the other species ranging under A.

On the other hand, two species, with an elongated mussel, *U. cuneatus* Barn. (*niger* Rat., *crassidens* v. C. Lam.) and *gibbosus* Barn. range with group B, as to their generative organs, and also in the season, while they at least show no downward dilatation of the female shell (in *cuneatus* it seems to be decidedly higher in general) and their shells are comparatively heavy, the epiconch is of a uniform deep brown or black, though having some green rays when young, as do also *U. subrotundus*, *coccineus* etc.; the shell is very

[2] More about this feature will be said in another place.

heavy in *crassidens*, and the teeth very strong and of the same type with the other species of group B, while the decided downward curvature at the posterior end in old specimens approaches both species to the same, and removes them decidedly from A.

In *U. multiplicatus* the female was found November 1, with evidently mature embryones filling the uterus sacs, which are of rather the same appearance as those of *U. alatus*, and occupying the most posterior part of the outer branchiæ. Also, otherwise this species is quite different from *U. undulatus* Barn., in spite of the similar appearance of the old mussels, as already pointed out by Say.

A few words about *U. alatus* Say, *laevissimus* Lea and *gracilis* Barn. may be added. Of all three the branchial uteri were found filled late in October, in the former evidently discharging the embryones, and of a rather different formation from that in the two others, while the young mussels of the two former species are very much alike. It is known that in *U. alatus* the female mussel is markedly produced downward, and more so in *gracilis*, while in *laevissimus* it is scarcely distinct from the male.

Besides these two main, and, as it seems, most numerous groups, there are some species of quite different types. In order not to let this article become too lengthy, they, together with *Margaritana* and *Anodonta* will be considered later.

It is probably known to most conchologists that during the first two or three years of life, the genital glands are not developed at all. Yet the specimens are still rather small and young when they begin producing ova and sperma, and the assertion that the presence of embryones is a criterion of maturity of the parent is as far from truth here as it is for the *Cycladidæ*. In group A the filled uterus- or embryo-sacs increase in numbers as well as in size with advancing age of the mother animal. In *U. subovatus* Lea, *e. g.*, 18, 25, 28, 40 have been counted on a side, in specimens of different sizes, and these are probably not the lowest and highest numbers to be found, and correspondingly so in other species. For every one of them there is, however, an average number the rule for an adult, and these numbers are very different for the different species.

The embryones, or glochidia, of many species have been examined and figured long ago, especially by Lea, and they prove to be of rather different forms. Very probably they would be found more or less uniform in the several groups, and with the latter show differences which may also be of value for systematics. Although

having examined some of them, and their development, the writer is not prepared, as yet, to speak in a general way about them.

New Philadelphia, Ohio, Nov., 1895.

NOTES AND NEWS.

NEW RECORDS OF REVERSED AMERICAN HELICES.—I have myself found three reversed Helices. First, reversed *thyroides*. This specimen I sent to the late John G. Anthony for the Cambridge Collection. Second, reversed *multilineata*. This also I sent to Anthony. I now have another reversed *thyroides* in my collection. I also know of a third one, collected near Cincinnati, by the late Mr. Stannage, and also of a reversed *mitchelliana* collected by Prof. F. W. Bryant near Cincinnati.

This makes a list of six reversed specimens of *Mesodon*, which I have seen. Dr. Lewis had a reversed *albolabris* in his collection. This does not indicate that *Patula* has much the start.

—A. G. WETHERBY, *Magnetic City, N. C.*

VITRINA LIMPIDA IN WESTERN PENNSYLVANIA.—The last time I saw you I promised to send you some living *Vitrina limpida* Gld. if my "colony" had not died out, so I send you a dozen and trust they will reach you in good shape.

Last year I only found 12 alive, so feared the "colony" had died out, and, up to to-day, had not found a single specimen this year. It has been exceedingly dry this season, the deficit in rain-fall being *nearly* 11 *inches* up to November 1, but yesterday we had a steady, soaking rain; so to-day I started out for *Vitrina* and collected 95 in two hours, so you see, the "colony" is still flourishing in spite of the drought, and burning off the "drift" under which they lived. I think I told you that this "colony" came down the river in the flood of February, 1891, as that was the time the drift lodged in the hollow where they are found, and the Signal Service records show that the '91 flood came from the headwaters of the Allegheny. This is a good example of "dispersal by water," and one that has practically been proved.

To-day was cold and raw, with slight snow-spits (Signal Service record for November 10 show maximum temperature 39° F., minimum 36° F.), so *V. limpida* has the same habits as its European cousin *pellucida*, *i. e.*, out in cold weather. eggs among the rotten leaves.

As to the habits of *Vitrina limpida*, they yesterday [Nov. 17], as it was much dryer most of the shells had crawled into the c specimen was busily engaged in making a m deceased brother or sister, eating right thro habit of the *Zonites*.—GEO. H. CLAPP, *Pittsb*

THE STEARNS LOAN COLLECTION IN THE ART.—The citizens of Detroit, Michigan, a upon the addition to their facilities for scie cation, of the great collection of archæolog material of MR. FREDERICK STEARNS. W from the Detroit *Evening News*, of Novembe

"The occasion which last night emphasize gathering at the Detroit Museum of Art i Detroit public ought to recognize. It was th the public use of the additional gifts lately r Frederick Stearns. The archæological and which Mr. Stearns placed in the museum las able enough to entitle the donor to public g considered that the presentation of last nigh incident in Mr. Stearns' past relations to th places Mr. Stearns among the foremost of D tors. The very presence in a community persons of Mr. Stearns' tastes and artistic d ing influence, but when such a man is wil only his technical acquirements and skill, b stance for the common good, the fact goes the current notions about the crime of bei taste. The reception of last evening was a the public's appreciation of its indebtedness ence, but the best and real recognition wi day by the individuals who are edified and to the museum. The *News* tenders its ac Stearns of all the benefits which he has c through his generosity to the Museum."

We understand that Mr. Stearns is prepar for exhibition in a special hall of the Museu