

THE IDENTITY OF THE NAYAD-GENUS *NODULARIA* CONRAD WITH
UNIO RETZIUS.

BY DR. A. E. ORTMANN.

The type of Conrad's genus *Nodularia* (Proc. Ac. Philad. 6, 1853, p. 268) is *Unio douglasiae* Griffith & Pidgeon. Simpson (Syn., 1900, p. 806, and Descr. Cat., 1914, p. 949) has associated, in this genus, a large number of species from Asia and Africa, and places it in his subfamily *Hyrianae*, to which he assigns radial beak sculpture and a marsupium formed by the inner gills only, the latter character resting upon the observation of two species only.

Already Haas (System. Conchyl. Cabinet, vol. 9, Heft 44, 1911, p. 65 ff.) has pointed out that this conception of *Nodularia* cannot be maintained, since just the type-species (*douglasiae*) does not possess the characters assigned to the subfamily by Simpson: its beak sculpture is essentially of the zic-zac type, and its marsupium is formed by the outer gills. His examination of this species (and several others, l. c., p. 67) has revealed several other differences from Simpson's description of the anatomy of *N. japonensis*, and, as far as it goes, we are to conclude that "*Nephronaias douglasiae*" is not allied to the Hyriine type of Nayades, but rather to that type represented by *Unio* Retzius (1788) in the restricted sense as defined by myself (Ann. Carnegie Mus. 8, 1912, p. 273); that is to say, it belongs to the family *Unionida*, subfamily *Unioninae*. This is clearly shown by the existence of a supraanal opening separated from the anal ("Mantelschlitz unten geschlossen"), and by the marsupium.

From the characters of the shell, chiefly the zic-zac beak sculpture, it was to be inferred that *U. douglasiae* comes close to the genus *Unio* (compare my key of genera, l. c., pp. 239 and 240); but the chief character of *Unio*, the subtriangular, hooked glochidium, has not been observed hitherto, the gravid females investigated by Haas having only eggs, and not glochidia.

Recently Mr. B. Walker has been kind enough to send to me the soft parts of two gravid females of *U. douglasiae* Griff.

& Pidg., which had been communicated to him by Mr. L. P. Gratacap of the American Museum, New York. They are from Wladiwostok, southeast Siberia. Both had glochidia, which proved to be similar to those of *Unio*.

The examination of these specimens has established the following facts: All of the features of the family *Unionidae* (l. c., p. 223) are present. The diaphragm is complete, and formed only by the gills (no mantle connection between anal and branchial openings), and the outer lamina of the outer gills is connected with the mantle to its posterior end. The anterior end of the inner gills is separated from the palpi by a gap. A supraanal opening is separated from the anal by a mantle connection. The gills possess continuous septa, forming water tubes running parallel to the gill filaments.

The characters of the family *Unioninae* (l. c., p. 224) are also present. The marsupium is formed by the outer gills, and, when charged, these gills swell only moderately, leaving the edge sharp. There are no secondary water tubes.

For the rest, it should be said that the mantle connection between anal and supraanal openings is moderately long, about half as long as either. The anal has the inner edge distinctly crenulated; the branchial opening has distinct papillæ; but in front of the branchial the mantle edge is smooth. *Palpi* subfalciform, their posterior margins united for about one-third of their length.

Gills rather long and narrow, the inner the wider, chiefly anteriorly; their anterior ends as usual. Inner lamina of inner gills free from abdominal sac posteriorly, but connected anteriorly; in one of my specimens the connection extends to one-third of the length of the abdominal sac, in the other to nearly one-half of it: thus this character is variable, as in certain other forms of *Nayades* (Haas says only: connected anteriorly).

Septa and *water tubes* well developed in the outer gills of the female, this character extending all along the gill. *Placenta* present, but not very solid, the glochidia easily falling apart. *Glochidia* essentially agreeing with those of *Unio* [type, *pictorum* (L.); see Ortmann, *Naut.*, 28, '14, pp. 32,

33]. They are subtriangular in outline, and have spinulose hooks. However, they differ in being slightly oblique, the point of the ventral margin being placed a little posteriorly, so that the anterior portion of the ventral margin is longer than the posterior; the point is also sharper (more projecting); and, finally, they are smaller, and longer than high. While, in *U. pictorum*, L. and H. are 0.21 mm., in *U. douglasiae* the L. is 0.18 mm. and the H. is 0.15 mm.

Thus it is perfectly clear that *U. douglasiae* has the typical anatomical structure of the genus *Unio* (s. s., type *U. pictorum*), and that it cannot be separated from that genus on anatomical grounds. The question is, whether shell characters permit such a separation, and in this respect it should be pointed out that the general shape of the shell, the hinge teeth, and other characters are very like those of *U. pictorum*, and that the chief difference is in the beak sculpture, which is more complex, and covers more of the disk (upon this character Conrad seems to have relied when he created *Nodularia*. But when we compare other species, for instance the European *U. tumidus* Retz., we see that in all these species the beak sculpture is of the same general type, that is to say, of the zic-zac pattern, and that *U. douglasiae* represents the most extreme development of this, while *U. pictorum* has it in much obliterated condition, and *U. tumidus* is intermediate between these to a degree. Thus there is only a difference in the degree of development, and it should also be born in mind that even in *U. douglasiae* the beak sculpture varies a good deal (see the account given by Haas of the various forms of *douglasiae*).

Consequently we cannot escape the conclusion that *U. douglasiae* is a true *Unio* in all respects, and that it should stand as *Unio douglasiae* Griffith & Pidgeon. *Nodularia* Conrad, with *douglasiae* as type, becomes then a synonym of *Unio* Retzius.

This, probably, refers to those species which are related to *douglasiae*, that is to say, preëminently to all those associated by Haas in the "group of *N. douglasiae*." It remains to be seen what should become of the other species of *Nodularia* in

Simpson's sense. They cannot be called any more by this generic name, but where they finally will land cannot be told before they have been examined as to their anatomy. Already Haas has separated a number of them under other generic names, but these genera are mostly founded upon shell-characters only.

THE GENUS *ELYSIELLA* (VERRILL OR BERGH?).

BY SILAS C. WHEAT.

In 1872 Prof. A. E. Verrill and Dr. Rudolph Bergh each found an undescribed Nudibranch, and each erected a new genus for his species. As the forms were minute and resembled *Elysia* both authors chose the name *Elysiella*. The two species have in common the respiratory sac on which Verrill founded the genus, although they differ in the form of the head and tentacles, on which Dr. Bergh lays emphasis.

On the question of priority,—Prof. Verrill published his genus *Elysiella* in the American Journal of Science for April, 1872; Dr. Bergh published his *Elysiella* in Heft iv, Band I, Malacologische Untersuchungen in Dr. Semper's Reisen im Archipel der Philippinen. Dr. Bergh's *Band I* was issued at the rate of one *Heft* each year except in the year 1872 when both *iii* and *iv* appeared. Probably *Heft iv* came out in the autumn of 1872, several months later than the American Journal for April. A letter addressed to the publisher in Germany during the second month of the present war remains unanswered. Inquiries of American libraries for the month on which they received *Heft iv* have brought only the year 1872, copied from the title-page, not from their accession records. It seems proper to credit the genus to Prof. Verrill.

Genus *ELYSIELLA* Verrill.

“*Elysiella*, gen. nov. Allied to *Elysia* and *Placobranchus*. Head rounded, with two short, obtuse tentacles; eyes sessile behind the bases of the tentacles on the neck. Lateral lobes united behind, rounded and separate in front, and raised from the back, leaving a cavity beneath for respiration.



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