

Remarks on the generic position of *Hydrobia steinii*
 von Martens and *Paludestrina taylori* E. A. Smith
 with the description of a new genus.

by

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In April of this year Mr. J. Prins drew my attention to a locality in the neighbourhood of Vreeland (prov. Utrecht) where *Hydrobia steinii* occurs in great quantities. I availed myself of this opportunity to study this little snail more closely.

The different authors do not agree about the systematic position of this species within the family *Hydrobiidae*. At present the view prevails that it is no *Hydrobia*. Clessin was the first to place the present species in another genus, in his "Deutsche Excursions-Mollusken-Fauna" we find it in the genus *Bythinella* (4¹), p. 326). Several authors have followed Clessin in regarding *Hydrobia steinii* as belonging to *Bythinella* and recently Krull, who had studied the anatomy of *Hydrobia steinii*, arrived at the conclusion that it is really a true *Bythinella* (11, p. 462, nr. 15).

On the other hand Jackson & Taylor (8) have pointed out the great resemblance which exists between *Hydrobia steinii* and *Paludestrina taylori* E. A. Smith. The latter *Hydrobiid*, which lives in England, is considered at present — mainly on account of the shape of its egg-capsules — to belong to the American genus *Amnicola*. The shells of these two species so closely resemble each other, that E. A. Smith himself thought it impossible to distinguish them, but he preferred to keep the two forms separated until the animals of both had been studied more closely. In the opinion of E. von Martens, however, *Paludestrina taylori* differed from his *Hydrobia steinii* by its more conical broader form (8, p. 9). The striking resemblance between the two forms has induced Hermann (5, p. 198) to class *Hydrobia steinii* in the genus *Amnicola*.

A first thing to do for me consequently was to compare my specimens from Vreeland with *Paludestrina taylori*. In

¹) The numbers refer to the list of literature on p. 71.

addition to the data in the literature I had at my disposal a series of specimens — shells containing dried up animals — from Dukinfield, Cheshire, J. R. le B. Tomlin leg., preserved in the Zoological Museum at Amsterdam. From one of these specimens I could prepare the penis and the radula, which proved to be identical with the corresponding organs in *Hydrobia steinii*.

Moreover I could watch the living animal of *Hydrobia steinii*, which appeared to correspond in every detail with the description of *Paludestrina taylori* given by Smith (14, p. 192). I even observed the characteristic sulphur spot above each eye, to which Smith draws special attention. Specimens collected by me at Vreeland on April 30th 1936 deposited their egg-capsules in the first or second week of May; these egg-capsules (fig. 1) are quite similar to those described and figured by Jackson & Taylor (8, p. 10, fig. 3—5) from *Paludestrina taylori*.

I looked in vain for any difference in the shells of the two forms, it certainly cannot be found in the relation length: breadth as is evident when comparing the measurements of a series of each form:

A. *Paludestrina taylori* E. A. Smith, Dukinfield, J. R. le B. Tomlin leg.

Number of specimens	1	2	1	2	3	2	1	2	1
Length ¹⁾	2,9	2,8	2,7	2,7	2,6	2,3	2,2	2,1	2,0
Breadth ¹⁾	1,9	1,8	1,7	1,6	1,7	1,5	1,5	1,5	1,6

B. *Hydrobia steinii* von Martens, Houten (prov. Utrecht), M. M. Schepman leg., in collection Zoological Museum, Amsterdam.

Number of specimens	1	2	2	3	1	1	1	1	2	1
Length ¹⁾	2,6	2,5	2,5	2,4	2,4	2,4	2,3	2,2	2,1	2,0
Breadth ¹⁾	1,6	1,7	1,6	1,6	1,5	1,4	1,5	1,5	1,5	1,4

¹⁾ In mm.

This last set apparently belongs to the forma *scholtzi* A. Schmidt, which occurs locally and remains smaller than the typical *Hydrobia steinii*. From other Dutch localities the Zoological Museum possesses larger specimens e.g.:

C. Rhoon (prov. Zuid Holland), M. M. Schepman leg

Number of specimens	1	1
Length ¹⁾	2,8	2,8
Breadth ¹⁾	1,8	1,7

D. Utrecht, C. Druyvesteyn leg.

Number of specimens	1
Length ¹⁾	3,1
Breadth ¹⁾	1,9

Failing to detect any difference in any organ between *Hydrobia steinii* and *Paludestrina taylori* I am led to the conclusion that the latter is synonymous with the former.

I have nothing to add to the description of the animal, the shell and the operculum as given by Smith (14). Krull (11, p. 413) gives the following formula for the different teeth of the radula:

$$\text{Central: } \frac{(4-5) + 1 + (4-5)}{(1-2) \quad (1-2)}$$

$$\text{Lateral: } 2-3 + 1 + 3.$$

$$\text{Inner marginal: } 20-22.$$

$$\text{Outer marginal: ca. } 30.$$

My own observations gave the following results:

$$\text{Central: } \frac{4 + 1 + 4}{2 \quad 2}$$

$$\text{Lateral: } 2-3 + 1 + 3-4.$$

$$\text{Inner marginal: } \pm 20.$$

$$\text{Outer marginal: } X.$$

¹⁾ In mm.

K r u l l has not figured the radula and J o h a n s e n (9, p. 423, fig. 10) only figures the central tooth, so it might not be superfluous to figure the radula of *Hydrobia steinii* here (fig. 2).

The verge bears a truncated flagellum sheath, which is much shorter than the penis and which is only partially connected with it at the base (fig. 3a). The penis is of a greyish hue, the flagellum sheath is white.

Now we may turn to the question to which genus *Hydrobia steinii* belongs.

The true *Hydrobiae* (*Paludestrinae*) are inhabitants of brackish waters, their penes lack the flagellum sheaths and their shells are provided with acute tops. It is evident that *Hydrobia steinii* does not belong to this genus. Moreover K r u l l (11) has pointed out several anatomical differences between *Hydrobia steinii* on the one side and *H. ulvae* (P e n n.) and *H. stagnalis* (B a s t.) on the other.

The radula of *Hydrobia steinii* very closely resembles the radula of *Bythinella*, but the latter is distinguished by one basal denticle on each side of the central tooth. This little difference in the radulae might not be a sufficient reason to remove *Hydrobia steinii* from the genus *Bythinella*, but there are other more serious objections to such a view.

All true *Bythinellae* are stenothermal inhabitants of cold waters, they are to be found in wells etc. *Bythinella dunkeri* (v. F r a u e n f e l d) has an optimum-temperature of about 10° C. and deposits its eggs in February (3, p. 277). These eggs are deposited single, as in *Hydrobia steinii*, but the egg-capsules have the shape of a small watchglass (3, p. 268; pl. 16, fig. 13). The main difference is given by the shape of the verge. This consists of a penis furnished with a flagellum sheath, which is as long as the penis and is its backward prolongation. At the end the flagellum sheath is swollen and flattened. The shape of the verge of *Bythinella* is thus described and figured by B r e g e n z e r (3, p. 265, fig. T) from *B. dunkeri* and I can affirm his statements after examination of a male specimen of *B. brevis* (D r a p a r n a u d) (fig. 3b).

Thus the ecology, the shape of the verge and the shape of the egg-capsules of *Hydrobia steinii* and the species of the genus *Bythinella* do not agree, and besides Krull has detected differences in the nervous system and the female genitalia between *Hydrobia steinii* and *Bythinella dunkeri* (11, p. 428 & p. 444). I think we may conclude that *Hydrobia steinii* does not belong to the genus *Bythinella*.

The shell of *Hydrobia steinii* resembles the shell of some *Hydrobiids* classified in the genus *Amnicola* and placed by F. C. Baker in his new subgenus *Marstonia* in 1925. Thiele (15, p. 376) has removed the subgenus *Marstonia* to the genus *Lyogorus*, but according to F. C. Baker (1, p. 106 seq.) the verge and the egg-capsules in *Marstonia* are similar to those in *Amnicola*, and therefore it seems reasonable to me to maintain *Marstonia* as a subgenus of *Amnicola*.

The general aspect of the radula of *Hydrobia steinii* resembles that of *Marstonia*, but when the two are examined in detail it appears that they differ in several respects from each other. So the radula of *Hydrobia steinii* has shorter cusps on the different teeth, it has two instead of one basal denticle on the central tooth and the shape of the lateral and marginal teeth is somewhat different from the shape of those in *Marstonia*. In being an inhabitant of freshwater — lakes, canals etc. — *Hydrobia steinii* agrees with *Marstonia*, but the verge and the shape of the egg-capsules do not agree. For the flagellum sheath — judging from the figure by F. C. Baker (1, p. 95, fig. 43) — has a common base with the penis (fig. 3c), whilst the egg-capsules of *Marstonia* (1, p. 129, fig. 56B) have a keel just as those of *Hydrobia steinii*, but lack the basal ring, which is conspicuous in the egg-capsules of the latter species.

Accordingly it seems impossible to classify *Hydrobia steinii* in one of the genera *Hydrobia*, *Bythinella* or *Amnicola* (*Marstonia*) and I have not been able to find any other genus to which it could be transferred. Therefore I propose the new genus *Marstoniopsis* for *Hydrobia steinii*, being aware that

further systematic investigations in the family *Hydrobiidae* might prove it to be a subgenus or a synonym of some genus already established, but not examined in detail up to now.

It is difficult to give a diagnosis of the genus *Marstoniopsis* as there is only one species — the genotype *Marstoniopsis steinii* (v o n M a r t e n s) — known to belong to it, but the main characters of this species may serve to construct the provisional diagnosis which follows:

Shell: subcylindrical, turreted, umbilicated; whorls very convex separated by a deep suture; peristome continuous, outer margin simple.

Operculum: paucispiral, thin, horny, slightly concave exteriorly.

Animal: tentacles moderately long, scarcely tapering, eyes at the outer base of the tentacles with a sulphur-coloured spot above each.

Radula: resembling that of *Bythinella*, but central tooth with two basal denticles on each side.

Verge: provided with a flagellum sheath, which is only partially connected with it at the base.

Egg-capsules: single, provided with a keel and a basal ring.

Habitat: fresh water.

Distribution: northwestern Europe.

The distributional area of *Marstoniopsis steinii* comprises on the continent (chiefly according to E h r m a n n, 5, p. 198): the Netherlands (prov. Noord Holland, Zuid Holland, Utrecht and Overijssel), nearly the whole of Germany excepted the southwestern part, some localities in Poland, Latvia and near Riga, the southwestern part of Finland, two localities in Russia (lake Ladoga & gouvernement Twer) and scattered localities in Denmark and the south of Sweden.

In England *Marstoniopsis steinii* is reported from: „in canals near Manchester and other places in Lancashire and Cheshire” (6, p. 81). This isolated area suggests the possibility that the species has been introduced into England from elsewhere. So E. A. S m i t h (14, p. 191), E l l i s (6, p. 81) and

Boettger (2, p. 271) deal with a possible introduction of *Marstoniopsis steinii* from Tasmania or North America. Now that it has been proved that *Paludestrina taylori* is the same species as *Hydrobia steinii* one might presume in the first place that the species was introduced from the continent of Europe.

It is curious that the oldest fossil specimens of *Marstoniopsis steinii* known are recorded from England, i.e. from the pleistocene Cromer forest bed (13, p. 198). Reid's figure of one of these specimens (12, pl. V, fig. 8) is inadequate for determination, but the remark of Sandberger (l.c.): "welche Hr. Clessin und ich von Originalexemplare der lebenden Form nicht zu unterscheiden vermögen", makes it pretty sure that it is really *Marstoniopsis steinii* that has been found in the Cromer forest bed. As far as I know on the continent fossil specimens are only recorded from holocene deposits in the neighbourhood of Kalundborg (10, p. 8 & 10) and near Rostock (7, p. 167).

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Summary.

1. *Paludestrina taylori* E. A. Smith is a synonym of *Hydrobia steinii* von Martens.
2. *Hydrobia steinii* is no *Hydrobia*, nor a *Bythinella*, neither an *Amnicola* (*Marstonia*); on account of the resemblance to the species of this subgenus a new genus *Marstoniopsis* has been established for it.
3. *Marstoniopsis steinii*, which has been recorded from the pleistocene of England (Cromer forest bed) has probably died out since in that country; its actual occurrence in the environment of Manchester may be due to reintroduction from its area in the northwestern part of the European continent in historical time.

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Samenvatting.

Dit voorjaar stelde de heer J. P r i n s mij, door mij een rijke vindplaats van *Hydrobia steinii* von Martens in de omgeving van Vreeland aan te wijzen, in staat om deze slak nauwkeurig te bestudeeren.

Een vergelijking met de beschrijving van *Paludestrina taylori* E. A. Smith en met exemplaren van die soort uit de collectie van het Zoologisch Museum te Amsterdam bracht aan het licht, dat deze beide vormen, zooals trouwens reeds door andere auteurs was verondersteld, identiek zijn. Daar de naam *Paludestrina taylori* jonger is dan *Hydrobia steinii*, moet hij vervallen.

In de literatuur heerscht geen eenstemmigheid over de vraag tot welk geslacht *Hydrobia steinii* gerekend moet worden. Het onderzoek van de verschillende voor de systematiek belangrijke organen als: schelp, radula en penis, van den vorm van de eierkapsels en van de levenswijze wees uit, dat, hoewel er zeker verwantschap met het genus *Bythinella* en het subgenus *Marstonia* van *Amnicola* bestaat, de soort niet tot een van deze genera, evenmin als tot *Hydrobia* gerekend mag worden. Een ander geslacht uit de familie *Hydrobiidae*, dat in aanmerking komt om *Hydrobia steinii* op te nemen, werd vergeefs gezocht. Daarom leek het raadzaam voor *Hydrobia steinii* een nieuw genus op te stellen, waaraan de naam *Marstoniopsis* werd gegeven.

De oudste fossiele exemplaren van *Marstoniopsis steinii* zijn

gevonden in het plistoceene Cromer forest bed in Engeland. Tegenwoordig komt de soort in dat land voor op verschillende plaatsen in Lancashire en Cheshire in de omgeving van Manchester, waar zij in 1900 voor het eerst werd aangetroffen. Dit beperkte gebied van voorkomen en de betrekkelijk jonge datum van de eerste vondst van deze soort in Engeland doen veronderstellen, dat *Marstoniopsis steinii* nog tijdens of na het plistoceen in Engeland is uitgestorven, doch in historischen tijd van het noordwesten van het vasteland van Europa, waar zij op talrijke plaatsen voorkomt, uit, weer in Engeland is geïmporteerd.

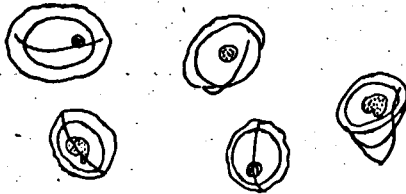


Fig. 1. Egg-capsules of *Hydrobia steinii* von Martens (longest diameter about 1 mm.), original.

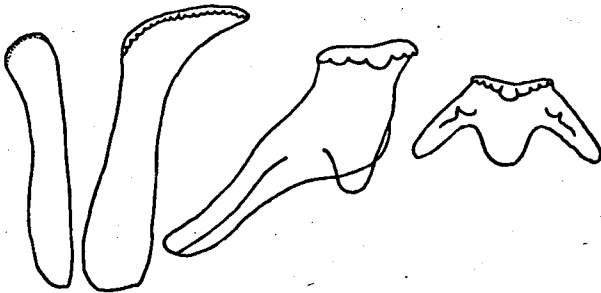


Fig. 2. Teeth of the radula of *Hydrobia steinii* von Martens, original.

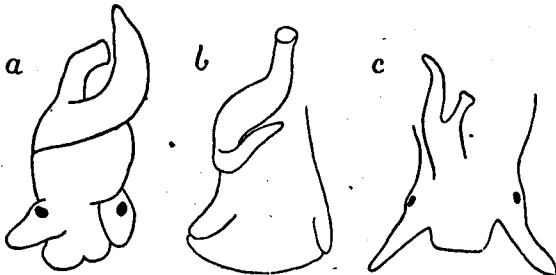


Fig. 3. Sketches to show the shape and the situs of the verge in: a. *Hydrobia steinii* von Martens, b. *Bythinella brevis* (Draparnaud), c. *Amnicola limosa porata* (Say); a & b original, c. after F. C. Baker.