

## SYSTEMATIC POSITION OF *LYMNAEA CORVUS* (GMELIN, 1788) (GASTROPODA: PULMONATA)

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**ABSTRACT:** In her earlier paper (Jackiewicz, 1959) the author distinguished within the complex species *Galba palustris* (O. F. Müller, 1774) the three species: *Galba corvus* Gmelin, 1788, *G. turricula* Held, 1836, and *G. occulta* Jackiewicz, 1959. The species were distinguished mainly on a basis of the characters of their reproductive organs. In the present paper it is shown that, owing to the characters of both its reproductive organs and shell. *G. corvus* is most closely related to *Lymnaea vulnerata* (Küster, 1862) and *L. stagnalis* (Linnaeus, 1758). However, the latter three species are markedly different from other lymnaeids, so that it seems justified to create within the genus *Lymnaea* Lamarck, 1799 the new separate subgenus *Lymnaea* s. stricto, for the three species to be placed in it.

**KEY WORDS:** Lymnaeidae, new subgenus, *Lymnaea* (*Lymnaea*), *Stagnicola*, reproductive organs

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## Systematic position of *Lymnaea corvus* (GMELIN, 1788) (*Gastropoda: Pulmonata*)

### ABSTRACT

In her earlier paper (JACKIEWICZ 1959) the author distinguished within the complex species *Galba palustris* (O. F. MÜLLER, 1774) the three species: *Galba corvus* GMELIN, 1788, *G. turricula* HELD, 1836, and *G. occulta* JACKIEWICZ, 1959. The species were distinguished mainly on a basis of the characters of their reproductive organs. In the present paper it is shown that, owing to the characters of both its reproductive organs and shell, *G. corvus* is most closely related to *Lymnaea vulnerata* (KÜSTER, 1862) and *L. stagnalis* (LINNAEUS, 1758). However, the latter three species are markedly different from other lymnaeids, so that it seems justified to create within the genus *Lymnaea* LAMARCK, 1799 the new separate subgenus *Lymnaea s. stricto*, for the three species to be placed in it.

### 1. Introduction

*Stagnicola corvus* (GMELIN, 1788) was for a long time regarded as a form of *S. palustris* (O. F. MÜLLER, 1774) (GEYER 1927 and EHRMANN 1937). The lymnaeid shell is commonly known as being extremely variable. For this reason numerous forms were described in almost all the lymnaeid species, only the conchological characters having been considered; on the other hand, some separate species were regarded as forms. The only character that allows for the certain identification of particular lymnaeid species is the structure of their reproductive organs.

Anatomical studies completed earlier by the author (JACKIEWICZ 1959) showed that *S. palustris* was a complex species that comprised three separate species which were *S. corvus*, *S. turricula* (HELD, 1836)\*, and *S. occulta* (JACKIEWICZ, 1959). The species distinguished were then included to the genus *Galba* SCHRANK, 1803.

However, further studies have shown that the reproductive organs of *S. corvus* differ much in structure from those of both *S. turricula* or *S. occulta*, but resemble those of two species of the genus *Lymnaea* LAMARCK, 1799: *L. vulnerata* (KÜSTER, 1862) and *L. stagnalis* (LINNAEUS, 1758) (Figs. 1 - 3). Moreover, the shell of *S. corvus* bears a close resemblance to the shells of the latter two species (Fig. 5)

\* *Galba turricula* HELD sensu JACKIEWICZ, 1959, has turned out a synonym of *S. palustris* (JACKIEWICZ manuscript).

## 2. Material and methods

I have examined altogether about 2,000 specimens belonging to the species in question. The shells were collected all over Poland. 43 specimens of *L. vulnerata* were collected by myself in 1979, from the locus typicus of the species, which is the River Cetina at Omis (Middle Dalmatia) in Yugoslavia. The gastropods were fixed with 75% alcohol solution. The drawings presented herein have been made by means of an Abbe drawing apparatus.

## 3. Results and conclusions

When studying the anatomy of lymnaeids, I concentrated on the structures of the reproductive system that are particularly important for systematic purposes. These are especially the length proportion between the praeputium and penis sheath, the structure of the penis, the shape and inner structure of the prostate, and the structure of the duct of the bursa copulatrix.

In *S. corvus*, as well as in *L. vulnerata* and *L. stagnalis* (Figs. 1 - 3: p and r), the length proportion between the praeputium and penis sheath is 3 : 1. It is only in *Galba truncatula* (O. F. MÜLLER, 1774) that the proportion is also 3 : 1, whereas in the other lymnaeid species it is 1 : 1, or even 1 : 5.

The penis (Figs. 4a, 4d and 4e) in *S. corvus*, *L. vulnerata*, and *L. stagnalis* is short (four times as long as the breadth of its basis). It consists of two apparent sections: the longer proximal section which is gradually narrowing, and the shorter, wedge-shaped terminal one. Between the two sections of the penis there is a swelling in the form of a ring, more or less pronounced. In the other lymnaeids I know, the length of the penis may be varied but no similar swelling can be observed on the penis (Fig. 4b).

The prostates of the described species are all the same shape (Figs. 1 - 3: k). The proximal section of the gland is quite broad, being yet much broadened and slightly swollen at the very basis. The distal section of the gland is pear-shaped, very big and much swollen. On the contrary, in the remaining *Stagnicola* representatives the prostates are all different shapes being characteristic of particular species.

The duct of the bursa copulatrix (Figs. 1 - 3: h) is also worth of attention. It is rather short, thick and broadened funnel-like at its outlet to the vagina (Figs. 1 - 3: g). It is only in *L. vulnerata* that the duct is somewhat longer and its funnel-shaped broadening is narrower (Fig. 2). The ducts of the bursae of the remaining species are much thinner. They may be longer or shorter but, except for *S. occulta*, are never broadened funnel-like at the end. The character states presented above are listed in Table 1.

The structure of the reproductive organs of *S. corvus*, *L. vulnerata*, and *L. stagnalis* is almost identical. The organs differ only in some details. In all the three species the praeputium (Figs. 1 - 3: r) is clavate, though slight differences appearing in each. The pyriform body (Figs. 1 - 3: d) also shows some interspecific variation. In both *L. vulnerata* and *S. corvus* it is

roundish in outline, whereas in *L. stagnalis* it looks as if consisted of two parts, the proximal part usually bigger than the distal one. The oviduct (Figs. 1 - 3: e) in *L. vulnerata* is long and rather broad. In *S. corvus* it is much variable. It is short as well, but may be either narrow or quite broad. On the contrary, in *L. stagnalis* it is in the form of a long and narrow tube.

Table 1

Characters of reproductive organs and their states in described species

Character	Species				
	<i>Stagnicola</i>		<i>Lymnaea</i>		
	<i>palustris</i>	<i>occulta</i>	<i>vulnerata</i>	<i>corvus</i>	<i>stagnalis</i>
praeputium length to penis sheath length	1:1	1:1	3:1	3:1	3:1
swelling on penis	-	-	+	+	+
number of prostate folds	1	1	more	more	more
funnel-like broadening of bursa copulatrix duct	-	+	+	+	+

The main difference between the three species is the inner structure of the prostate. In *L. vulnerata* in the distal part of the gland (Fig. 4f) there are two folds. In *S. corvus* (Fig. 4g) the folds are numerous and thick, while in *L. stagnalis* (Fig. 4h) they are very numerous and fine. In the other species I know out of the family *Lymnaeidae*, the prostate has a single, usually well-developed fold (Fig. 4c), except for *Omphiscola glabra* (O. F. MÜLLER, 1774) in which the wall of the prostate has no fold at all.

The most characteristic shell features common for *S. corvus*, *L. vulnerata*, and *L. stagnalis* are: the aperture height which usually equals half the shell height, the big and much swollen body whorl, and the remaining whorls being flat. In the other *Stagnicola* species the aperture height is usually smaller than half the shell height, the body whorl not so swollen, and the remaining whorls are usually convex.

The shell of *S. corvus* (Figs. 5d - 5f) is big, egg-shaped-conic, horny or brown. It bears 6 - 7 whorls. The spire is high, conic, pointed at the tip. The aperture is egg-shaped and usually covers half the shell height. The height of the shell amounts to 45 mm, and the breadth to 16 mm.

*L. vulnerata* (Figs. 5a - 5c) has a light brown, egg-shaped-conic shell. The shell has 5 rather flat whorls. The body whorl is comparatively swollen. The spire is relatively low, conic, slowly widening. The sharp apex of the shell is commonly reddish brown. The biggest shell I collected was 13 mm high and 7 mm broad.

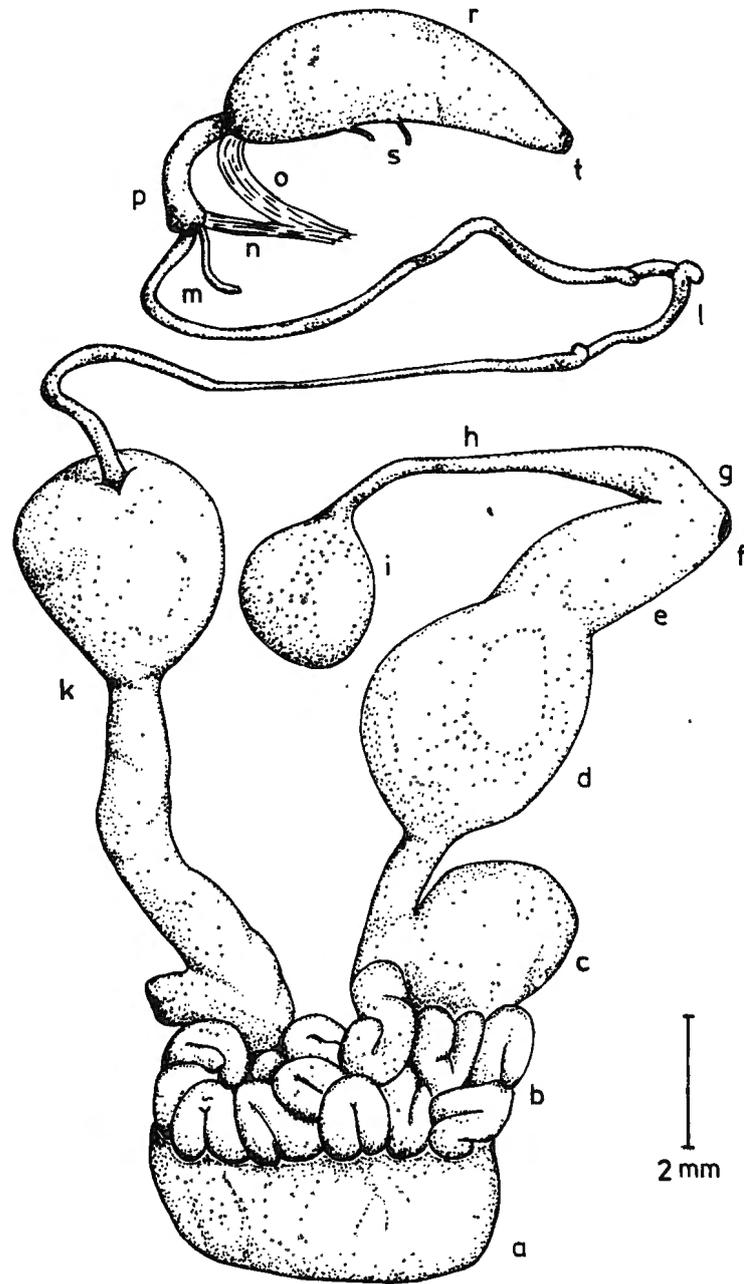


Fig. 1. Reproductive organs of *Lymnaea cornus*: a - albuminoid gland, b - uterus, c - nidamental gland, d - pyriform body, e - terminal oviduct, f - opening of female reproductive organs, g - vagina, h - duct of bursa copulatrix, i - bursa copulatrix, k - prostate, l - vas deferens, m - nerve of penis, n - retractor of penis sheath, o - retractor of praeputium, p - penis sheath, r - praeputium, s - protractor, t - opening of male reproductive organs

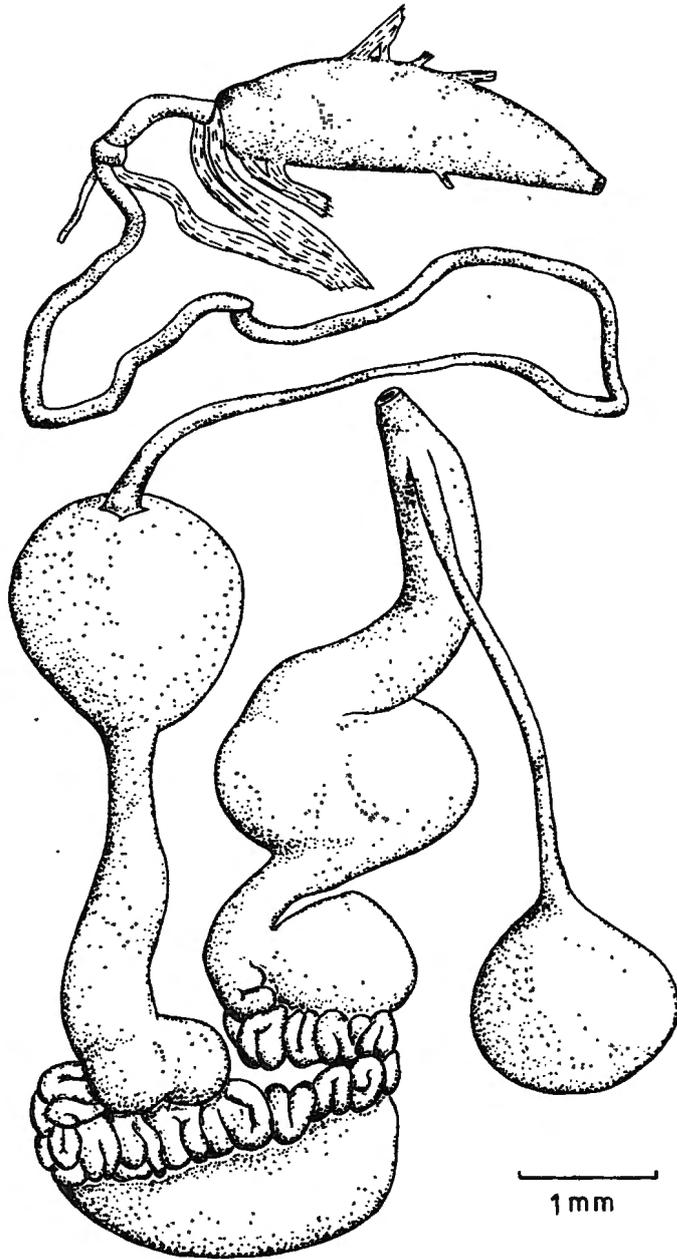


Fig. 2. Reproductive organs of *Lymnaea vulnerata*

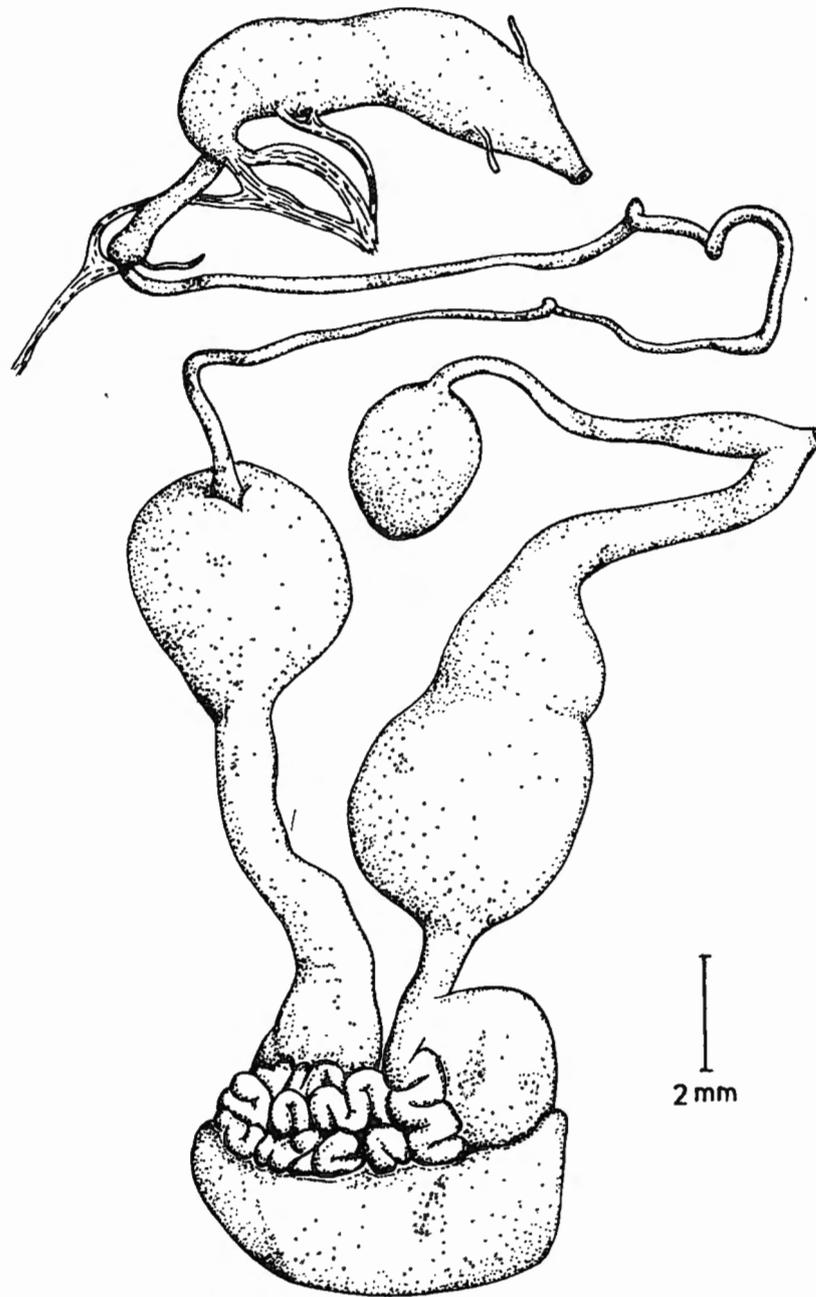


Fig. 3. Reproductive organs of *Lymnaea stagnalis*

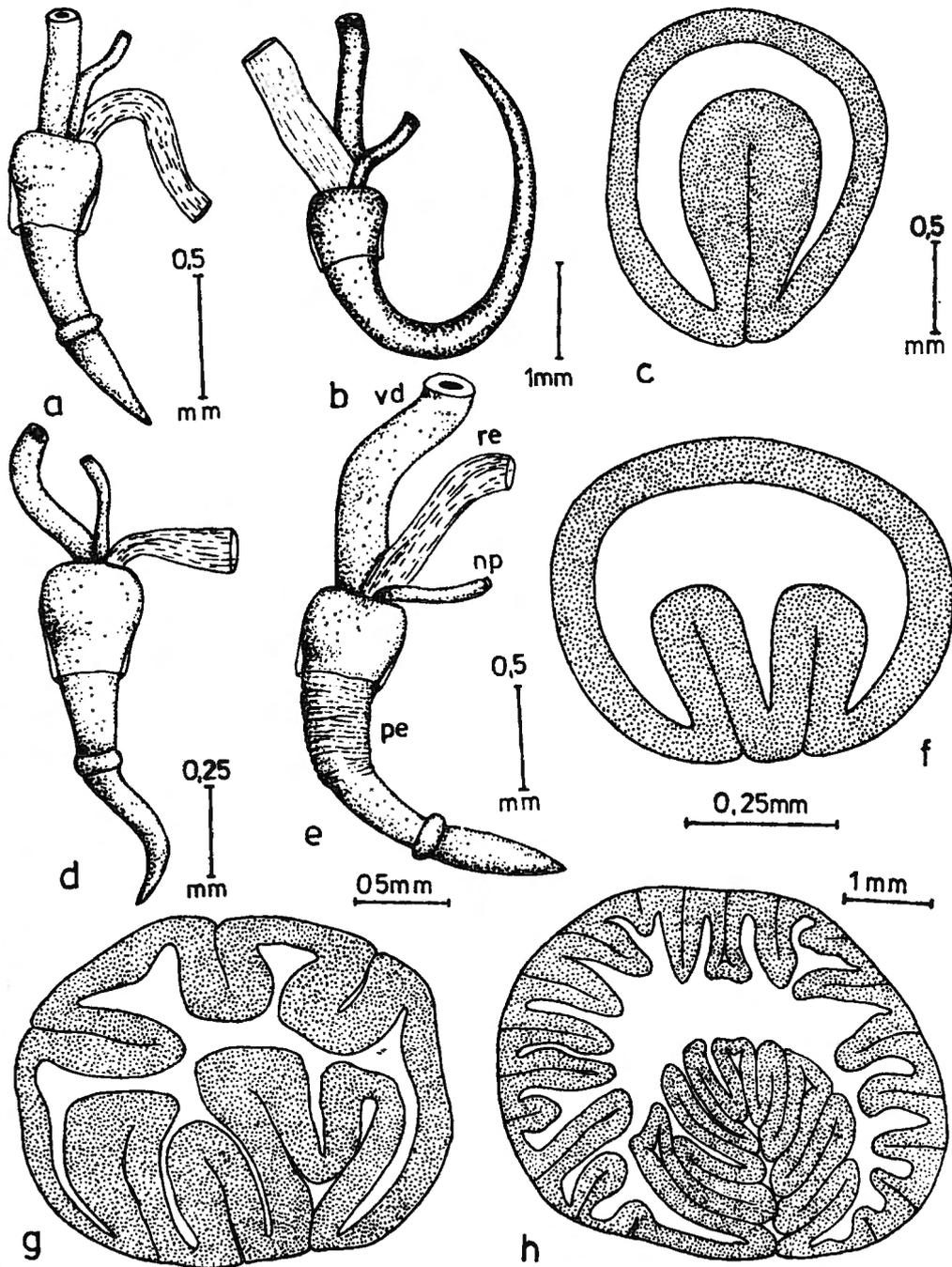


Fig. 4. Penis (a - b and d - e) and transverse section of prostate (c and f - h): *Lymantria curvis* (a and g), *L. ruberata* (d and f), *L. stagnalis* (e and h), *Sagittula palustris* (b - c); pe - penis, np - nerve of penis, re - retractor of penis, vd - vas deferens

The shell of *L. stagnalis* (Figs. 5g - 5i) is big, egg-shaped-conic, the colour white to light brown. Its 6 - 8 whorls are flat. The body whorl is very big and much swollen. The spire is high, slim, very sharply ended. The aperture is big, elongately egg-shaped, its height equalling half the shell height. Out of all the lymnaeid shells this one has the largest dimensions. Its height may reach up to 60 mm (or more in some cases) and breadth up to 30 mm.

The characters of the reproductive organs and shell of *S. corvus* indicate sure enough that the species is closely related to *L. vulnerata* and *L. stagnalis*. Moreover, the three species in question are a compact and homogenous group which differs considerably in reproductive organs and shell from the rest of the *Lymnaeidae*. This would justify the creation within the genus *Lymnaea* LAMARCK, 1799 a new subgenus to cover the three species.

**Subgenus: *Lymnaea s.str.***

Species: *Lymnaea (Lymnaea) vulnerata* (KUSTER, 1862)

Species: *Lymnaea (Lymnaea) corvus* (GMELIN, 1778)

Species: *Lymnaea (Lymnaea) stagnalis* (LINNAEUS, 1758)

A picture of relationships within the *Lymnaeidae*, drawn upon a basis of the structure of the reproductive organs, is due to be presented in a separate paper of the author.

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## STRESZCZENIE

**Pozycja systematyczna *Lymnaea corvus* (GMELIN, 1788)  
(*Gastropoda: Pulmonata*)**

We wcześniejszej pracy (JACKIEWICZ 1959), w obrębie zbiorczego gatunku *Galba palustris* (O. F. MÜLLER), autorka wyodrębliła, głównie w oparciu o cechy narządów rozrodczych, trzy gatunki: *Galba corvus* GMELIN, 1788, *G. turricula* HELD, 1836 oraz *G. occulta* JACKIEWICZ, 1959. W niniejszym artykule autorka wykazuje, iż *G. corvus* tak pod względem cech narządów rozrodczych, jak i muszli, najbliższa jest *Lymnaea vulnerata* (KUSTER, 1862) i *L. stagnalis* (LINNAEUS, 1758). Te trzy gatunki natomiast różnią się znacznie od innych błotniarek, toteż wydaje się uzasadnione utworzenie dla nich odrębnego podrodzaju *Lymnaea* s. str. w obrębie rodzaju *Lymnaea* LAMARCK, 1799.

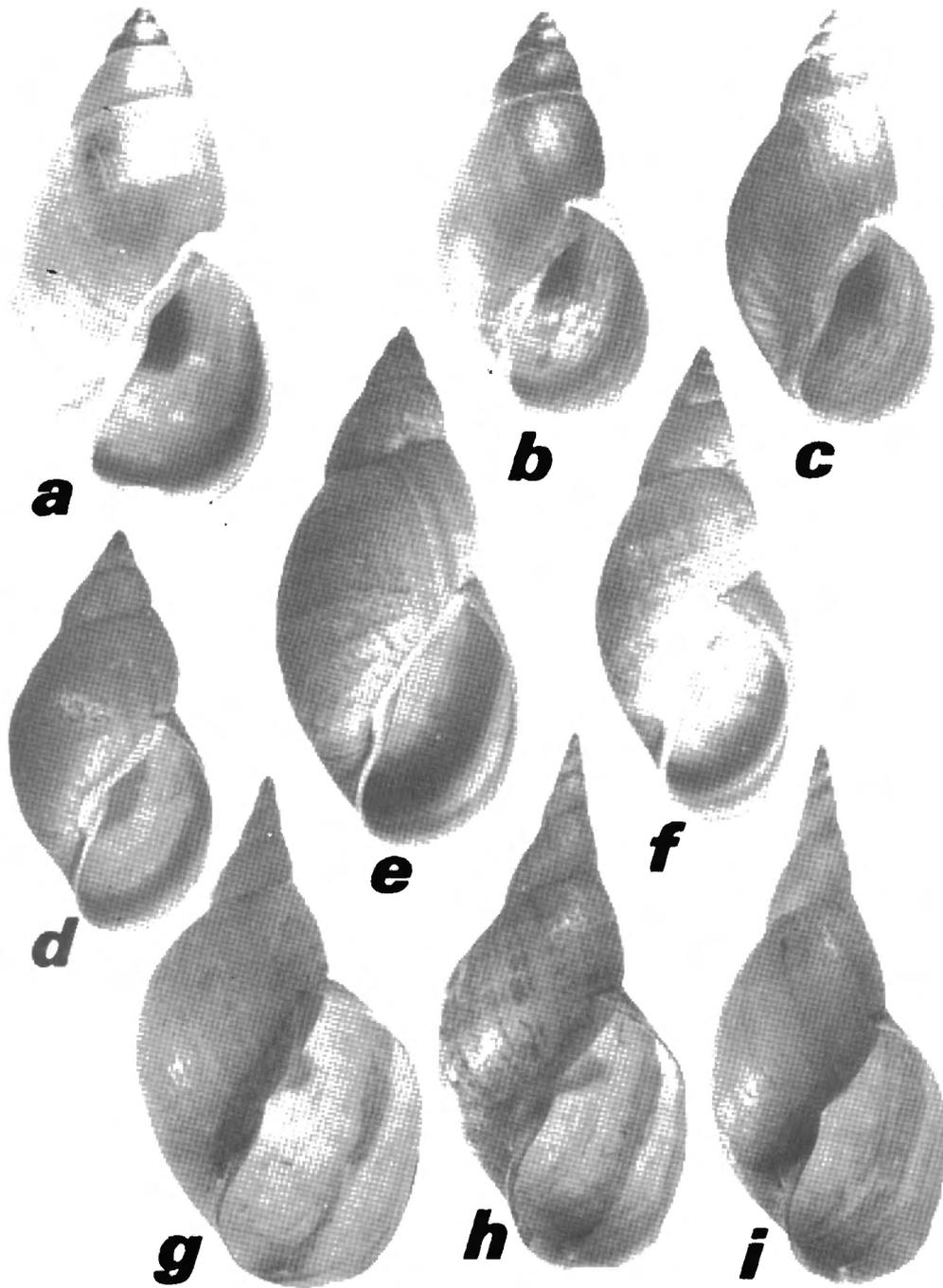


Fig. 5. Shells of *Lymnaea*: a-c - *L. vulnerata*, 5.5 x; d-f - *L. corvus*, 3 x; g-i - *L. stagnalis*, 1.8 x