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The larvae of *Potamophylax inermis* MORETTI & CIANFICCONI, 1994 and *Potamophylax gambaricus spinulifer* MORETTI, 1994

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Abstract. The larvae of *Potamophylax inermis* and *Potamophylax gambaricus spinulifer* are illustrated and compared.

The revision of the European species belonging to the *Potamophylax cingulatus* group (MORETTI et al., 1994) includes two species and one subspecies endemic to the Italian fauna: *P. gambaricus* MALICKY, 1971 in the southern Apennines and Sicily; *P. inermis* MORETTI & CIANFICCONI, 1994 in the central Apennines; *P. gambaricus spinulifer* MORETTI, 1994 in the north central Apennines (CIANFICCONI, 2002) (Fig. 1).

Aquatic stages of these taxa have not been described yet. In this paper the larvae of *P. inermis* and *P. gambaricus spinulifer* are considered, following the description of *P. cingulatus* larva by HICKIN (1967).

Photographs of the larval cases, drawings of the 5th instar larvae and their silk glands and micrographs of the silk weave are presented.

Material examined

The larvae of the two taxa were collected in several sampling stations in association with adult specimens. Those illustrated here come from running water in Central Italy (Umbria). *P. inermis* from the River Nera (Triponzo, PG, 405 m a.s.l.; MORETTI et al., 1997) and *P. gambaricus spinulifer* from the Carpina stream, a tributary of the River Tiber (PG, 700 m a.s.l., leg. Radicchi).

These biotopes are characterized by clear water, a pebble substrate and a covering of beech leaves. Chemico-physical characteristics are within tolerance limits for these larvae (T 7 to 9 °C; O_2 85 to 100 %), total hardness 20 to 40 Fr. dgr., pH 7 to 7.8; organic matter 2 to 3 mg/l).

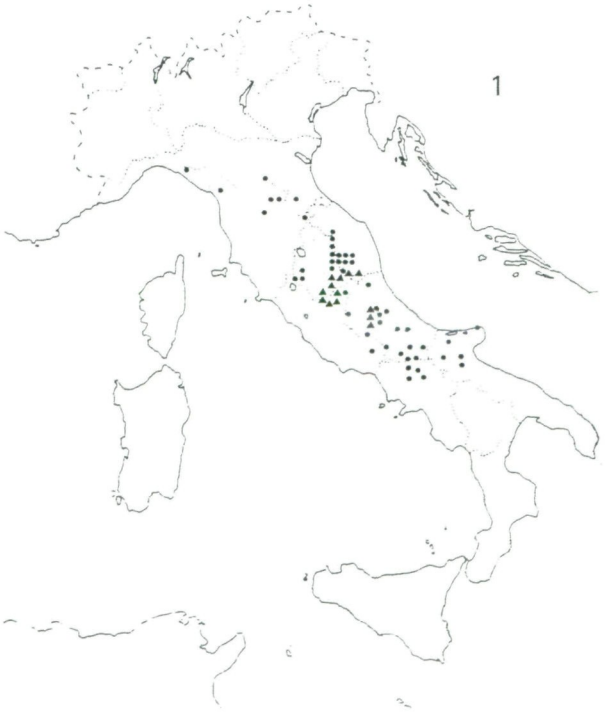


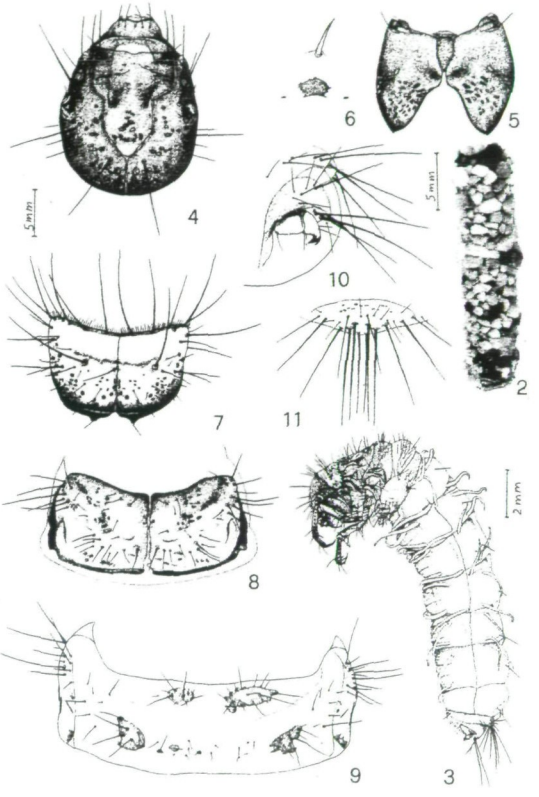
Fig. 1. Distribution map of *Potamophylax inermis* (□) and *P. gambaricus spinulifer* (•) in the Italian Peninsula up to 2003.

Larval case and silk weave

P. inermis: The larval case is built from small sand grains, sometimes with leaf fragments. The posterior end is rounded and partially closed. It is 20 mm long and 4 mm in diameter (Fig. 2).

P. gambaricus spinulifer: In winter the larval case, 20-30 mm long, is flat and wide, made of overlapping fragments of dead beech leaves (Fig. 12 a). In spring the case is initially a combination of leaves and sand grains and is slightly curved (Fig. 12 b) and then only sand grains and is cylindrical, 19-22 mm in length and 4-5 mm in diameter (Fig. 12 c).

The silk glands in both larvae are long and extremely convoluted (Fig. 27). A dense silk weave holds the sand grains together. By removing the grains from the case (Fig. 28) it is possible to see the loose silk threads forming a web (Figs.29 b, 31) with reinforcements that appear as a raised dense frame (Fig. 29 a) around each grain (Fig. 30).



Figs. 2-11. *Potamophylax inermis*: 2, larval case; 3, larva (5th instar) laterally, showing single tracheal gills; 4, head, dorsal; 5, head, ventral; 6, prosternite and prosternal horn; 7, pronotum; 8, mesonotum ;9, metanotum; 10, anal claw and lateral sclerite; 11, dorsal sclerite segment IX.

Larva

The larva of *P. gambaricus spinulifer* (20 mm long) (Fig. 20) is bigger and darker than that of *P. inermis* (18 mm long) (Fig. 3).

The dark spots on the dorsum of the head are similar in both larvae (Fig. 4). In *P. gambaricus spinulifer* the colour of the head is much darker and the ventral apotome is slightly longer (Fig. 13) than in *P. inermis* (Fig. 5). The two small black lateral sclerites of the prosternum in *P. gambaricus spinulifer* are larger (Fig. 14) than in *P. inermis* (Fig. 6). The border line between anterior and posterior parts of the pronotum is more marked and darker in P. *gambaricus spinulifer* (Fig. 15) than in *P. inermis* (Fig. 7) and the anterior margin has shorter setae. The pigmented area of the mesonotum is more extensive in *P. gambaricus spinulifer* (Fig. 16) than in *P. inermis* (Fig. 8) and the lateral sclerite of the metanotum is more evident and marked by an elongated black spot (Fig. 17). The anal claw is longer in *P. gambaricus spinulifer* (Fig. 18) than in *P. inermis* (Fig. 10) and the setae of the lateral sclerite are more numerous.

The dorsal sclerite of segment IX is less rounded in *P. inermis* (Fig. 11) than in *P. gambaricus spinulifer* (Fig. 19) and has a row of dots

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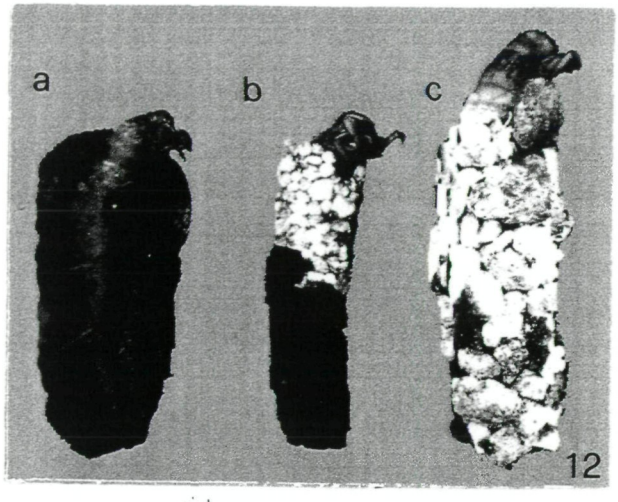
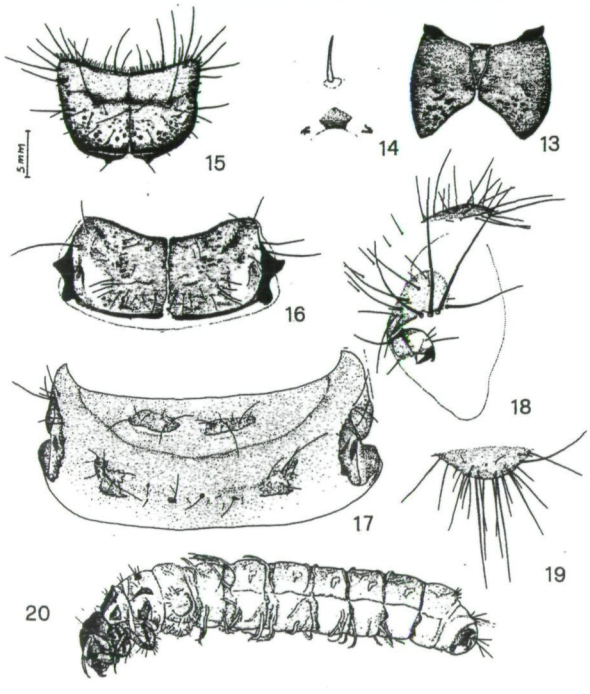
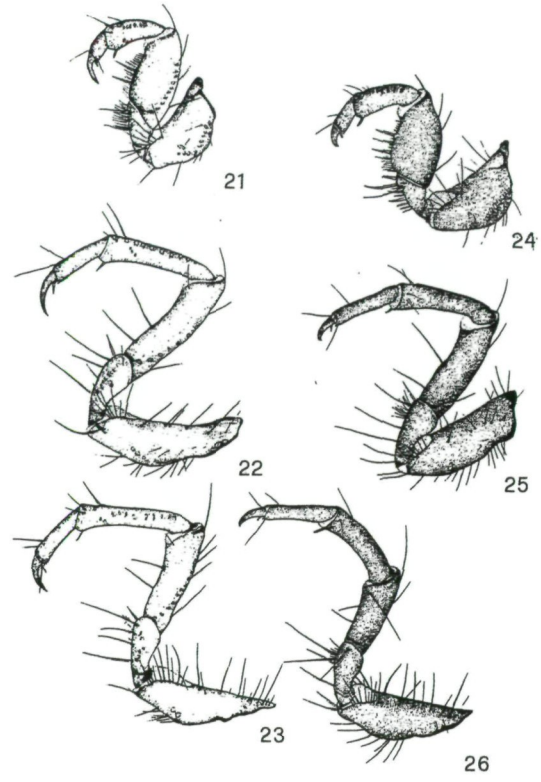
on the anterior margin. The longitudinal rows of dark brown dots on the thoracic leg segments are more evident in *P. inermis* (Figs. 21, 22, 23) than in *P. gambaricus spinulifer* (Figs. 24, 25, 26) and the tarsal claw is longer.

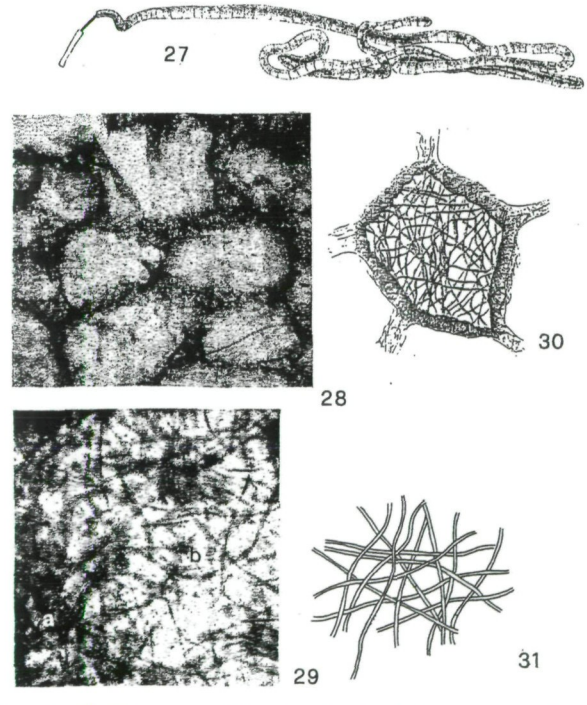




Figs 12- 20. *Potamophylax gambaricus spinulifer*: 12, larval cases: a) winter case; b) spring case with leaf fragments; c) spring case made only of sand grains. 13, head, ventral. 14, prosternite and prosternal horn; 15, pronotum; 16, mesonotum; 17, metanotum; 18, anal claw and lateral sclerite; 19, dorsal sclerite segment IX; 20, larva (5th instar) lateral view.



Figs. 21-26.. Left thoracic legs. *Potamophylax inermis*: 21, foreleg; 22, midleg; 23, hindleg. *P. gambaricus spinulifer*: 24, foreleg; 25, midleg; 26, hindleg.



Figs. 27-31. Silk weave. 27, right silk gland; 28, structure of silk threads after removal of sand grains from case; 29, SEM micrograph. a) part of raised frame with dense silk weave; b) loose irregular threads under sand grains; 30, drawing of frame and silk web (average size 154 µ long x 66 µ wide); 31, detail of silk web. (diameter of silk thread 1- 5 µ; meshes from 20 x 10,l to 20 x 25.µ)

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