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The Morphology of the Pupa of Coprophagous Beetles
Oxytelus piceus (Linnaeus, 1767)
and *Platystethus arenarius* (Fourcroy, 1785)
Coleoptera, Staphylinidae

Morfologia poczwarki koprofagicznych chrząszczy
Oxytelus piceus (Linnaeus, 1767) i *Platystethus arenarius* (Fourcroy, 1785)
Coleoptera, Staphylinidae

O. piceus and *P. arenarius* are numbered among common rove beetles belonging to the *Oxytelinae* subfamily. They are similar as regards habitat requirements, and the range of their occurrence and periods of development overlap at least partly. The whole cycle of development of these species takes place in animals', mainly cattle excrements (1, 2, 4, 8).

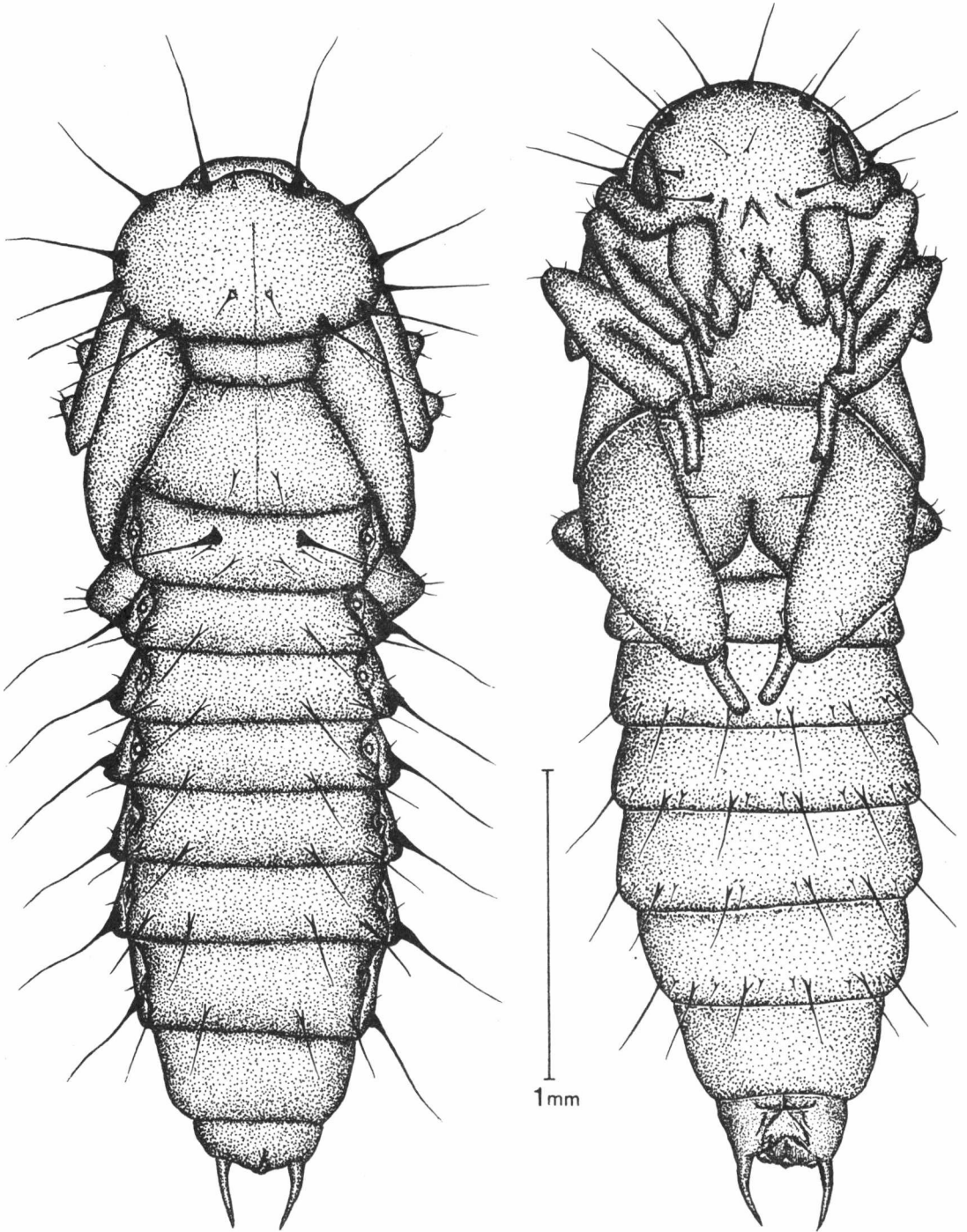
The knowledge of the morphology of *O. piceus* and *P. arenarius* early developmental stages is insufficient. Detailed description of the third larval stage is given by the author (8). Some data related to *P. arenarius* larva's morphology are given by Hinton (8), Kasule (3) and Potockaja (7). Hinton also gives some information on the biology of these species. *O. piceus* pupa has not been described. Whereas the illustrations of *P. arenarius* pupa, by Kuhn t (5) and Reiter (6) require completion.

The research material was collected from cattle excrement in the environs of Zakrzów, Ciechanki Łańcuchowskie, Milejów near Lublin. They were bred at ca 20°C on cattle excrements as far as the pupal stage. The morphology of the pupa of both these species has been described below.

The *O. piceus* pupa

(Figs. 1 and 2)

The body length: 3.25–3.55 mm, the epicranium width: 0.75–0.85 mm, the epicranium length: 0.62–0.66 mm, the width of pronotum: 0.91–0.99 mm. Body yellow, setae and chetae light-brown, growing out of protuberances.



Figs. 1 and 2. Female pupa of *O. piceus*: 1 — dorsal view, 2 — ventral view

The whole area of cuticles with microstructure in the form of tiny spikes. Short before the imago stage the eyes are black, the pronotum, antennae and legs light-brown. The wings of pair II, metanotum, the middle of the abdomen's tergites and rearmost part of the abdomen processes dark-grey, the rest of the body dark-yellow.

There are 8 setae and 6 short chetae on the head, 4 setae and 4 chetae in the rear part of the head, 2 setae and 2 chetae on the forehead, and 1 seta near the base of each mandible. Besides, there are 4 very short spiky setae on the upper mandible. The antennae are situated on the nodes of the Ist and IInd pair of legs, and their distal parts slightly protrude beyond the pair II. The length of antennae is considerably smaller than that of the elytra.

12 setae grow at the side of the pronotum, out of which 2 front setae are slightly thicker and longer than the remaining ones, while 2 rear setae have a characteristic structure. They are divided into 2 unequal parts, more or less at the one third of the seta's length, measuring from its base (Figs. 2 and 3). Moreover, there are 4 chetae on the pronotum, forming pairs in its front and rear parts. There are 2 chetae on the mesonotum and 2 on the metanotum. The distal parts of thighs — with 3 chetae. The rear part of the elytra and the wings of pair II reach the ventral side of the pupa, covering nearly whole legs of pair III, except for their nodes and tarsi.

On the dorsal side of the abdomen there are 9, and on the ventral part — 8 visible segments. The tergite I of the abdomen with 2 long setae and 4 chetae. On each of the tergites II–VII 4 setae occur. The sternites of the first 6 segments of the abdomen reach the dorsal part of the body. On the ventral part of the sternite II there are 8 chetae, and on that of each of the sternites III–VI — 6 setae and 6 chetae. Moreover, 1 thick seta and 1 cheta grow on the lateral parts of each of the sternites I–VI. The last abdominal segment's structure is different from that of the other segments. Its tergite is elongated, forming a pair of abdominal processes, narrowing towards the end. On the sternite of this segment sexual dimorphism of the pupa is strongly marked (Figs. 4a, b).

The dorsal side of the pupa with 4 pairs of normally developed spiracles (segments I–IV) and 3 pairs of degenerated spiracles (segments V–VII). They are placed on the sides of the body among the tergites and sternites, except for the pair I which is between the tergite I of the abdomen and the metasternum sternite (Figs. 2 and 8a, b).

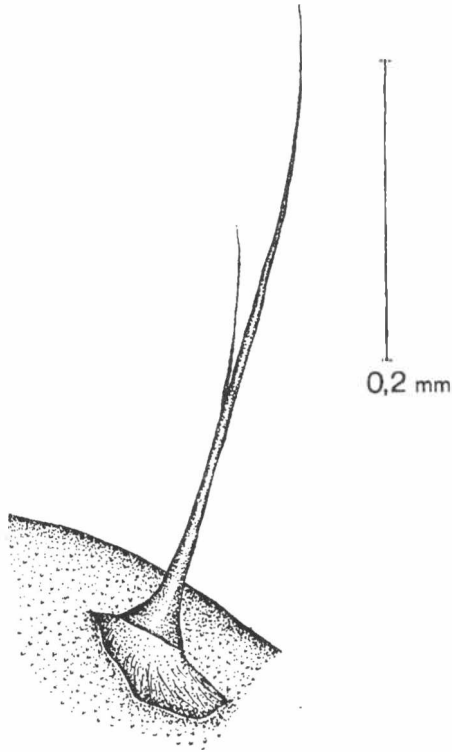


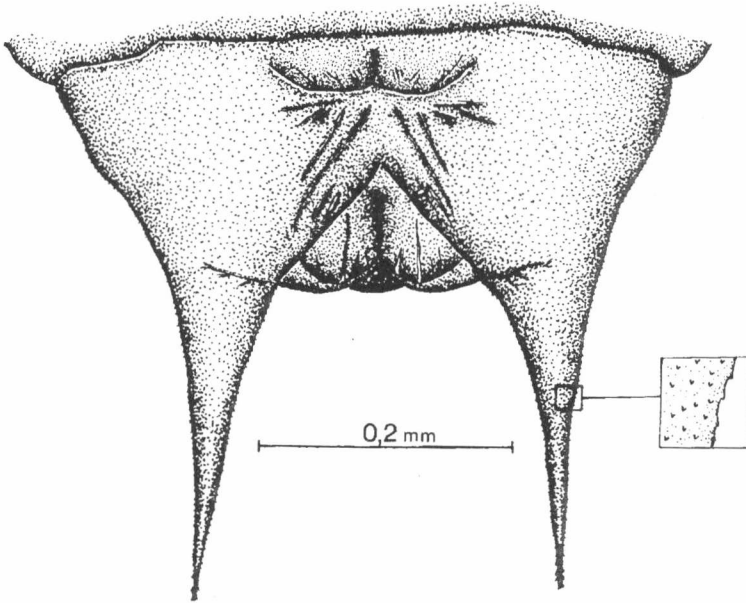
Fig. 3. *O. piceus*, pupa — back setae of pronotum

The *P. arenarius* pupa

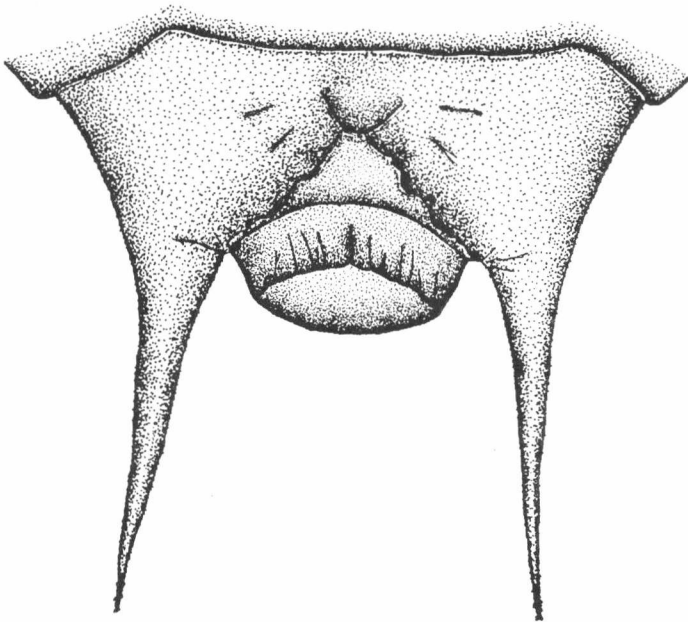
(Figs. 5 and 6)

The body length: 2.70–3.35 mm, the epicranium width: 0.60–0.95 mm, the epicranium length: 0.58–0.70, the width of pronotum: 0.70–1.03 mm. The body relatively wide and short, dark-brown, slightly flattened on dorsal-ventral side. Short before the imago stage the body of the pupa (except for yellow legs) is black.

The cuticles' area with irregular microstructure in the form of tiny teeth. The microstructure forms two distinct, characteristic, longitudinal streaks. One of them is a narrow, delicate dorsal streak going through the middle of pronotum, mesonotum and partly metanotum, and another — wide and strongly marked abdominal streak going through the middle of ventral parts of the abdominal segments I–VII (Figs. 5 and 6). Most of the body surface of the pupa has similar microstructure, however, it is more scattered in comparison with that on the streak's surface. Terminal abdominal processes, among others, are devoid of microstructure.

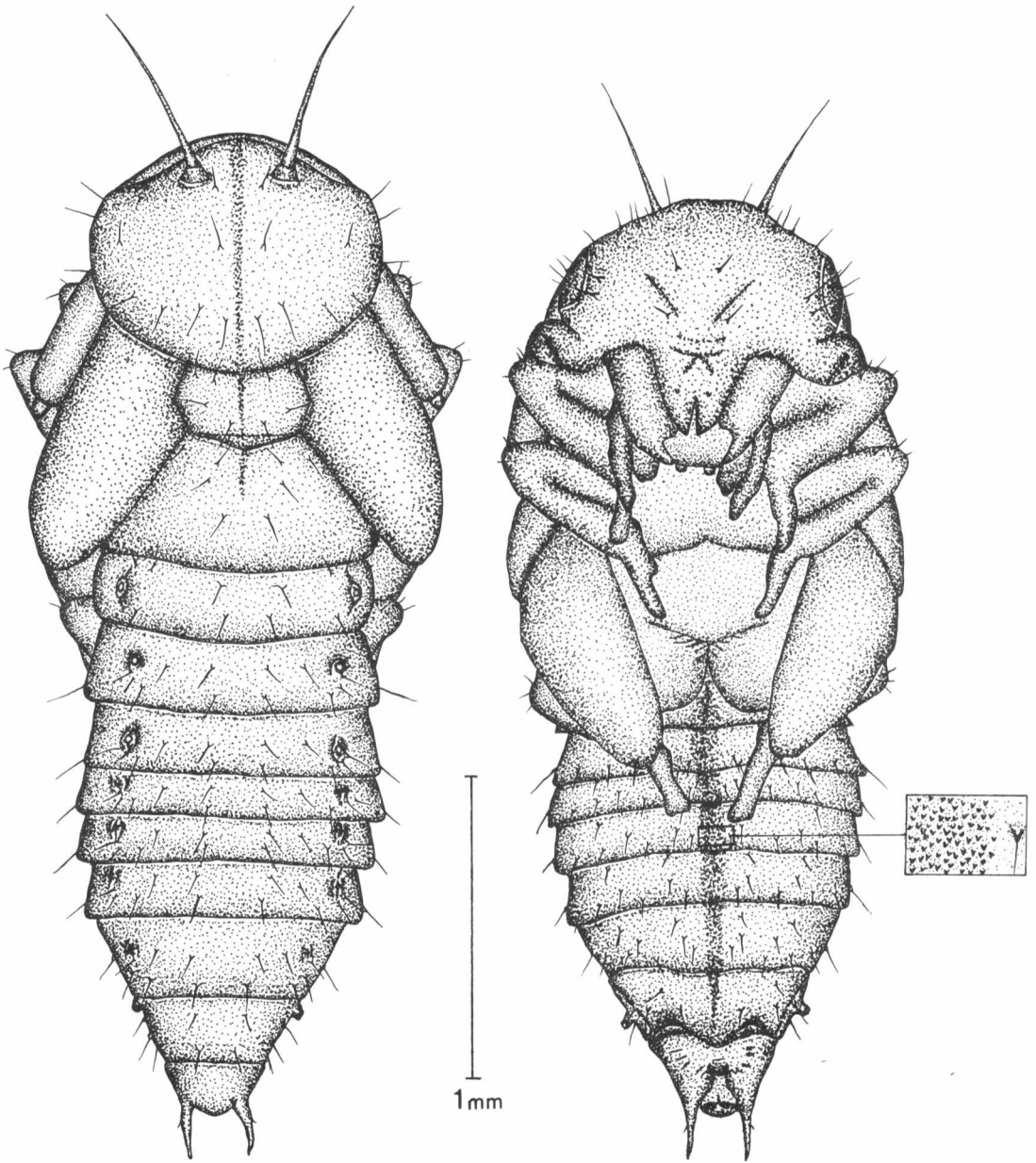


a

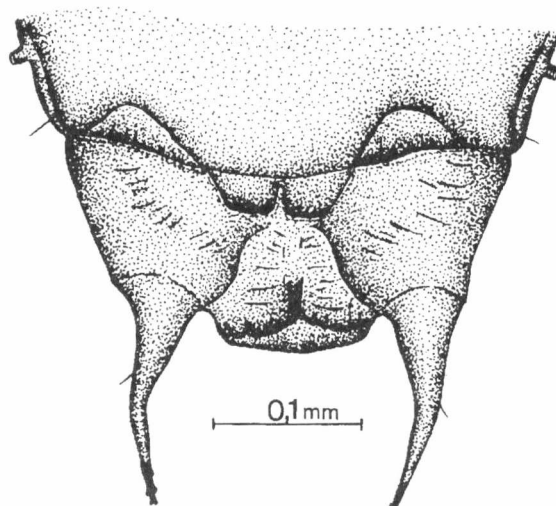


b

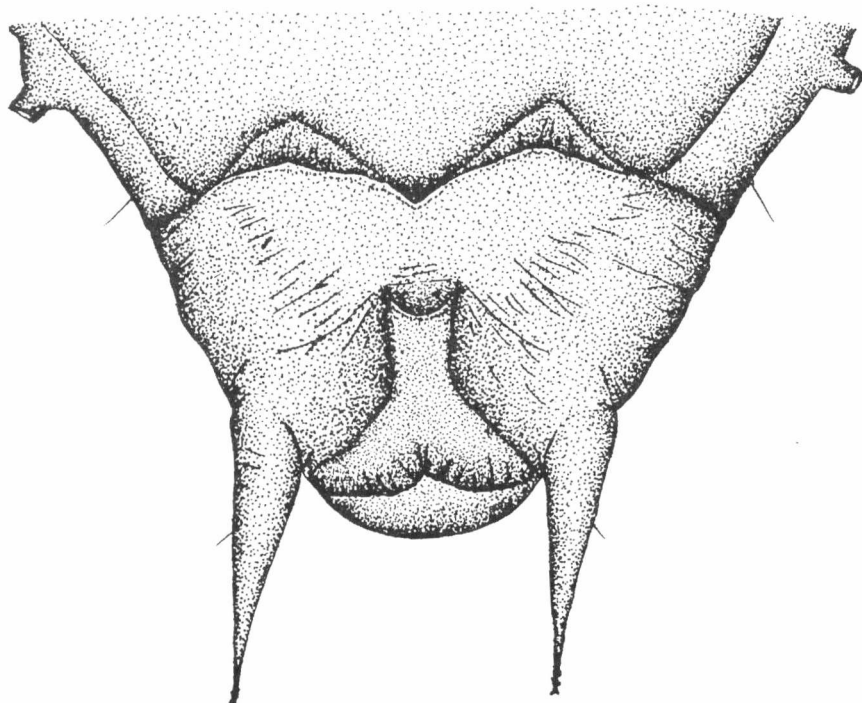
Fig. 4. *O. piceus*, distal abdominal segment of pupa (ventral view): a — female, b — male



Figs. 5 and 6. Male pupa of *P. arenarius*: 5 — dorsal view, 6 — ventral view



a



b

Fig. 7. *P. arenarius*, distal abdominal segment of pupa (ventral view): a — female, b — male

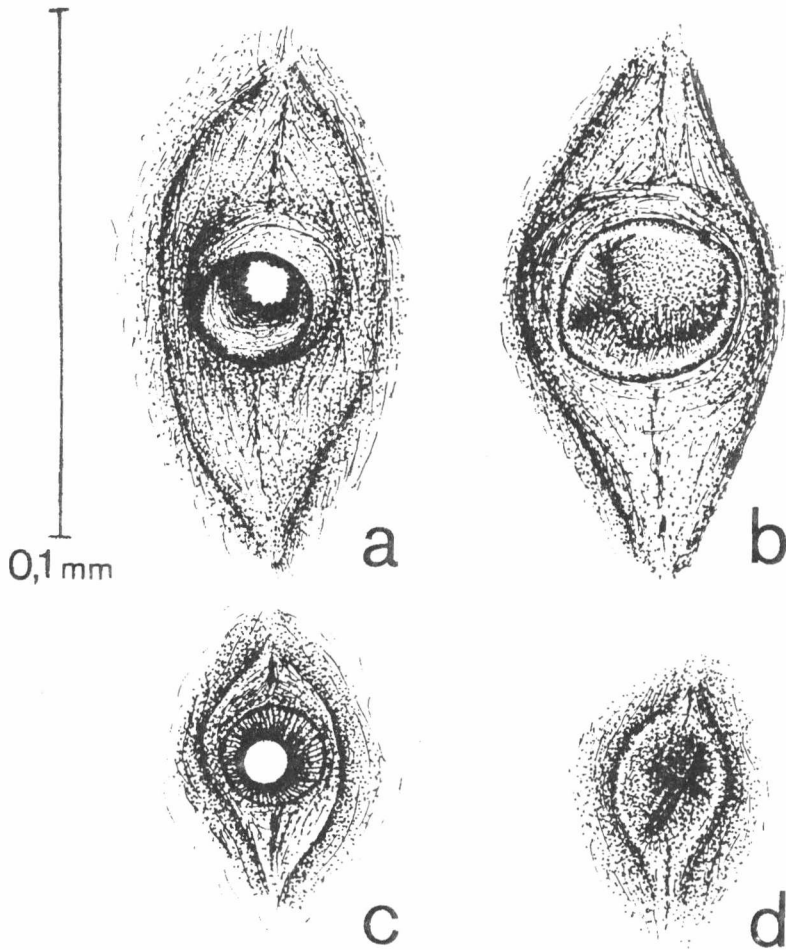


Fig. 8. *O. piceus* (a, b) and *P. arenarius* (c, d), abdominal spiracles of pupa: active spiracles — a, c, inactive spiracles — b, d

16 chetae grow on the head: 8 — on the crown of the head, 2 — on each side, close to the eyes, and 4 chetae on the forehead. The relatively short antennae are situated on the nodes of legs of pairs I and II. The distal parts of thighs of all legs have 3 chetae. The wings of pairs I and II reach the ventral side of the pupa. The top of wings of pair II usually reaches the rear margin of the second abdominal segment.

There are 9 abdominal segments visible on the dorsal side and 8 — on ventral side. The sternites and tergites of these segments grow into uniform rings. The amount of chetae in the dorsal part of the abdominal segments is the following: segment I — 10, segments II-VII — 14 in each, segment VIII — 8. There are also chetae on the ventral side of the abdomen: segment

Table 1. Some differences in morphological structure between the pupae of *O. piceus* and *P. arenarius*

Part of the body or measurements	Species	
	<i>O. piceus</i>	<i>P. arenarius</i>
Length of the body (in mm, N=10)	3.25-3.55	2.7-3.35
Distal part of the antenna	protrudes beyond	does not protrude beyond
Microstructure of the body surface	IIInd pair of legs uniform, does not form oblong streaks	IIInd pair of legs not uniform, forms two oblong streaks
A number of setae or chetae (ls - long setae, sc - short chaetae)		
Head	14 (8 ls, 6 sc)	24 sc
Pronotum	16 (12 ls, 4 sc)	20 (2 ls, 18 sc)
Mesonotum and metanotum	2 sc on each	8 sc on each
I abdominal segment (dorsal)	6 (2 ls, 4 sc)	10 sc
II-VII abdominal segments (dorsal)	4 ls on each	14 sc on each
III-VI abdominal segments (ventral)	12 (6 ls, 6 sc)	18 sc
VII abdominal segment (ventral)	0	8 sc

II — 10, segments III-VI — 18 on each, segment VII — 8. The terminal abdominal segment is elongated, forming two processes, with 1 tiny cheta growing on each of them. The ventral part of that segment with strongly marked sexual dimorphism (Figs. 7a, b). The latter is also visible when comparing the epicranium width of the pupa, which in male fluctuates from 0.80 to 0.95 mm, and in female — from 0.60 to 0.75 mm. On the dorsal part of the pupa, on the abdominal segments I-III there are 3 pairs of well-developed and well-functioning spiracles. The spiracles on segments IV-VIII are degenerated and impervious (Figs. 6 and 8c, d).

In natural conditions the pupation takes place in the soil, under excrements, at the depth of one to several centimetres. The pupal stage lasts 5-7 days at 20-22°C.

As it results from the observation made by the author, the pupation of *O. piceus* and *P. arenarius* in natural conditions takes place in more or less the same vegetative period (VI-X), and in the same habitat, that is in cattle excrements or the soil under excrements. Therefore, it is purposeful to make a list of morphological features making the distinction of these roove beetle species pupae possible (Table 1).

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STRESZCZENIE

Podano szczegółowy opis morfologii poczwarki *Oxytelus piceus* i *Platystethus arenarius*, koprofagicznych chrząszczy z podrodziny *Oxytelinae*. Stwierdzono wyraźne różnice w budowie tych poczwarek. Dotyczą one chetotaksji ciała, długości czułków, kształtu przedplecza, budowy i liczby przetchlinek. Mikrostruktura podłużnych smug u *P. arenarius* i budowa tylnych szczecinek na przedpleczu u *O. piceus* mogą być charakterystycznymi cechami morfologicznymi poczwarek tych gatunków.

Wykryto również wyraźny dymorfizm płciowy wymienionych poczwarek. Występuje on na stronie brzusznej ostatniego segmentu odwłoka.

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