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**Diagnostic characters of the second stage larvae of Central European species
of *Agabus* LEACH (Coleoptera, Dytiscidae)**

[With 66 text figures]

Abstract. Diagnostic characters of the second stage larvae of 25 Central European species of *Agabus* LEACH are reviewed. The main differences between particular species were found, similarly as in the third stage, in the colouring and size of the larvae, the shape of head and of terminal segment, the relative length of cerci, the distribution and length of cercal setae and in the tergal chaetotaxy, in particular that of the terminal abdominal segment. Key to the identification of larvae supplements the above discussion.

INTRODUCTION

The present paper fills a gap in the study of the larvae of European species of *Agabus* LEACH, investigations of which begun with the third stage (GALEWSKI, 1978, 1980) and were followed by a series of papers devoted to the relatively poorly known first stage larvae (GALEWSKI, 1978a, b; 1983 a, b, c, d; 1984 a, b, c). Although the knowledge of the two larval instars — the first and even more the third — enables in many instances extrapolation of characters of the second larval stage, there are some peculiarities proper to the second stage, which, if known, may make the identification a lot easier.

So far, second stage larvae of only a few species have been described (BERTRAND, 1928; GALEWSKI, 1968, 1972a, b, 1973; DE MARCO, 1974) and some identification keys offered (BERTRAND, 1928, BEIER, 1927; NILSSON, 1982) based on characters of the third instar larvae; often, however, small number

of species known by the authors of the keys (BERTRAND, 1928; BEIER, 1927; DE MARCO, 1982) would make determination of the earlier instars virtually impossible.

DIAGNOSTIC CHARACTERS OF LARVAE

The size of body

This character shows in general a similar differentiation as in the third stage larvae — the larvae of the largest species e. g. *A. bipustulatus* (L.), *A. solieri* AUBÉ, *A. subtilis* ER., *A. nigroaeneus* ER. and *A. fuscipennis* (PAYK.) having the largest size, those of medium size species — *A. neglectus* ER., and *A. melanarius* AUBÉ — being somewhat smaller than the larvae of the first group, and the remaining larvae of small species — being also relatively the tiniest [the only exception seems to be the larva of *A. congener* (THUNB.) which has a relatively fair size]. Thus, groups of species can be conveniently separated without resorting to more difficult, often requiring magnification, procedures. Unfortunately, within each size bracket the differences are much less pronounced than in the third stage and any one trying to separate the larvae of *A. affinis* (PAYK.) group (markedly small in the third stage!) from, say, those of *A. paludosus* (FABR.), *A. guttatus* (PAYK.) or *A. conspersus* (MARSH.) by their size alone could not be very successful as the body length of larvae of these two groups does not seem to differ in any conspicuous way (by contrast to the adult and third larval stage). Moreover, there seems to be a considerable variation within species — of each size group, not to mention varying larval length during growth. The size of thoracic terga (flattened!) and head seem to be here good indices of the larva size.

The pigmentation of head and terga

The colouring, particularly of head, enables often a very reliable and easy separation of larvae of various species.

The very peculiar colour-pattern — an inverted dark V-mark on a pale epicranium of *A. undulatus* (SCHRANK) and an entirely different V-letter pattern in *A. labiatus* (BRAHM.) identify these at the first sight. Dark, relatively small median patches of a otherwise pale epicranium in *A. conspersus* (MARSH.), *A. nebulosus* (FORST.) and dark puncturation (in addition to occasional dark median marking) in *A. didymus* (OL.) are also excellent indices of their identity. Pigmentation pattern — a very large central dark epicranial patch surrounded by pale lateral bands — in *A. neglectus* ER. and

a V-letter dark marking on clypeus in *A. sturmi* (GYLL.) — may also help separation of these species. Most of other species, though, appear to have a mostly uniform, dark colouring or rather uncontrastive cranial pigmentation with some obfuscate central areas and pale ocular patches or marks, or spots and not particularly different from one another. And there is frequently a large extent of variation which additionally confounds the differences; the only exception here seem to be the larvae of *A. affinis* (PAYK.) group — which display a fairly stable dark colouring — enabling together with their very slender body form (and other also very striking characteristic, see below) a rapid and reliable separation of these larvae.

The body form

It may offer some help in the identification, or at least in a preliminary grouping, of larvae of some species. Whereas certain species appear to be rather short, “bulky” — for instance *A. melanarius* AUBÉ, *A. congener* (THUNB.), *A. paludosus* (FABR.), *A. subtilis* ER. or *A. nigroaeneus* ER., others are definitely more slender and to such belong for example *A. bipustulatus* (L.), *A. guttatus* (PAYK.), *A. conspersus* (MARSH.) or *A. nebulosus* (FORST.), and, these appearance is certainly enhanced by a form of head — broad in the first group and rather narrow in another. However, the growth stage of particular larvae may not be overlooked — the more grown — older larvae being naturally more elongated and slender than the less grown, younger ones — and one has always to bear this in mind.

The form of head

It certainly belongs to most important characters in the identification of larvae and together with head size enables a quick identification of most species. A peculiar, well enlarged anteriorly with a very long clypeus edge — subtriangular form of head characterizes larvae of the *A. affinis* (PAYK.) group, and within the group itself the width of head and neck and the degree of divergence of head sides is fairly typical of each species. A markedly large and broad (broadest of all species), but rather rectangular, head with a relatively narrow neck is found in *A. melanarius* AUBÉ, whereas the head width is less striking but the neck definitely broader in *A. subtilis* ER., *A. nigroaeneus* ER., *A. neglectus* ER., *A. uliginosus* (L.) and *A. paludosus* (FABR.). Also a wide but slightly enlarged anteriorly, head with a long clypeus edge is seen in *A. striolatus* (GYLL.). In *A. congener* (THUNB.), *A. guttatus* (PAYK.), *A. biguttatus* (L.), and even more in *A. wasastjernaе* SAHLB., *A. bipustulatus* (L.), *A. solieri* AUBÉ, *A. didymus* (OL.) and *A. sturmi* (GYLL.), the head appears to be still narrower, and it is markedly slender in *A. conspersus* (MARSH.),

A. nebulosus (FORST.) and in particular in *A. undulatus* (SCHRANK) and *A. labiatus* (BRAHM.) (in that order if decreasing width). In *A. conspersus* (MARSH.) the head sides are slightly diverging anteriorad, by contrast to other species of the "narrow head" group with more or less parallel-sided head. The group of species with a intermediate head width — *A. congener* (THUNB.), *A. guttatus* (PAYK.), *A. biguttatus* (OL.), *A. sturmi* (GYLL.) and more robust *A. paludosus* (FABR.) display even a head contracted anteriorly with converging anteriorad sides. There are differences in head shapes even within each group enabling often separation of closely related species e. g. *A. guttatus* (PAYK.) and *A. biguttatus* (OL.); *A. solieri* AUBÉ and *A. bipustulatus* (L.); *A. conspersus* (MARSH.) and *A. nebulosus* (FORST.); *A. undulatus* (SCHRANK) and *A. labiatus* (BRAHM.) or the mentioned species of *A. affinis* (PAYK.) group. A certain intraspecific variability, though, should be always reckoned with and identification corroborated by other characters, in particular those of the last abdominal segments, cerci and chaetotaxy (see below).

The shape of mandibles

Strikingly elongate, narrow and minutiously serrate mandibles of *Agabus affinis* (PAYK.) group markedly contrast with those of a rather short, broad type and with perfectly smooth inner edge, found in most of other species. Fairly slender — though less so than in *A. affinis* (PAYK.) group and devoid of serration — mandibles are also found in *A. striolatus* (GYLL.), a species with an enlarged anteriorly head — the character which may also help separation from such species as *A. melanarius* AUBÉ, *A. subtilis* ER., *A. nigroaeneus* ER. or others with a wide head but robust, short mandibles. Within the two groups the diversification in shape is rather feeble and has no special value in identification.

The elongation of antennae and palpi

By contrast to mandibles, there seems to be no notable differentiation. Certainly some differences in the elongation and "slenderness" of particular antennal segments among the species can be observed — e. g. in *A. subtilis* ER. or *A. nigroaeneus* ER. — basal antennal segment is more strongly elongate than in most other species, or in some species some segments of maxillares or labiales palpi, are more slender than in others, but generally the differences are subtle with little practical importance and often require a special magnification and preparation for comparison.

The shape of terminal abdominal segment

The most varied shape of terminal abdominal segment deserve, together with head form and length of cerci, certainly a special consideration in the identification. It enables not only an easy grouping of larvae but often also separation of particular species. A very characteristic, very strongly elongate, regularly narrowly conical terminal abdominal segment is found in the *A. affinis* (PAYK.) group. A less elongated conical (but relatively fairly long) terminal abdominal segment is shown by *A. melanarius* AUBÉ and *A. striolatus* (GYLL.), and finally shortly conical — the shortest segment of this type characterizes *A. bipustulatus* (L.) and *A. solieri* AUBÉ. In another clear-cut group the segment in question is robust, short but with a blunt apex — more or less truncate: to this type belong *A. congener* (THUNB.) *A. wasastjerna* SAHLB., *A. subtilis* ER., *A. nigroaeneus* ER., *A. neglectus* ER., *A. chalconotus* ER. and *A. melanocornis* ZIMM. In all remaining species the said segment is rather, slender with clearly concave sides and protruding apex; the most elongate, slender segment of this kind is found in *A. conspersus* (MARSH.), *A. nebulosus* (FORST.), *A. didymus* (OL.), *A. undulatus* (SCHRANK) and *A. labiatus* (BRAHM.). In other species — *A. guttatus* (PAYK.), *A. biguttatus* (OL.), *A. paludosus* (FABR.), *A. uliginosus* (L.), *A. fuscipennis* (PAYK.) — the terminal segment is shorter and in the first three species mentioned relatively feebly tapered posteriorly (broad apex). The differences within each group are less pronounced but together with other characters may often enable the identification of particular species.

The chaetotaxy of head and body

The presence of setigerous, often pigmented punctures on dorsal side of head sometimes is a good indication of species identity. Thus, in *A. bipustulatus* (L.) a conspicuous semicircular band of pigmented punctures on epicranium separates not only this species from a related *A. solieri* AUBÉ, but also of most other species which lack such a puncturation. The length and robustness of crinal setae on terga may often too, facilitate considerably the identification. It suffices to mention the separation of such poorly setose species (tergal setae short and inconspicuous) as *A. neglectus* ER. and even more *A. subtilis* ER., *A. nigroaeneus* ER. and *A. fuscipennis* (PAYK.) from the other species, all provided with more or less conspicuous setae. The length and number of crinal setae on terminal abdominal segment constitutes, also, a valuable help in particular when separating closely related, more difficult to identify, species [e. g. *A. conspersus* (MARSH.) and *A. nebulosus* (FORST.); *A. didymus* (OL.) from both; *A. neglectus* ER. from *A. subtilis* ER. or *A. nigroaeneus* ER.; *A. chalconotus* (PANZ.) and *A. melanocornis* ZIMM.; *A. paludosus* (FABR.)

from both *A. guttatus* (PAYK.) and *A. biguttatus* (OL.); *A. congener* (Thunb.) and *A. uliginosus* (L.); *A. melanarius* AUBÉ and *A. striolatus* (GYLL.)]. The density and conspicuousness of secondary setae or spines, particularly on posterior abdominal segments, can, also in many instances supplement the crinal chaetotaxy in the diagnosis. In general the species with the last developed crinal setation (*A. neglectus* ER., *A. nigroaeneus* ER., *A. subtilis* ER.) show the least conspicuous, delicate secondary setation (though the number of setae may be fairly high), whereas those with profuse crinal setae display a conspicuous secondary setae or spines. The number of secondary setae or punctures on dorsal side of last abdominal segment is characteristic for many species and may corroborate the determination based on important structural features.

The length of cerci

The relative to terminal abdominal segment length — length of cerci belongs also to important diagnostic criteria — although subject to certain intraspecific variation. *A. affinis* (PAYK.) group — with the relatively shortest cerci — (basal part much shorter than terminal abdominal segment) contrasts well with the remaining species where the cerci are definitely longer. In *A. melanarius* AUBÉ and *A. uliginosus* (L.) — the cerci are subequal in length to terminal abdominal segment, but in all other species they seem to be markedly longer than the last abdominal segment. In *A. conspersus* (MARSIL.) and *A. undulatus* (SCHRANK) the length of cerci is exceeding ca 1.7 times, and in *A. labiatus* (BRAHM.) and *A. nebulosus* (FORST.) even roughly twice the length of the terminal abdominal segment. In other species the length of cerci exceeds barely 1.3–1.5 times the length of terminal abdominal segment. Despite certain variability, which must be remembered, it is a good character for separation, often of closely related species.

The cercal chaetotaxy

Like in the first and third stages the distribution of cercal setae is of paramount importance in the identification of species, permitting separation of distinct groups of species and in some instances even closely related ones. The widely spaced cercal proximal setae allow separation of *A. fuscipennis* (PAYK.) at first glance. A loose distribution of proximal setae in the anterior half of cerci characterizes *A. congener* (THUNB.), *A. wasastjernae* SAHLB., *A. uliginosus* (L.), *A. didymus* (OL.) and the species of *A. affinis* (PAYK.) group; here *A. congener* (THUNB.) displays a more or less regular distribution of setae (the two anterior setae are sometimes closer to each other than to posterior

one), whereas in *A. didymus* (OL.)¹ and *A. wasastjernae* SAHLB. the first two proximal setae are visibly concentrated, and in *A. uliginosus* (L.) and *A. affinis* (PAYK.) group conversely concentrated are the last two setae, the anterior one being clearly set apart. In all other species the proximal cercal setae are all more or less concentrated at cercus base [in some species e. g. *A. nebulosus* (FORST.) and *A. conspersus* (MARSH.) the distribution appears to be somewhat looser] and differences in the relation between particular setae are here less clear which makes the identification on this character alone rather difficult. Still, in some species the distribution of particular setae within a "comb" may help to determine the species identity.

The strongly differentiated length of cercal setae may also constitute valuable hint in the diagnosis of species. It suffices to mention the extremely short setae of *A. wasastjernae* SAHLB. or in the *A. subtilis* ER., *A. nigroaeneus* ER. or a lesser extent in *A. fuscipennis* ER., *A. neglectus* ER. and (anterior proximal setae) in *A. affinis* (PAYK.) group. Surprisingly short setae in relation to cercus length are found in *A. conspersus* (MARSH.) and *A. nebulosus* (FORST.) — the species with very long cerci. In all other species the length of cercal setae, though variable, seems to well exceed those of the above group.

The proximal cercal setae are not always of equal length within the same "comb". Thus in *A. affinis* (PAYK.) group the mentioned anterior seta is much shorter than the posterior ones and in *A. nigroaeneus* ER., *A. neglectus* ER., *A. chalconotus* (PANZ.) and *A. melanocornis* ZIMM. the inner seta (which may be in a median or posterior position) is strikingly shorter than the remaining proximal setae. There are also some differences between proximal setae in other species but these generally less pronounced, still, after a careful examination they may be of some help in identification.

KEY TO SPECIES

1. Legs with swimming hairs. Epiceranium with elongate dark marks or bands (figs. 23, 24) 2
- Legs without swimming hairs. Epiceranium with various pale spots, darker patches, etc (figs. 6, 7, 20–22), or uniformly dark 3
2. Dark bands on head converging anteriorly and often with dark clypeal mark forming somewhat of an X-letter pattern (fig. 23). Head broader (fig. 23). Terminal abdominal segment broader and with stronger setation (figs. 59, 60). Cercal proximal anterior seta slightly set apart from the other two (figs. 59, 60) *A. undulatus* (SCHRANK)
- Dark bands on head diverging in a V-letter pattern (fig. 24). Head narrower (fig. 24). Terminal abdominal segment more slender and with more feeble — barely distinct — secondary setation (figs. 57, 58). Cercal proximal setae well concentrated (figs. 57, 58) *A. labiatus* (BRAHM.)

¹By contrast to first stage larvae in which last two setae seem to be closer.

3. Cercal setae very widely spaced — along whole cercus length (figs. 61, 62) *A. fuscipennis* (PAYK.)
- Cercal proximal setae distributed loosely or concentrated in anterior part of cerci (figs. 25–56, 63–66) 4
4. Head with sides strongly diverging anteriorad (broadened anteriorly) and with long, narrow mandibles (figs. 1–3). Terminal abdominal segment strongly elongate — oblongly conical (figs. 25–27). Cerci main segment markedly shorter than terminal abdominal segment (figs. 25–27) 5
- Head sides less strongly diverging and mandibles shorter (figs. 4–14, 16–22). Terminal abdominal segment less elongate — of various shapes (figs. 28–56, 63–66). Cerci main segment not shorter (or in rare instances insignificantly shorter) than terminal abdominal segment (figs. 28–56, 63–66) 7
5. Head relatively narrow (fig. 3). Terminal abdominal segment well tapered apically (fig. 25) *A. affinis* (PAYK.)
- Head broader (figs. 1–2). Terminal abdominal segment less tapered apically (figs. 26, 27) 6
6. Head with less diverging sides (fig. 2). Terminal abdominal segment shorter (fig. 26) *A. biguttulus* THOMS.
- Head with more diverging sides (fig. 1). Terminal abdominal segment more elongate (fig. 27) *A. unguicularis* THOMS.
7. Head large and very broad with relatively narrow neck (fig. 8). Terminal abdominal segment well elongate, conical (figs, 38, 39). Cerci not longer or insignificantly longer than terminal abdominal segment, with concentrated proximal setae (figs. 38, 39) *A. melanarius* AUBÉ.
- Head relatively smaller and narrower with broader neck (figs. 4–7, 9–14, 16–22). Terminal abdominal segment shorter. Cerci [exception *A. uliginosus* (L.) but here a loose distribution of cercal proximal setae] markedly longer than terminal abdominal segment (figs. 28–37, 40–56, 63–66) . . . 8
8. Terminal abdominal segment very short — “stubby”, with more or less truncate apex (figs. 28–37). Tergal and cercal setae [except in *A. congener* (THUNB.)] generally shorter (figs. 28–37) 9
- Terminal abdominal segment more slender with acuminate or more protruding apex (figs. 40–56, 63–66). Tergal and cercal setae longer (figs. 40–56, 63–66) 15
9. Cercal proximal setae loosely distributed (figs. 28–30). No neck delimiting line (figs. 16, 18) 10
- Cercal proximal setae concentrated at cercus base (figs. 31–37). Neck delimited by a line of stronger sclerotisation (figs. 4–7) 11
10. Cercal proximal setae fairly regularly distributed: anterior and median setae sometimes more closely together (figs. 28, 29). Cercal and tergal setae (figs. 28, 29) longer; cercal proximal setae ca 1/3–1/4 of cercus length (figs. 28, 29). Terminal abdominal segment with distinct setation and puncturation (figs. 28, 29) *A. congener* (THUNB.)
- Cercal proximal setae very irregularly spaced: posterior seta strongly isolated from the concentrated remaining ones (figs. 30). Cercal and tergal setae very short; cercal proximal setae barely 1/8–1/10 of cercus len-

- gth (fig. 30). Terminal abdominal segment devoid of setae or punctures (fig. 30) *A. wasastjernae* SAHLB.
11. Large larva (head total length 1.64–1.80 mm) 12
 —. Smaller larvae (head total length 1.13–1.40 mm) 13
12. Head and pronotum larger (head total length 1.75–1.80 mm, pronotum length 1.25–1.30 mm) (larvae of slightly larger size). Terminal abdominal segment (in contrast to third stage larva (!) where reverse relations are observed) more robust, usually shorter (figs. 33, 34) *A. nigroaeneus* ER.

- . Head and pronotum smaller (head total length 1.64–1.70 mm, pronotum length 1.15–1.20 mm) (smaller, narrower larvae). Terminal abdominal segment less robust, usually longer (figs. 31, 32) *A. subtilis* ER.
13. Cerci relatively shorter: hardly 1.5 – 1.7 times as long as terminal abdominal segment; terminal abdominal segment more elongate (figs. 36, 37) Cercal and tergal setae shorter (figs. 35, 36). Larger (head total length 1.35–1.45 mm) and (well grown-up) more slender larvae *A. neglectus* ER.

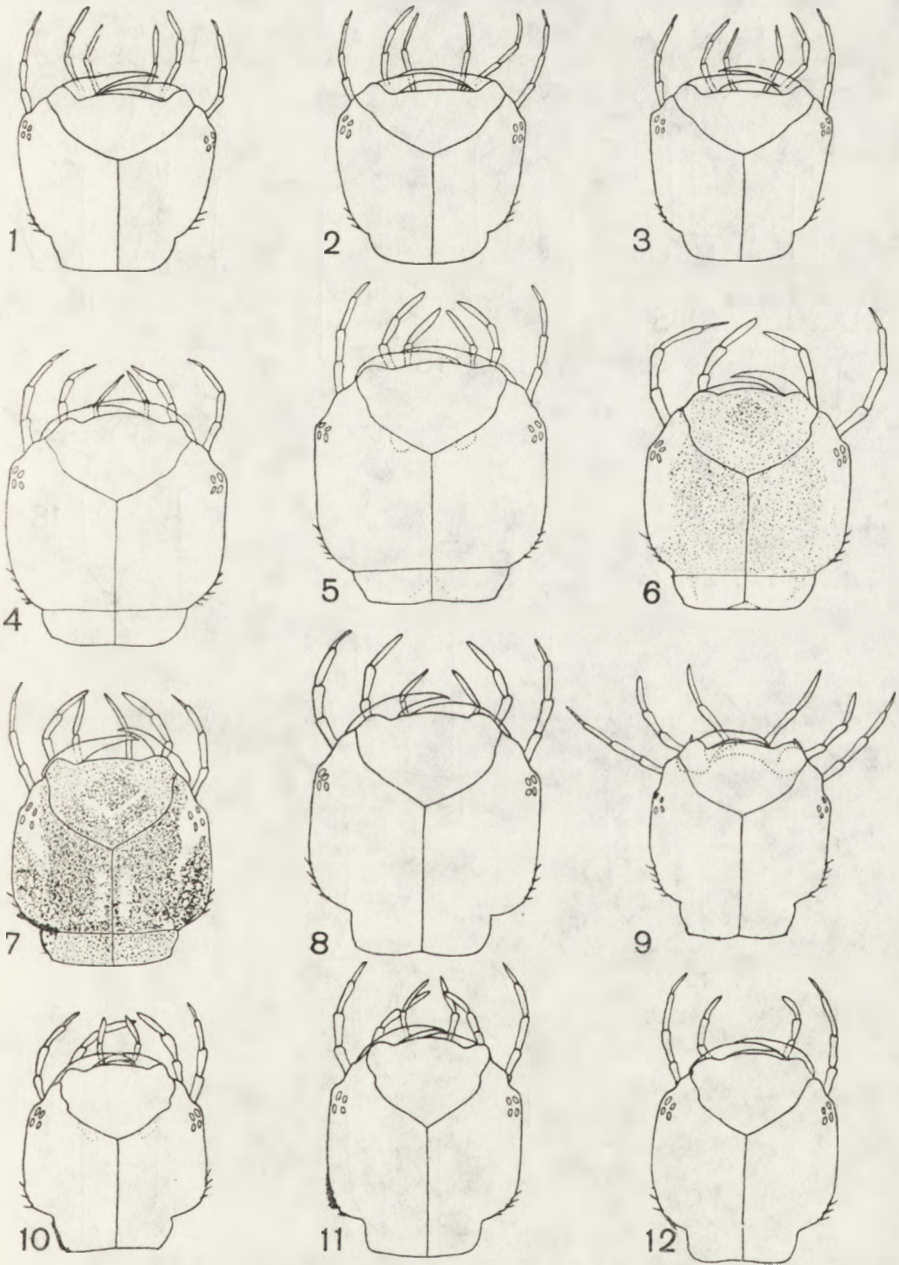
- . Cerci relatively longer: slightly less than twice as long as terminal abdominal segment; terminal abdominal segment shorter, more robust (fig. 37). Cercal and tergal setae longer. Smaller (head length 1.13–1.20 mm) and more robust, shorter larvae 14
14. Head with a distinct colour-pattern (fig. 7); terminal abdominal segment with ca 50 secondary setae *A. melanocornis* ZIMM.
 —. Head mostly dark, without any noticeable colour-pattern. Terminal abdominal segment with a sparser setation *A. chalconotus* (PANZ.)
15. Head with sides well diverging anteriorad, long clypeus edge and fairly long mandibles (fig. 17) *A. striolatus* (GYLL.
 —. Head parallel-sided or with sides converging, or only very feebly diverging, anteriorly (figs. 9 – 14, 19–22); clypeal edge and mandibles (figs. 9–14, 19–22) short 16
16. Posterior and median proximal setae strongly concentrated and isolated from the basal (anterior) seta (figs. 43, 44) Head broad (fig. 9) *A. uliginosus* (L.)

- . Cercal proximal setae more or less well concentrated or anterior and median setae grouped more strongly together (figs. 40, 41, 45–56, 63–66). Head narrower (figs. 10–14, 20–22) 17
17. Distribution of cercal proximal setae irregular — posterior seta isolated from the other two (figs. 55, 56) *A. didymus* (OL.)
 —. Distribution of cercal proximal setae fairly regular — all concentrated more or less in one group at cercus base 18
18. Larger larvae: head length 1.60–1.70 mm 19
 —. Smaller larvae: head total length 1.10–1.40 mm 20
19. Head broader and with more prominent temporal angles and a shorter neck (fig. 14). Epicranium with a distinct, often pigmented, puncturation across. Terminal abdominal segment longer (figs. 53, 54) *A. bipustulatus* (L.)

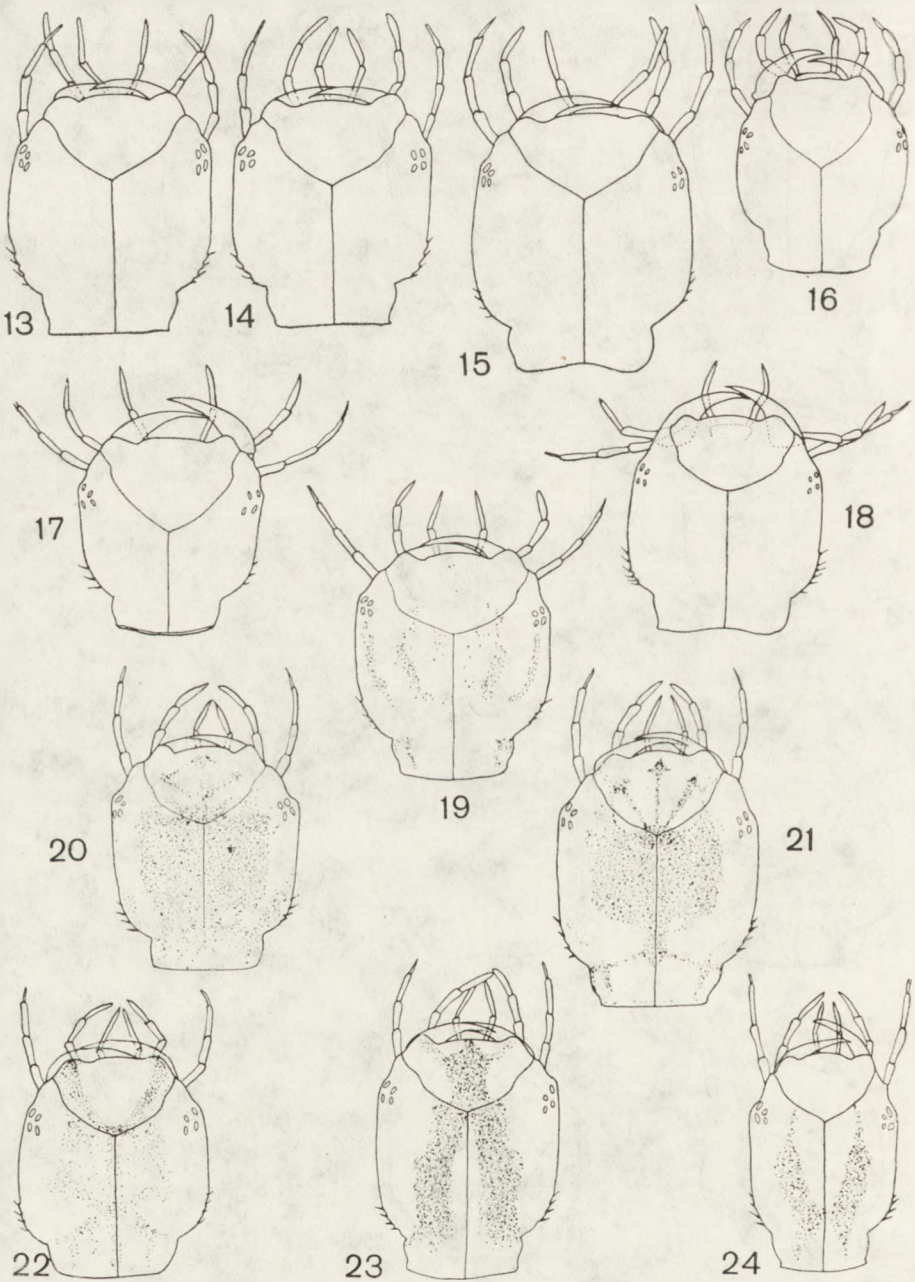
- . Head narrower, more elongate with a longer neck and gently curved tem-

- poral angles (fig. 13); puncturation of dorsal side barely distinct, faint. Terminal abdominal segment shorter (figs. 51, 52) *A. solieri* AUBÉ
20. Head well elongate, pale epicranium with a dark median patch (figs. 20, 21) Cerci very long — up to 1.7–2 times as long as terminal abdominal segment (figs. 63–66) 21
- Head broader, darker, epicranium with various pale spots or streaks at sides: Cerci shorter — at most 1.5 times as long as terminal abdominal segment (figs. 40, 41, 45–50) 22
21. Head less elongate with sides more curved at base; dark projections on clypeus shorter (fig. 20). Cerci at most 1.7 times as long as terminal abdominal segment (figs. 63, 64) *A. conspersus* (MARSH.)
- Head more elongate and often larger; dark clypeal projections of central patch longer (fig. 21). Cerci up to twice as long as terminal abdominal segment (figs. 65, 66) *A. nebulosus* (FORST.)
22. Head with more gently curved temporal areas (fig. 22); clypeus with distinct dark, oblique, a V-letter forming bands at sides (fig. 22). Tergal and cercal setae more delicate (figs. 40, 41). Terminal abdominal segment more elongate, slender with a more acuminate apex (figs. 40, 41) *A. sturmi* (GYLL.)
- Head temporal areas more strongly curved; no oblique bands on clypeus (figs. 10–12). Tergal and cercal setae more robust (figs. 45–50). Terminal abdominal segment shorter with an obtuse apex (figs. 45–50) 23
23. Head broader with well converging anteriorad sides (fig. 10). Body shorter, more “stocky”. Terminal abdominal segment shorter (figs. 49, 50) *A. paludosus* (FABR.)
- Head narrower with sides less converging anteriorad (figs. 11, 12). Body more slender, more elongate. Terminal abdominal segment longer (figs. 45–48) 24
24. Head fairly broad with temporal angles well marked and a fairly broad neck (fig. 11). Terminal abdominal segment and cerci longer; terminal segment less regularly tapered distally, cerci with a broader base (figs. 45, 46) *A. guttatus* (PAYK.)
- Head narrower with temporal angles more gently curved and a narrower (in absolute terms) neck (fig. 12). Terminal abdominal segment and cerci shorter; terminal abdominal segment more regularly tapered and cerci base markedly narrower (figs. 47, 48) *A. biguttatus* (OL.)

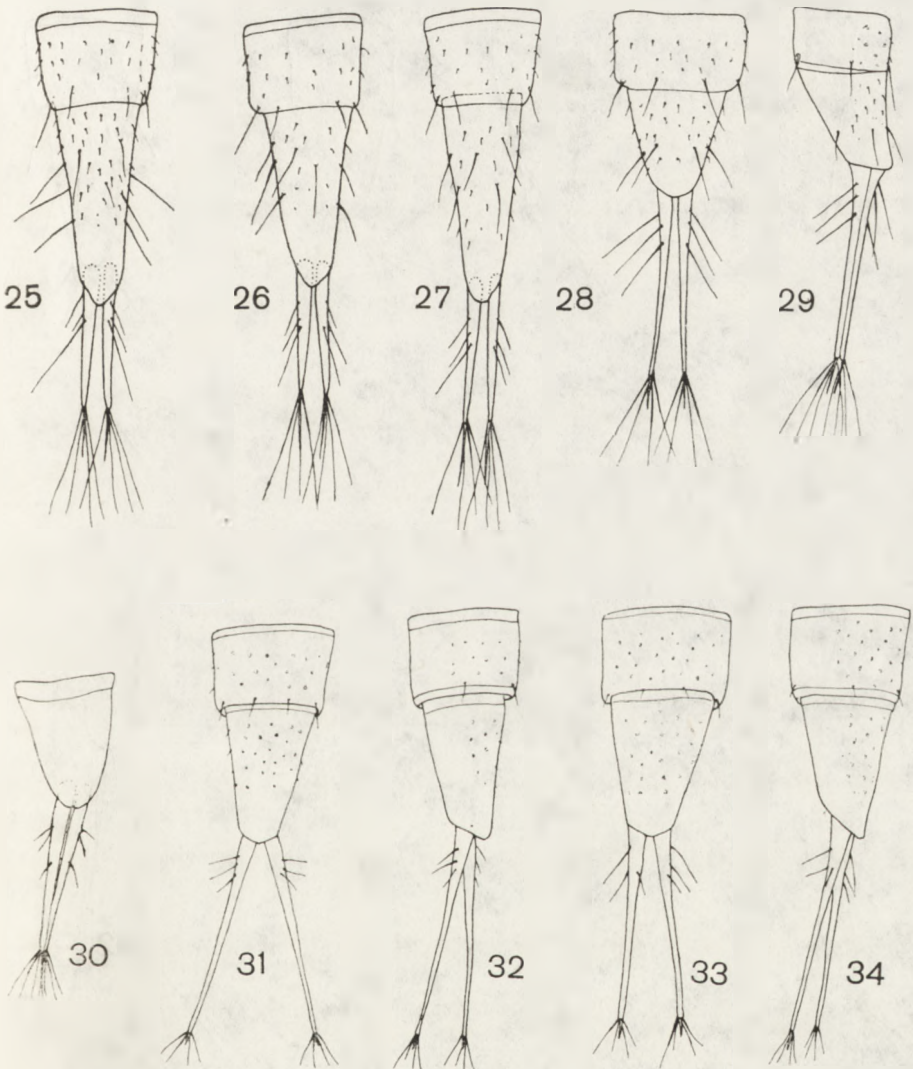
The material for the present work has been collected chiefly in Poland. The collecting was done mainly in the vicinity of Warsaw, in Białowieża, in the Masurian Lake area and in Carpathian Mts. Some of the larvae were also taken in western Germany (Rheinland-Westphalia — vicinity of Krefeld, Schleswig-Holstein — Plön near Kiel) and in Austria (Obergurgl-Oetz-taler Alps). Part of the material has been lent by the Zoological Museum in Copenhagen. I kindly thank Dr. Sv. G. LARSEN — the keeper of the beetles collection in Copenhagen — for the obtained material.



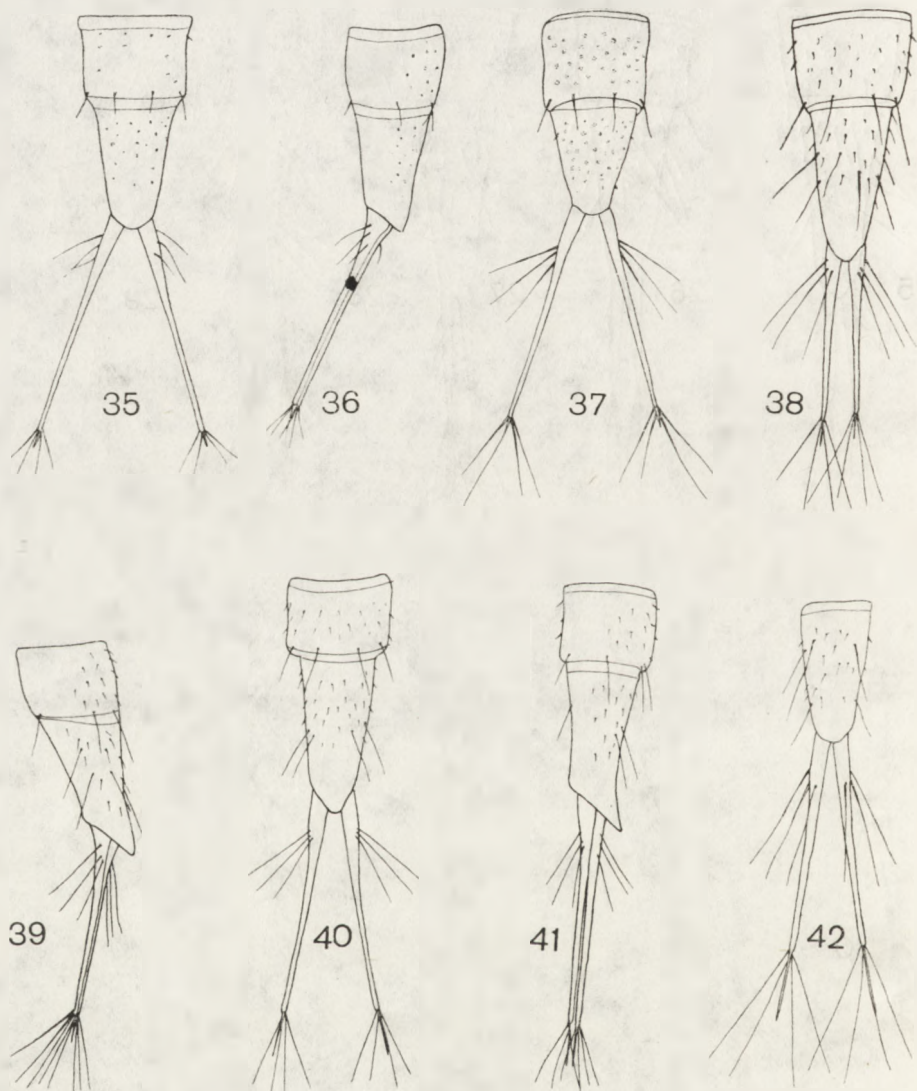
Figs 1-12. Heads of second stage larvae (dorsal view): — *Agabus unguicularis* THOMS., 2 — *A. biguttulus* THOMS., 3 — *A. affinis* (PAYK.), 4 — *A. subtilis* ER., 5 — *A. nigroaeneus* ER., 6 — *A. neglectus* ER., 7 — *A. melanocornis* ZIMM., 8 — *A. melanarius* AUBÉ, — 9 — *A. uliginosus* (L.), 10 — *A. paludosus* (FABR.), 11 — *A. guttatus* (PAYK.), 12 — *A. biguttatus* (OL.).



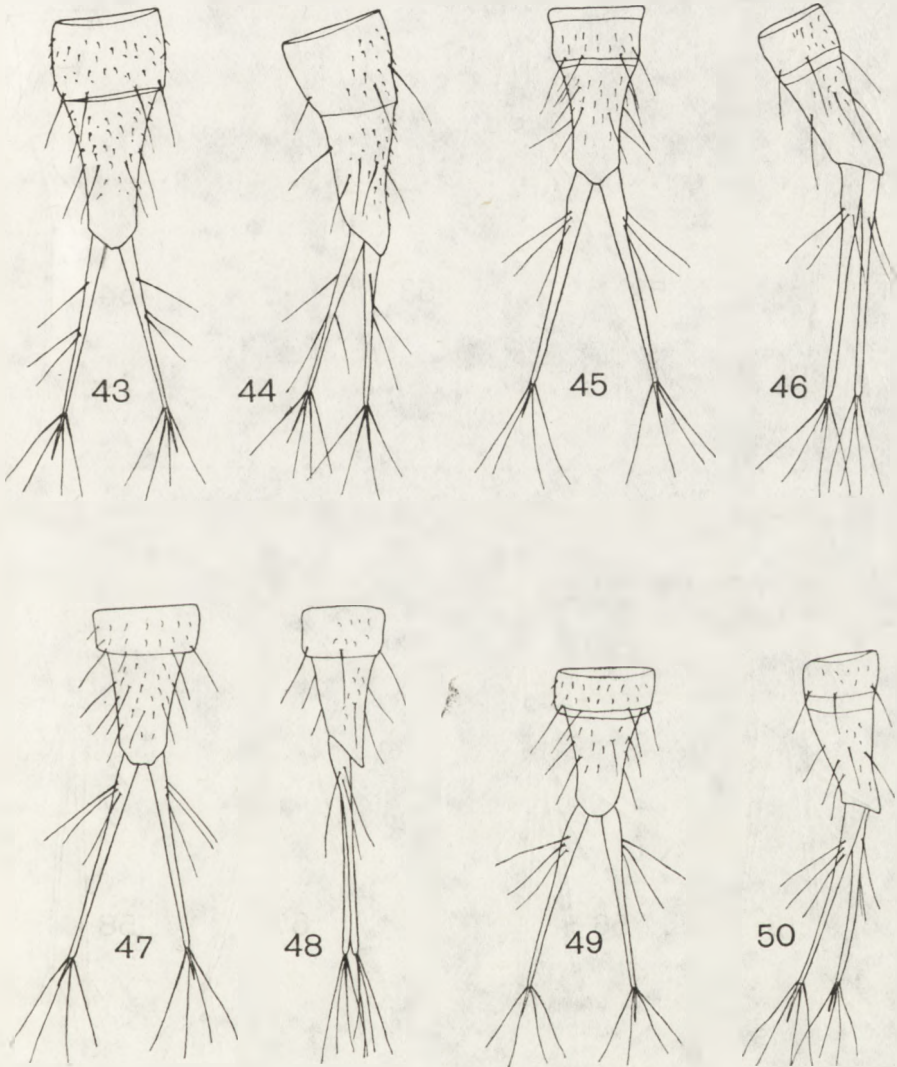
Figs 13-24. Heads of second stage larvae (dorsal view): 13 - *A. gabus solieri* AUBÉ, 14 - *A. bipustulatus* (L.), 15 - *A. fuscipennis* (PAYK.), 16 - *A. wasastjernae* SAHLB. (after NILSSON; temporal spines omitted in the original drawing), 17 - *A. striolatus* (GYLL.) (after NILSSON), 18 - *A. congener* (THUNB.), 19 - *A. didymus* (OL.), 20 - *A. conspersus* (MARSH.), 21 - *A. nebulosus* (FORST.), 22 - *A. sturmi* (GYLL.), 23 - *A. undulatus* (SCHRANK), 24 - *A. labiatus* (BRAHM.).



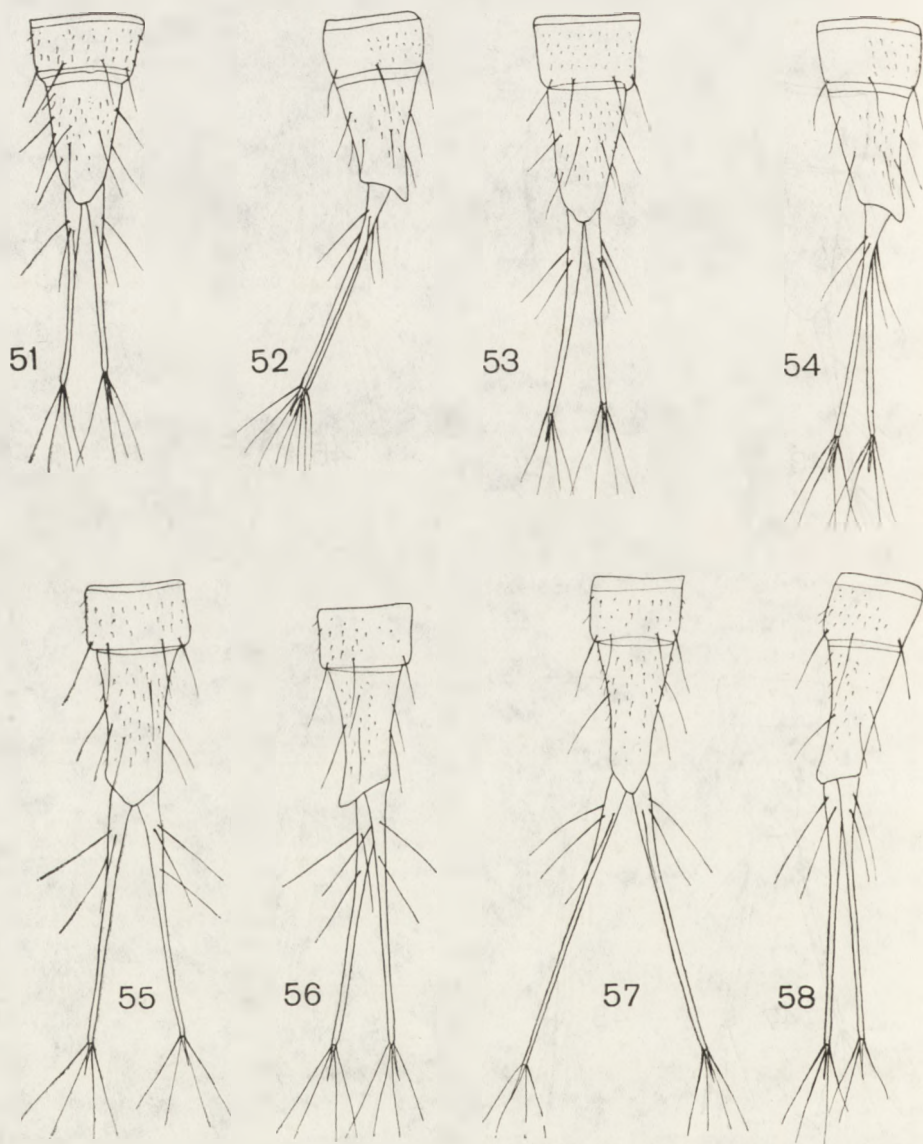
Figs 25-34. Last abdominal segments and cerci of second stage larvae (25-28, 30-33 - dorsal, 29, 32, 34 - lateral view): 25 - *Agabus affinis* (PAYK.), 26 - *A. biguttulus* THOMS., 27 - *A. unguicularis* THOMS., 28, 29 - *A. congener* (THUNB.), 30 - *A. wasastjernae* SAHLB. (after NILSSON), 31, 32 - *A. subtilis* ER., 33, 34 - *A. nigroaeneus* ER.



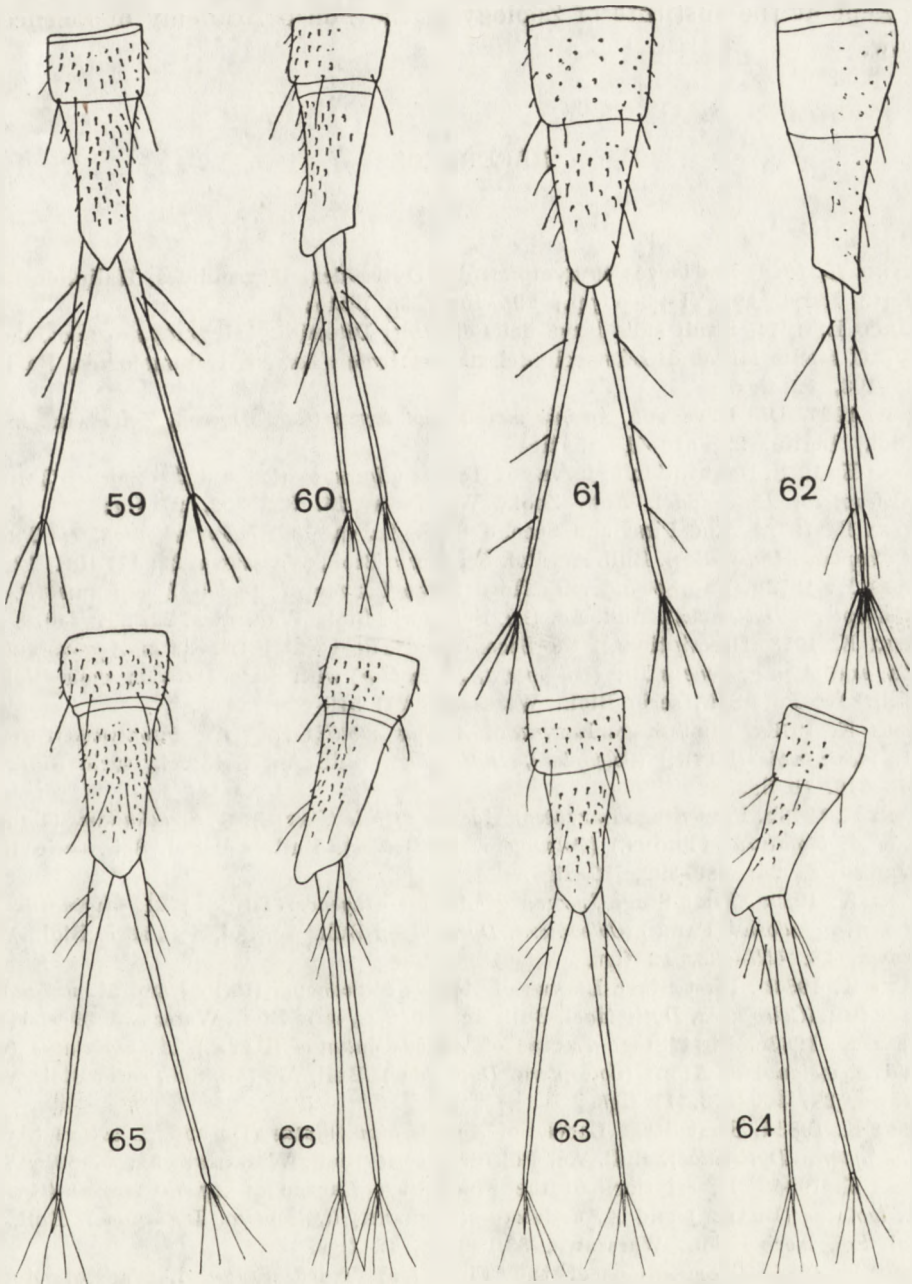
Figs 35-42. Last abdominal segments and cerci of second stage larvae (35, 37, 38, 40, 42, 43 - dorsal, 36, 39, 41 - lateral view): 35, 36 - *Agabus neglectus* ER., 37 - *A. melano-cornis* ZIMM., 38, 39 - *A. melanarius* AUBÉ, 40, 41 - *A. sturmi* (GYLL.), 42 - *A. striolatus* (GYLL.) (after NILSSON).



Figs 43–50. Last abdominal segments and cerci of second stage larvae (43, 45, 47, 49 – dorsal, 44, 46, 48, 50 – lateral view): 43, 44 – *Agabus uliginosus* (L.), 45, 46 – *A. guttatus* (PAYK.), 47, 48 – *A. biguttatus* (OL.), 49, 50 – *A. paludosus* (FABR.).



Figs 51-58. Last abdominal segments and cerci of second stage larvae (51, 53, 55, 57 - dorsal, 52, 54, 56, 58 - lateral view): 51, 52 - *Agabus solieri* AUBÉ, 53, 54 - *A. bipustulatus* (L.), 55, 56 - *A. didymus* (OL.), 57, 58 - *A. labiatus* (BRAHM.).



Figs 59-66. Last abdominal segments and cerci of second stage larvae (59, 61, 63, 65 - dorsal, 60, 62, 64, 66 - lateral view): 59, 60 - *Agabus undulatus* (SCHRANK), 61, 62 - *A. fuscipennis* (PAYK.), 63, 64 - *A. conspersus* (MARSH.), 65, 66 - *A. nebulosus* (FORST.).

The material of my own collecting in Poland, Germany and Austria is being kept at the Institute of Zoology of the Polish Academy of Sciences in Warsaw.

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STRESZCZENIE

[Tytuł: Cechy diagnostyczne larw II stadium środkowoeuropejskich gatunków z rodzaju *Agabus* LEACH (Coleoptera, Dytiscidae)]

Autor omawia cechy diagnostyczne larw II stadium 25 środkowoeuropejskich gatunków z rodzaju *Agabus* LEACH. Poszczególne gatunki różnią się głównie, podobnie jak w III stadium, wielkością i ubarwieniem (głównie głowy), kształtem głowy oraz ostatniego segmentu odwłoka, jak również względną (w stosunku do długości końcowego segmentu odwłoka) długością przysadek odwłoka, oraz rozmieszczeniem i długością szczecinek cerkalnych i tergalnych — zwłaszcza ostatniego segmentu odwłoka. Klucz do oznaczania larw uzupełnia przegląd omawianych cech diagnostycznych.

РЕЗЮМЕ

Заглавие: Диагностические признаки личинок II стадии центрально европейских видов из рода *Agabus* LEACH (Coleoptera, Dytiscidae)]

Автор обсуждает диагностические признаки личинок II стадии 25 видов. Виды различаются в основном, так само, как в III стадии, по величине и окраске (главным образом головы), по форме головы и последнего сегмента брюшка, а также относительной (по отношению к длине последнего сегмента брюшка) длиной придатков брюшка как и размещением и длиной церкальных и тергалных щетинок, особенно на последнем сегменте. Обзор рассматриваемых диагностических признаков дополнен ключем для определения личинок.