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

[With 66 Text-figures]

Abstract. The overall body size, the shape of head and of the last abdominal segment, the length of cerci and of the tergal and cercal setae, the distribution of cercal setae, as well as width of thoracic and abdominal terga, are the main characters distinguishing particular species. In addition to discussion of the value of particular characters given, the autor provides a key to the identification of the larvae in question.

By contrast to the third stage larvae (BERTRAND, 1928; DE MARCO, 1973; GALEWSKI, 1977, 1980), the larvae of the first stage are relatively poorly known. Recently (GALEWSKI, 1978a,b; 1981a-c; 1982a,b; 1983). I have presented several descriptions. Some of the larvae have been described by BERTRAND (1928) and by DE MARCO (1974), but the descriptions by the former author contain little which could be used in the separation of species. Having at last gathered the necessary material some of which has been lent by the British Museum (Natural History) in London and by the Zoological Museum in Copenhagen, I am able to review diagnostic characters of larvae of almost all (25) species (exception is very rare *A. clypealis* THOMS.) occurring in Central Europe and to give a key to their identification.

DIAGNOSTIC CHARACTERS OF LARVAE

By contrast to the larvae of the third stage, the size of the first stage larvae does not appear to be correlated with that of the adults. Thus, for instance, *A. fuscipennis* (PAYK.) the adults of which are distinctly smaller than either

those of *A. bipustulatus* (L.), *A. subtilis* Er. or *A. nigroaeneus* Er., shows definitely a larger size — a larger head and wider terga in the first larval stage — than the species mentioned: it is undoubtedly the largest larva in that stage in Europe. *A. bipustulatus* (L.), on the other hand, appears not to be much bigger than either *A. melanarius* Aubé or *A. biguttatus* (Ol.) — species which are undoubtedly much smaller in the imaginal stage. A further example may furnish *A. sturmi* (Gyll.) the larvules of which are not only smaller than those of *A. paludosus* (Fabr.) or *A. congener* (Thunb.) (slightly smaller species) but also those of *A. affinis* (Payk.) group — the smallest in the adult stage in Europe. One thus has to be careful in inferring a larger or smaller size of the adult (and hence the species identity) from the analogous size of the larvae. The dimensions here are fully independent, but, certainly as a fairly constant feature they may help in the separation of species.

THE RELATIVE SIZE AND SHAPE OF HEAD

The shape of head belongs certainly to the most important taxonomic characters showing a differentiation which surpasses even that of the third stage. A broadly triangular in outline head separates at the first sight the larvae of the *A. affinis* (Payk.) group and the larva of *A. striolatus* (Gyll.) from those of all other species; better marked temporal angles and a narrower neck are additional features distinguishing *A. striolatus* (Gyll.) from its counterparts. By contrast, a narrowly triangular — slightly ovoid — head characterizes the larvae of *A. bipustulatus* (L.), *A. conspersus* (Marsh.), *A. nebulosus* (Forst.), *A. didymus* (Ol.), *A. undulatus* (Schrank), and *A. labiatus* (Brahm). Still in other species — *A. solieri* Aubé, *A. nigroaeneus* Er., *A. subtilis* Er. and *A. uliginous* (L.), the head is more trapezoid with diverging anteriorad sides but with more or less well marked temporal angles. An inversely trapezoid head — with converging anteriorad sides — is found, by contrast, in *A. paludosus* (Fabr.). In some other species the head is rather subrectangular with parallel or subparallel sides, and to this group belong *A. fuscipennis* (Payk.), *A. guttatus* (Payk.), *A. biguttatus* (Ol.), *A. congener* (Thunb.), as well as *A. chalconotus* (Panz.), and *A. melanocornis* Zimm. The latter two, though, display a markedly broad neck which sets them apart from all remaining species. Finally, in *A. sturmi* (Gyll.) the head appears slightly roundish. There are, of course, some differences within the particular groups of species, but a certain specific variability must be always reckoned with, which may make the identification more difficult. This character should, therefore, be always corroborated — in particular in case of separation a closely related, similar species — by other features.

The size of head — relative to the size of the larvae — may constitute some help in identification. Thus, in some species e. g. in *A. sturmi* (Gyll.), *A. uliginosus* (L.), *A. biguttatus* (Ol.) or *A. paludosus* (Fabr.), the head appears visibly to be smaller than in others such as *A. melanarius* Aubé, *A. fuscipennis*

(PAYK.), *A. bipustulatus* (L.), *A. striolatus* (GYLL.), or in *A. affinis* (PAYK.) group. Most of species, however, display a head of a somewhat intermediate size and the differences here seem to be rather too subtle to be of some value. A various degree of larval growth and some variability bring some additional confusion.

THE COLOURING OF HEAD

By contrast to the third stage larvae which display an elaborate pattern of pale or dark spots, patches or stripes, the head of first stage larvae of a majority of species is mostly uniformly dark with hardly two pale spots or dark marks on clypeus, if at all. Some species, however, show a contrasting pattern of dark longitudinal bands, the ground-colour remaining very pale, namely *A. labiatus* (BRAHM) and *A. undulatus* (SCHRANK) which can also be perfectly separated on the basis of the bands form, in addition to their head shape. In some other species, e. g. in *A. sturmi* (GYLL.), *A. didymus* (OL.) and to a lesser degree in *A. conspersus* (MARSH.) and *A. nebulosus* (FORST.), the head shows a pattern of dark and pale patches, spots or stripes which may be a first indice as to the species identity but which should be corroborated by other characters as it often subject to a fair degree of variation.

THE LENGTH OF HEAD APPENDAGES

The differences are here minute and difficult to perceive, so I have renounced of this character in my key. Generally, the larvae with a more elongate head have longer antennae and palpi than those with a shorter head. The length of mandibles, conversely, is positively correlated with the width of head — and the larvae with a wide "triangular" head display the longest and narrowest mandibles, whereas those with a contracted anteriorly head shown a relatively short organ in question.

THE SHAPE AND SETATION OF TERGA

The shape of terga, in particular the thoracic ones, may be a valuable help in identification. In some species with a fairly wide "plump" body e. g. in *A. fuscipennis* (PAYK.) *A. striolatus* (GYLL.), *A. solieri* (AUBÉ), *A. chalconotus* (PANZ.), *A. melanocornis* ZIMM., *A. congener* (THUNB.), *A. paludosus* (FABR.), *A. guttatus* (PAYK.) or *A. biguttatus* (OL.), the anterior terga are much wider than head (when flattened under cover glass), while in other — relatively slender, slim larvae — e. g. *A. undulatus* (SCHRANK), *A. labiatus* (BRAHM), *A. nebulosus*

(FORST.), *A. conspersus* (MARSH.), *A. didymus* (OL.) or even in *A. melanarius* AUBÉ terga are definitely narrower — their width exceeds only slightly that of head. There are, of course, certain differences between particular species within each category, but they are in most cases relatively small [the separation of *A. paludosus* (FABR.), *A. guttatus* (PAYK.) and *A. biguttatus* (OL.) seems to be a notable exception: their markedly short — stripe-like abdominal terga proved to be of a paramount importance in identification] and one would be better adviced here to resort to other more conspicuous features in identification.

The tergal setation, particularly that of the posterior abdominal segments offer sometimes a very good indication of the species identity. Thus certain larvae display very long, well developed crinal setae on their terga — the terminal ones being much longer than the tergum — and here belong *A. undulatus* (SCHRANK), *A. labiatus* (BRAHM), *A. nebulosus* (FORST.), *A. conspersus* (MARSH.), *A. didymus* (OL.), *A. paludosus* (FABR.), *A. bipustulatus* (L.), *A. solieri* AUBÉ or *A. sturmi* (GYLL.). In others, e. g. in *A. melanarius* AUBÉ, *A. chalconotus* (PANZ.), *A. melanocornis* ZIMM., *A. uliginosus* (L.) and *A. congener* (THUNB.), the crinal setae are visibly shorter — the terminal scarcely longer than the tergum. In still others — *A. subtilis* ER., *A. nigroaeneus* ER. or *A. fuscipennis* (PAYK.), the crinal setae are strongly reduced, the terminal ones measuring only a fraction of length of the tergum — in the first two species barely 1/4–1/5 of the tergum length, in the last about 1/3–1/2 of that length, and this may conform largely to the conditions found in the third stage larvae as well.

THE SHAPE OF THE TERMINAL ABDOMINAL SEGMENT

Several distinct groups of larvae can be distinguished here, similarly as in the third stage, which may certainly be related to the most varied larval environment and mode of respiration (GALEWSKI, 1971). The longest organ in question — of a markedly elongate, slender conical form — up to two and a half times as long as broad at base — belong clearly to the larvae of *A. affinis* (PAYK.) group as well that of *A. striolatus* (GYLL.). Next, as far as elongation and slenderness go, are certainly the larvae of *A. undulatus* (SCHRANK) and to a lesser degree those of *A. labiatus* (BRAHM), *A. nebulosus* (FORST.) and *A. conspersus* (MARSH.) which show an abdominal segment about a twice as long as broad at base. An elongate but fairly robust terminal abdominal segment — one and a half to one and three quarters as long as broad at base, is found in *A. fuscipennis* (PAYK.), *A. subtilis* Er., *A. nigroaeneus* Er. and in *A. uliginosus* (L.). In other species the organ involved is still shorter — barely a third longer than broad at base. To this group belong *A. bipustulatus* (L.), *A. neglectus* Er., *A. guttatus* (PAYK.), *A. biguttatus* (OL.), *A. paludosus* (FABR.) and *A. congener* (THUNB.). Finally, in *A. chalconotus* (PANZ.) and *A. melanocornis* ZIMM. the

terminal abdominal segment is markedly truncate with an hardly developed apex — barely longer than broad at base — clearly the shortest in the genus.

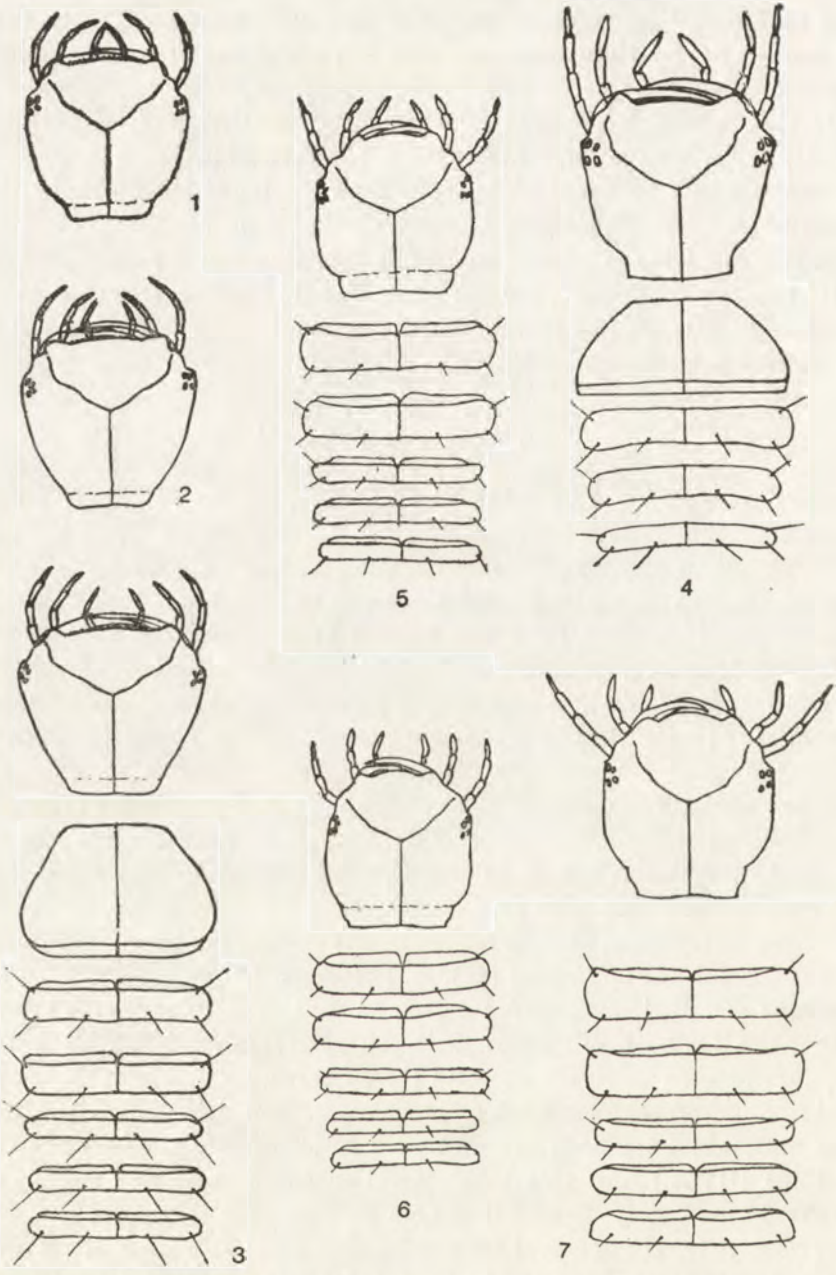
There are certainly some differences amongst species in particular groups chiefly in the degree of prominence of the apex, concavity of lateral walls etc., but mostly they are subtle and prone to variation.

In general, the terminal abdominal segment constitutes one of the most reliable criteria on which a main "sorting out" of a proper group of species can be based. It is certainly of a lesser use in the identification of particular species — especially the closely related, similar ones, but in some instances it can be applied with a great avail (for instance in the separation of *A. subtilis* Er. and *A. nigroaeneus* Er.).

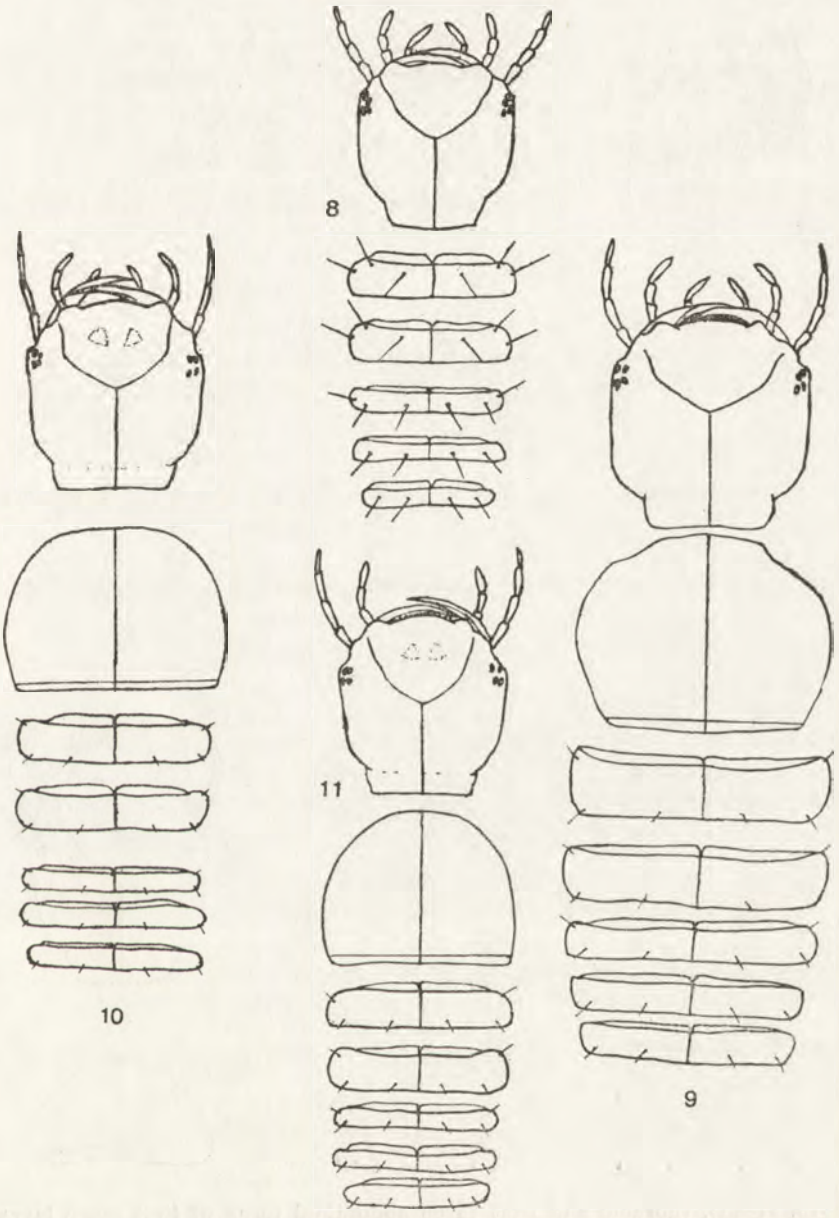
THE LENGTH OF CERCI

The differences, like in the last instar larvae, are very strongly pronounced and belong to the most reliable features in identification. They do not seem to be correlated in any fixed way with the length of the terminal abdominal segment and most various length relations can be found here facilitating greatly the separation of species. Thus the longest cerci — two and a half times to three times as long as a moderately elongate last abdominal segment, are found in *A. fuscipennis* (Payk.), *A. undulatus* (Schrank), *A. labiatus* (Brahm) and in *A. nebulosus* (Forst.). The cerci of a median length about twice as long as terminal abdominal segment — which seems to be shorter than in the first group — are encountered in the most of species: *A. bipustulatus* (L.), *A. solieri* Aubé (less elongate segment), *A. subtilis* Er., *A. nigroaeneus* Er., *A. congener* (Thunb.), *A. didymus* (Ol.), *A. sturmi* (Gyll.) and in *A. conspersus* (Marsh.) (more elongate segment). The group with short cerci (one and a half times to twice as long as terminal abdominal segment) and a short terminal abdominal segment comprises *A. uliginosus* (L.), *A. paludosus* (Fabr.), *A. guttatus*(Payk.), *A. biguttatus* (Ol.), *A. melanarius* Aubé, as well as *A. chalconotus* (Panz.) and *A. melanocornis* Zimm. — species with shortest, stubby terminal segment. Finally, larvae with fairly short cerci (basal cercal joint about as long as the terminal abdominal segment) but a strongly elongate (the longest in the genus) terminal abdominal segment are met with in *A. affinis* (Payk.) group and in *A. striolatus* (Gyll.) and this most peculiar combination of characters tells the larvae immediately from all others in the genus.

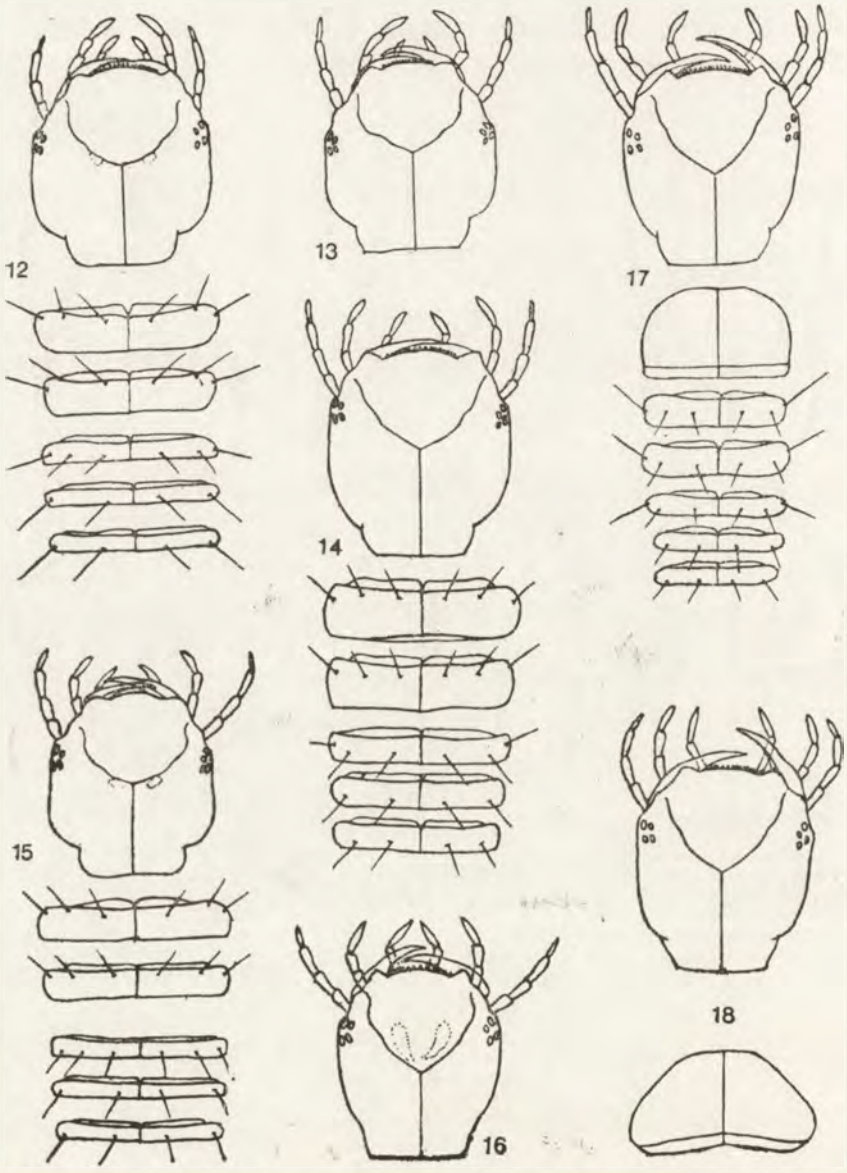
The relative length of cercal segments: the basal (proximal) or main segment and the apical (distal) one, may be very helpful in identification. Thus, in the larvae with relatively shortest cerci — *A. affinis* (Payk.) and its relatives, as well as in *A. striolatus* (Gyll.), the apical cercal segment is the longest, in the former species about as long as the basal segment, in the latter of up to 3/4 of that length. In other larvae the apical segment is visibly shorter. Thus, in species with the longest cerci: *A. undulatus* (Schrank). *A. labiatus* (Brahm), *A. nebu-*



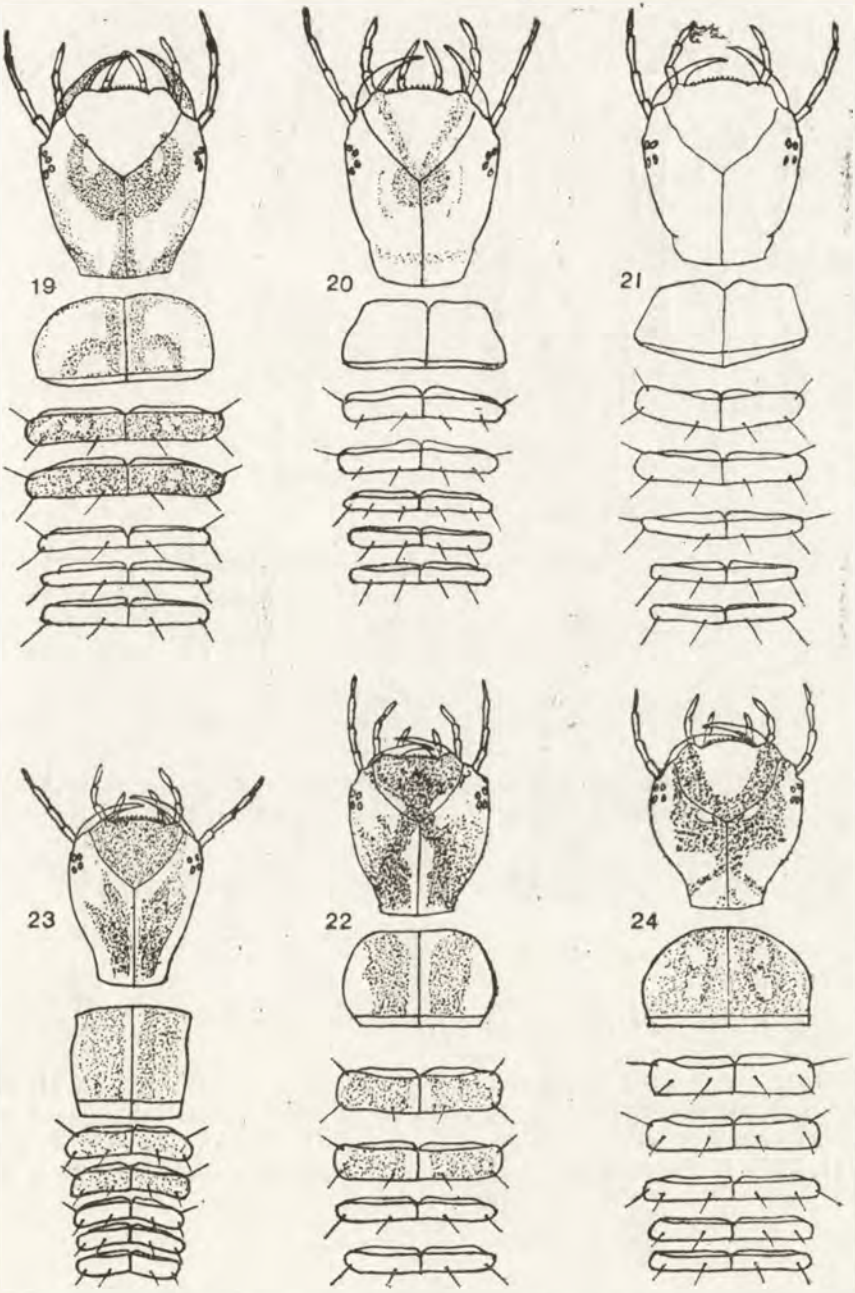
Figs. 1–7. Heads, thoracic and first three abdominal terga of first stage larvae (dorsal view): 1 — *Agabus biguttulus* THOMS. (head only), 2 — *A. affinis* (PAYK.) (head only), 3 — *A. unguicularis* THOMS., 4 — *A. striolatus* (GYLL.), 5 — *A. melanocornis* ZIMM., 6 — *A. chalconotus* (PANZ.), 7 — *A. congener* (THUNB.).



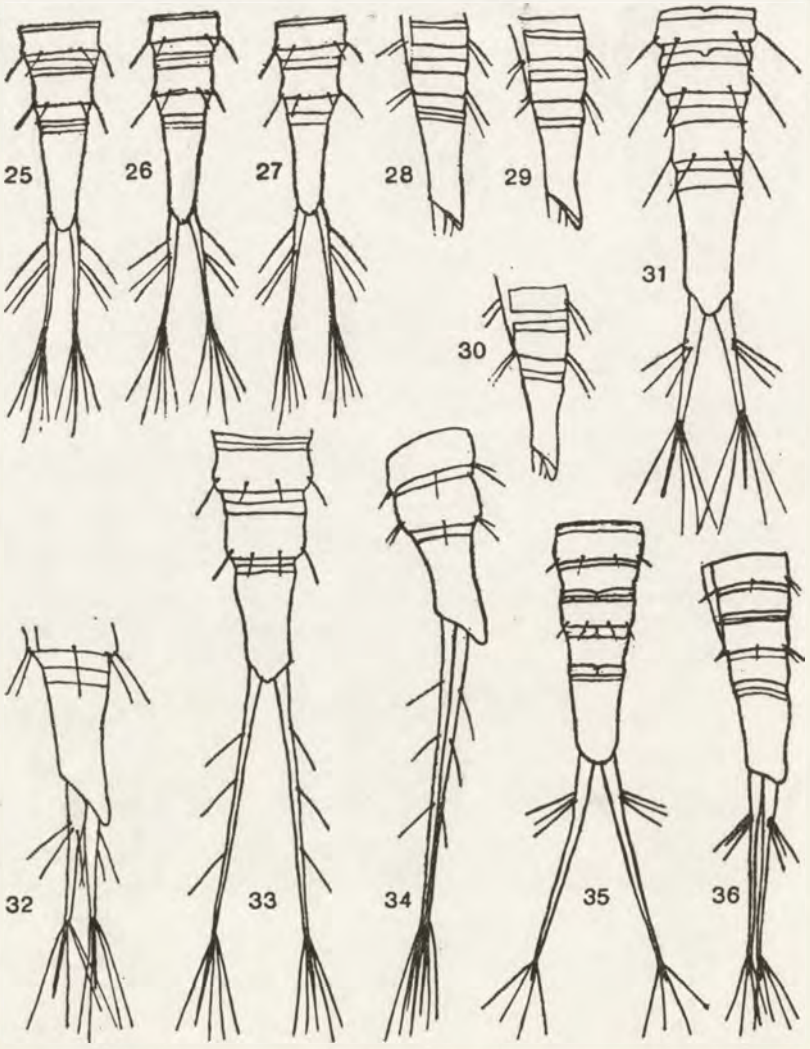
Figs. 8–11. Heads, thoracic and first three abdominal terga of first stage larvae (dorsal view): 8 — *Agabus uliginosus* (L.), 9 — *A. fuscipennis* (Payk.), 10 — *A. nigroaeneus* Er., 11 — *A. subtilis* Er.



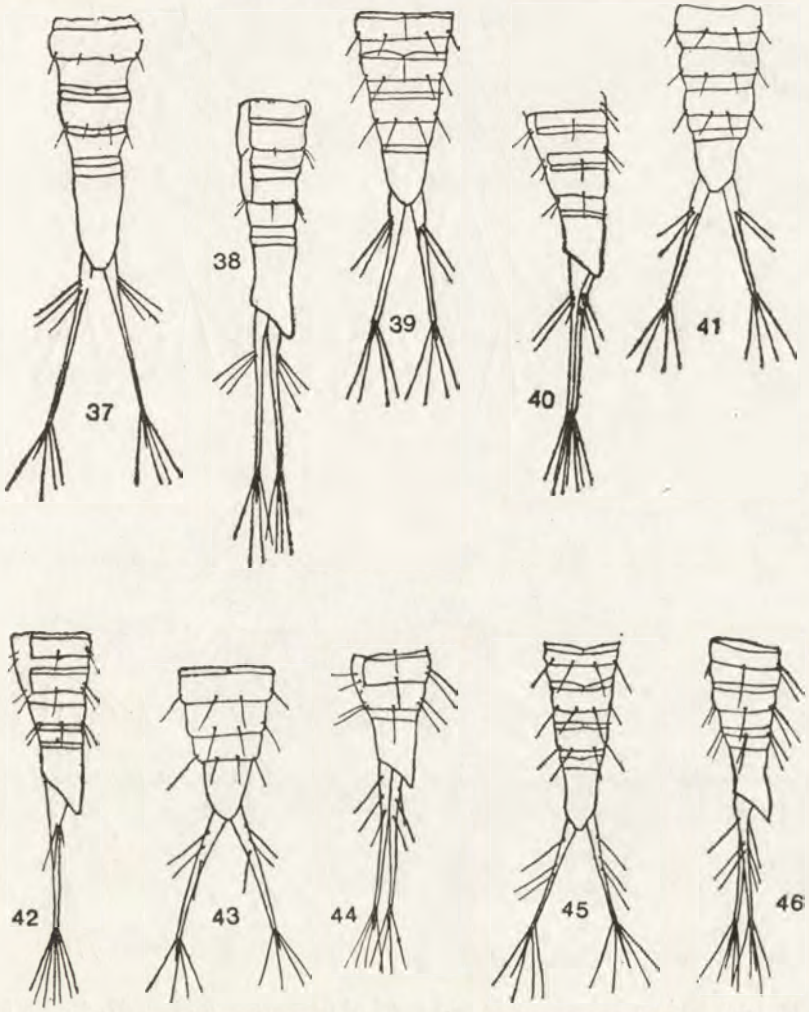
Figs. 12–18. Heads, thoracic and first three abdominal terga of first stage larvae (dorsa view): 12 — *Agabus guttatus* (Payk.), 13 — *A. biguttatus* (Ol.) (head only), 14 — *A. melanarius* Aubé, 15 — *A. paludosus* (Fabr.), 16 — *A. wasastjernae* Sahlb., after Nilsson (head) 17 — *A. bipustulatus* (L.), 18 — *A. solieri* Aubé (head and pronotum).



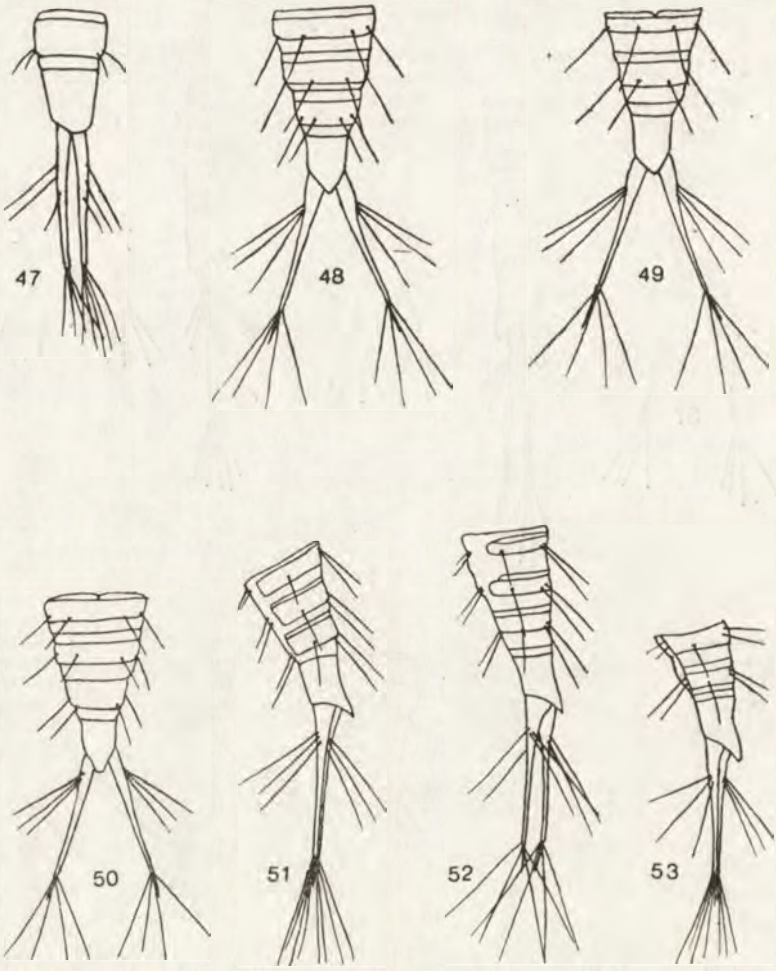
Figs. 19–24. Heads, thoracic and first three abdominal terga of first stage larvae (dorsal view): 19 – *Agabus didymus* (OL.), 20 – *A. nebulosus* (FORST.), 21 – *A. conspersus* (MARSH.), 22 – *A. undulatus* (SCHRANK), 23 – *A. labiatus* (BRAHM), 24 – *A. sturmi* (GYLL.).



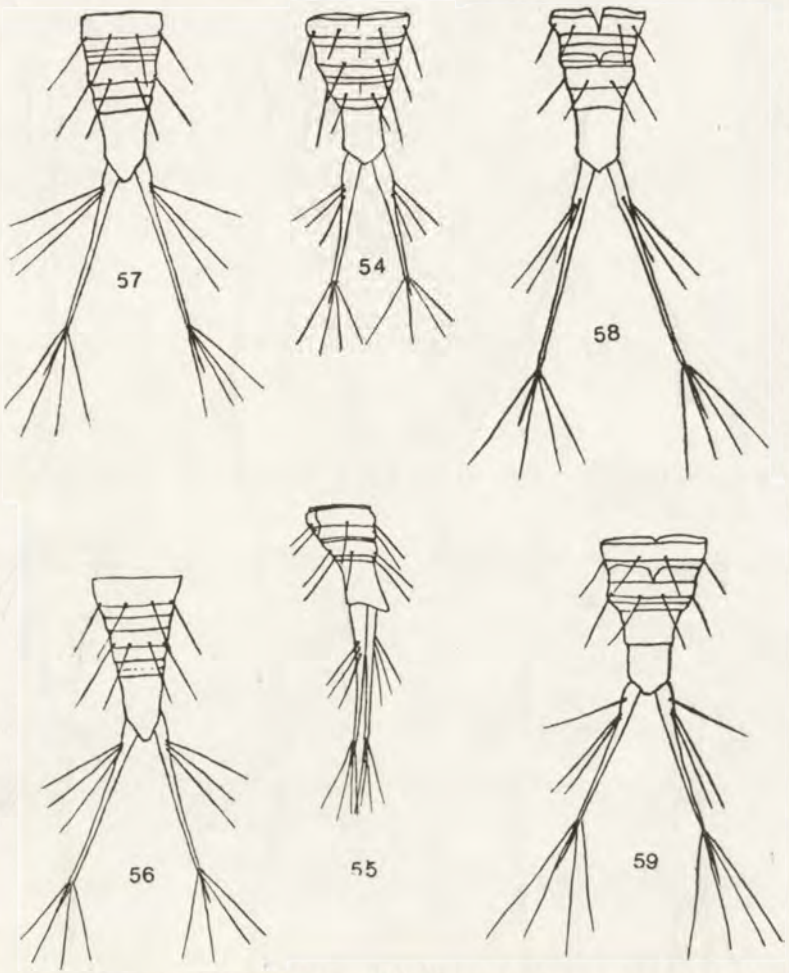
Figs. 25–36. Last abdominal segments and cerci of first stage larvae. 25–27, 31, 33, 35 — dorsal view, 28–30, 32, 34, 36 — lateral view, 28–30 — last abdominal segment only. 25, 28 — *Agabus unguicularis* THOMS., 26, 29 — *A. affinis* (PAYK.), 27, 30 — *A. biguttulus* THOMS., 31, 32 — *A. striolatum* (GYLL.), 33, 34 — *A. fuscipennis* (PAYK.), 35, 36 — *A. nigroaeneus* ER.



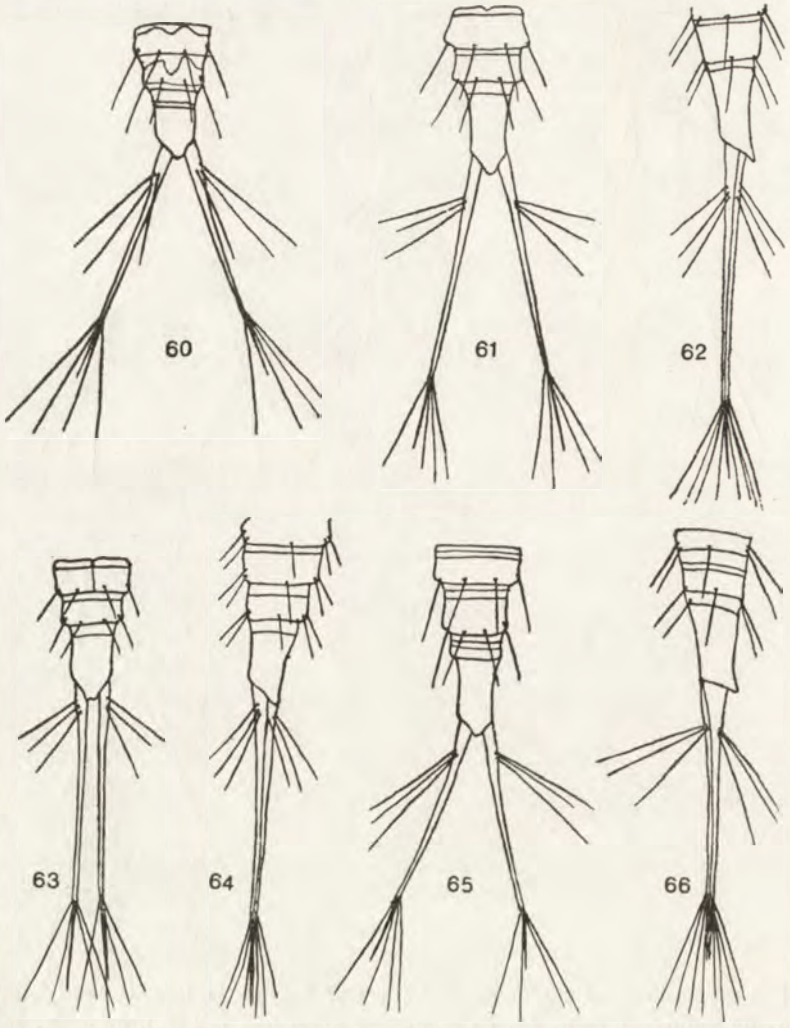
Figs. 37–46. Last abdominal segments and cerci of first stage larvae. 37, 41, 43 – dorsal view, 38, 40, 42, 44, 46 – lateral view. 37, 38 – *Agabus subtilis* ER., 39, 40 – *A. melanocornis* ZIMM., 41, 42 – *A. chalconotus* (PANZ.), 43, 44 – *A. congener* (THUNB.), 45, 46 – *A. uliginosus* (L.).



Figs. 47–53. Last abdominal segments and cerci of first stage larvae. 47, 48–50, 54 – dorsal view, 51–53, 55 – lateral view. 47 – *Agabus wasastjernae* (Sahlb.), 48, 51 – *A. guttatus* (Payk.), 49, 52 – *A. biguttatus* (Ol.), 50, 53 – *A. melanarius* Aubé.



Figs. 54–59. Last abdominal segments and cerci of first stage larvae. 54, 56, 57, 58, 59 — dorsal view, 55 — lateral view. 54, 55 — *Agabus paludosus* (FABR.), 56 — *A. solieri* AUBÉ, 57 — *A. bipustulatus* (L.), 58 — *A. nebulosus* (FORST.), 59 — *A. didymus* (OL.).



Figs. 60–66. Last abdominal segments and cerci of first stage larvae. 60, 61, 63, 65 – dorsal view, 62, 64, 66 – lateral view. 60 – *Agabus conspersus* (MARSH.), 61, 62 – *A. undulatus* (SCHRANK), 63, 64 – *A. labiatus* (BRAHM), 65, 66 – *A. sturmi* (GYLL.).

losus (FORST.), *A. fuscipennis* (PAYK.), as well as in some of those with cerci of medium length: *A. bipustulatus* (L.), *A. solieri* AUBÉ, *A. sturmi* (GYLL.), *A. conspersus* (MARSH.), *A. didymus* (OL.), and in some with short cerci: *A. guttatus* (PAYK.) and *A. biguttatus* (OL.), the apical segment is one fifth to one third as long as the basal one; the only exception in this last group is *A. uliginosus* (L.) in which the said segment measures up to a half of length of the basal one. In all other larvae the apical segment is strongly reduced, barely one eight to one tenth of the basal segment length, often a hardly visible, stubby process.

THE LENGTH AND DISTRIBUTION OF CERCAL SETAE

The distribution of cercal setae belongs certainly to the most important and reliable characters and allows an easy and quick identification of many species. Thus, broadly spaced proximal setae in *A. fuscipennis* (PAYK.) identify that species at the first sight. Less loosely bot fairly regularly distributed at cercus base proximal setae of *A. congener* (THUNB.), and the widely separated basal seta from two other proximal ones in anterior half of cercus in *A. uliginosus* (L.), *A. didymus* (OL.), as well as in *A. affinis* (PAYK.) group, are a good indication of their identity (in the *A. affinis* (PAYK.) group, though, other characters must be used to separate particular species). In all other species the proximal cercal setae are more or less concentrated at cercus base and the differences between species are rather subtle and to not suffice to identify them.

The difference in the length of cercal setae may also facilitate identification of certain species. Thus, very inconspicuous, hardly a quarter as long as the basal cercal segment or even shorter proximal setae characterize *A. subtilis* ER., *A. nigroaeneus* ER. and *A. fuscipennis* (PAYK.). Longer than in the preceding group., but still barely one third as long as the basal segment or cercus, proximal setae, distinguish *A. chalconotus* (PANZ.), *A. melanocornis* ZIMM., *A. congener* (THUNB.) and *A. uliginosus* (L.). In remaining species the setae in question are much better developed — at least half as long (at least proximal setae) as the basal cercal segment and sometimes of up to 3/4 or more of the cercus main segment length. The differences, though, within each group are of a lesser nature and do not suffice, most often to an identification. Of a certain help here may be a differentiation of proximal setae; if some of the species e. g. in *A. nebulosus* (MARSH.) one of these setae is markedly shorter than others and constitute an additional reliable feature in the separation of the related *A. didymus* (OL.) and *A. conspersus* (MARSH.).

KEY TO FIRST STAGE LARVAE

1. Head with longitudinal dark markings or bands (Figs. 22, 23) 2
—. Head without longitudinal markings or bands 3

2. Dark bands on head strongly diverging, appearing together with the dark clypeal mark as an irregular X-shaped pattern (Fig. 22) . . . . . *undulatus* (SCHRANK)
—. Dark bands on head almost parallel and near to each other (Fig. 23) . . . . . *labiatus* (BRAHM)
3. Head broadly triangular in outline (Figs. 1–4). Terminal abdominal segment strongly elongate. Cerci main segment not longer than terminal abdominal segment (Figs. 25–27, 31) 4
—. Head of a different shape (Figs. 8–21, 24). Terminal abdominal segment markedly shorter. Cerci main segment noticeably longer than terminal abdominal segment (Figs. 33–60, 65, 66) 7
4. Cerci shorter and more robust, cercal proximal setae concentrated (Figs. 31–32). Larger larva: head length 0.90–0.95 mm . . . *striolatus* (GYLL.)
—. Cerci longer and thinner, cercal proximal setae spaced. (Figs. 25–30). Smaller larvae: head length 0.60–0.65 mm 5
5. Head small, slightly roundish (Fig. 1) . . . . . *biguttulus* (THOMS.)
—. Head larger, more distinctly triangular (Figs. 2, 3) 6
6. Head narrower (Fig. 2), last abdominal segment and cerci shorter (Figs. 26, 29) . . . . . *affinis* (PAYK.)
—. Head broader (Fig. 3), last abdominal segment and cerci longer (Figs. 25, 28) . . . . . *unguicularis* (THOMS.)
7. Proximal cercal setae very broadly spaced — along the whole cercus length (Figs. 33, 34) . . . . . *fuscipennis* (PAYK.)
—. Proximal cercal setae grouped in basal half of cercus (Figs. 33–60, 65, 66) 8
8. Proximal cercal setae arranged more loosely (Figs. 43–47) 9
—. Proximal cercal setae concentrated at cercus base (Figs. 35–42, 48–60, 65, 66) 12
9. Basal (anterior) setae isolated from the other two (Figs. 45, 46) 11
—. Setae distributed more regularly (Figs. 43, 44, 47) 10
10. Head broader, with temporal angles well marked (Fig. 7) . . . . . *congener* (THUNB.)
—. Head narrower, with temporal angles hardly discernible (Fig. 16) . . . . . *wasastjernae* (SAHLB.)
11. Head broader, subrectangular, uniformly brownish (Fig. 8). Terminal abdominal segment elongate; tergal and cercal setae shorter (Figs. 45, 46) . . . . . *uliginosus* (L.)
—. Head narrower, slightly oval in outline and with a distinct colour-pattern (Fig. 19). Terminal abdominal segment short, and tergal and cercal setae longer (Fig. 59) . . . . . *didymus* (OL.)
12. Head with a distinct colour-pattern (Figs. 20, 24) 13
—. Head more or less dark 14
13. Head roundish (Fig. 24). Cerci shorter, main segment hardly twice as long as terminal abdominal segment (Figs. 65, 66) . . . . *sturmi* (GYLL.)
—. Head elongate (Fig. 20). Cerci longer, main segment at least three times as long as terminal abdominal segment (Fig. 58) . . . *nebulosus* (FORST.)

14. Head ovoid or subovoid, well rounded at sides, with barely distinct tempora angles (Figs. 17, 18, 21) 15
—. Head subrectangular or trapezoid, with temporal angles more or less conspicuous (Figs. 5, 6, 12–15) 17
15. Larger larvae: head length 1.0–1.2 mm, length of full grown larvae 6.0–6.5 mm. Terminal abdominal segment slightly conical (Figs. 56, 57). Proximal inner seta about 3/4 of cercus main segment length (Figs. 56, 57). Terga broader (Figs. 17, 18) 16
—. Smaller larvae: head length 0.6–0.7 mm, length of full grown larvae 4.0–4.2 mm. Terminal abdominal segment subquadrate (Fig. 60). Proximal inner seta hardly half as long as cercus main segment (Fig. 60) . . . . . *conspersus* (MARSH.)
16. Head slightly shorter with gently arcuate sides and with a slightly shorter and broader neck (Fig. 17). Terminal abdominal segment more "stubby" with slightly concave walls (Fig. 57). Crinal tergal setae shorter . . . . . *bipustulatus* (L.)
—. Head slightly longer with slightly more curved sides at base and slightly longer and narrower neck (Fig. 18). Terminal abdominal segment narrower with hardly concave walls (Fig. 56). Tergal crinal setae longer . . . . . *solieri* AUBÉ.
17. Terminal abdominal segment short, "stubby" with acuminate apex (Figs. 39–42, 48–56). Tergal setae conspicuous, the terminal at least half as long as the tergum (Figs. 5, 6, 12–15, 39–42, 48–56). Head with parallel or converging anteriorad sides (Figs. 5, 6, 2-15)[1] 18
—. Terminal abdominal segment more or less elongate with rounded apex (Figs. 35–38). Tergal setae inconspicuous, the terminal 1/4 or 1/5 of tergum length (Figs. 10. 11, 35–38). Head with diverging anteriorad sides (Figs. 10, 11) 23
18. Neck very wide and short, of about 3/4 of head width and up to 6 times as wide as long (Figs. 5, 6). Tergal and cercal setae fairly short; terminal tergal setae barely as long as the tergum (Figs. 5, 6, 39–42), proximal cercal setae at most half as long as cercus main segment (Figs. 39–42) 19
—. Neck markedly narrower, hardly 2/3 or less of head width and scarcely 4 times as wide as long (Figs. 12–15). Tergal and cercal setae longer, terminal tergal setae longer than the tergum and proximal cercal setae at least 2/3 of cercus main segment (Figs. 12, 15, 48–55) 20
19. Head narrower at base (Fig. 6). Tergal and proximal cercal setae shorter, the latter about 1/3 as long as cercal main segment (Figs. 6, 41, 42). Terminal abdominal segment with a longer apex (Figs. 41, 42) . . . . . *chalconotus* (PANZ.)
—. Head broader at base (Fig. 5). Tergal and proximal cercal setae longer, the latter up to a half of cercus main segment length (Figs. 5, 39, 40). Terminal abdominal segment more "stumpy" with a shorter apex (Figs. 39, 40) . . . . . *melanocornis* ZIMM.

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[1] In Italian specimens of *A. melanocornis* ZIMM., the head is visibly contracted anteriorly, whereas in specimens from England of that species the head sides are almost parallel.

20. Head relatively short with sides strongly curved at base and temporal angles well marked (Figs. 12, 13, 15). Terga, in particular the abdominal ones, markedly short, tergal and cercal setae robust and very long (Figs. 12, 13, 15, 48–52, 54, 55). Terminal abdominal segment truncate (Figs. 48–52, 54, 55) 21

—. Head longer with sides gently curved at base and temporal angles hardly perceptible (Fig. 14). Terga, in particular the abdominal ones, visibly longer, tergal and cercal setae much thinner and shorter (Figs. 14, 50, 53). Terminal abdominal segment slightly conical (Figs. 50, 53) . . . . . *melanarius* Aubé

22. Head sides converging anteriorad, neck narrower (Fig. 15). Terminal abdominal segment narrower at base with a shorter apex (in dorsal view) and markedly more slender laterally (Figs. 54, 55). Terga and tergal setae, particularly the inner ones, shorter (Figs. 15, 54, 55). Cerci basal part narrower (Figs. 54, 55). Body shorter, "plumper" (Fig. 15) . . . . . *paludosus* (Fabr.)

—. Head sides parallel or subparallel, neck broader (Figs. 12, 13). Terminal abdominal segment broader at base, with a longer apex and markedly broader laterally (Figs. 48–52). Terga and tergal setae, particularly the inner ones, longer (Figs. 12, 48–52). Cerci basal part markedly broadened (Figs. 48–52). Body more elongate (Fig. 12) 22

22. Head large and markedly broad, neck in relation to head width narrower (Fig. 12). Terminal abdominal segment slightly shorter but with more prominent, more acuminate apex (Figs. 48, 51). Cerci slightly shorter (Figs. 48, 51) . . . . . *guttatus* (Payk.)

—. Head smaller and narrower with relatively broader neck (Fig. 13). Terminal abdominal segment slightly longer with a less prominent, more stumpy apex (Figs. 49, 52). Cerci slightly longer (Figs. 49, 52). . . . . *biguttatus* (Ol.)

23. Neck narrower (Figs. 10, 11) 24

—. Neck broader . . . . . *neglectus* Er.

24. Head larger and with a broader neck (Fig. 10). Terminal abdominal segment broader, "plumper". Cerci longer, of about a double length of terminal abdominal segment (Figs. 35, 36) . . . . . *nigroaeneus* Er.

—. Head smaller with a narrower neck (Fig. 11). Terminal abdominal segment more slender, narrower. Cerci shorter, at most about one and a half or one and three quarters as long as terminal abdominal segment (Figs. 37, 38) . . . . . *subtilis* Er.

The larvae were collected chiefly in Poland: in the vicinity of Warsaw, in Białowieża, in the Masurian Lake area and in the Carpathian Mts. Some of the larvae were also taken in western Germany (Rheiland-Westphalia, the vicinity of Krefeld) and in Austria (Obergurgl). Part of the material has been lent by the British Museum (Natural History) and the Zoological Museum in Copenhagen. I kindly thank all the persons who made the material available to me, in particular Dr. Jane Marshall the curator of the coleopterological collection in London, and Dr. Sv. G. Larsson the keeper of the beetles collection in Copenhagen.

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

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STRESZCZENIE

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

Autor omawia cechy diagnostyczne larw I stadium środkowoeuropejskich gatunków z rodzaju *Agabus* LEACH. Różnice w wielkości ciała, w kształcie głowy oraz ostatniego segmentu odwłoka, jak również w szerokości i oszczeceniu

tergitów oraz w długości przysadek odwłokowych i długości i rozmieszczeniu szczecinek cerkalnych okazały się najważniejszymi cechami różniącymi poszczególne gatunki. Autor podaje również klucz do oznaczania wymienionych larw.

РЕЗЮМЕ

[Заглавие: Диагностические признаки личинок I стадии среднеевропейских видов из рода *Agabus* LEACH (*Coleoptera, Dytiscidae*) с ключем для их определения]

Автор дает обзор диагностических признаков личинок I стадии 25 видов из рода *Agabur* LEACH, распространенных в центральной Европе. Наиболее существенными признаками, по которым различаются отдельные виды, являются: размер тела, форма головы и последнего сегмента брюшка, ширина тергитов, длина кринальных щетинок тергитов, длина придатков брюшка (cerci), а также длина и распределение церкальных щетинок. Автор дает также определитель рассматриваемых личинок.

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