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Descriptions of larvae of *Agabus uliginosus* (L.) and *A. congener* (THUNB.) (Coleoptera, Dytiscidae)

Opisy larw *Agabus uliginosus* (L.) i *A. congener* (THUNB.) (Coleoptera, Dytiscidae)

Описание личинок *Agabus uliginosus* (L.) и *A. congener* (THUNB.) (Coleoptera, Dytiscidae)

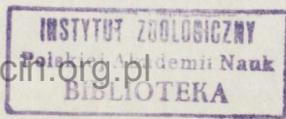
[With 28 text-figures]

While collecting in Zaborów distr. Pruszków in a shallow, grassy pool in 1954 I came across of a large number of small *Agabus* larvae which could not be run down to any species known so far. The larvae possessed widely spaced setae on the cerci and in this respect slightly reminded of larvae of *A. congener* (THUNB.) — their head, however, was much broader and the shape of the last abdominal segment and the body chaetotaxy were definitely different. The imagines reared of the larvae turned out to belong to *A. uliginosus* (L.) — a fairly common species in grassy puddles and pools with some rotting leaves on the bottom from the neighbouring trees or shrubs. The larvae were of the third stage. I also took, apart from a rich material of third stage larvae, several larvae of the second stage in Germany (Holstein), which enabled me to compare both larval stages with the corresponding ones of *A. congener* (THUNB.).

The third stage larva of *A. congener* (THUNB.) was described by BERTRAND in 1928¹.

Below I give the descriptions of larvae of the second and third stages of both species.

¹ According to BERTRAND (1928) the third stage larva of this species has first been described by XAMBEU (1891) and wrongly attributed to *A. chalconotus* PANZ. The latter species, in BERTRAND's opinion, had not occurred in the ponds where the larvae were captured: the only *Agabus* species found there were *A. solieri* AUBÉ and *A. congener* (THUNB.).



Agabus uliginosus (LINNAEUS, 1761)

Second Stage Larva

Length 7.0–9.0 mm. Dorsal side of body brownish or pale brownish with a very slight olive shade. Freshly emerged larvae paler than the older ones.

Head (fig. 1) fairly broad, its sides parallel or subparallel; head width at eyes level (1.10 mm) slightly exceeding length without neck (0.95 mm). Neck width 0.70 mm. Neck length 0.25 mm. Mandibles of a short type, fairly narrow in their apical part. Palpi consisting of fairly short joints. Labium fairly broad, about twice broader than long. Maxillae (stipes) roughly twice longer than broad. Underside of head with few, barely distinct setigerous punctures. Temporal spines 6–7 in number. Dorsal side of head unicolorous brownish, except for two pale spots near the clypeal suture, often pale areas near eyes and near anterior margin of head. Ventral side of head, palpi and antennae, yellowish-olive.

Thoracic terga (figs. 5, 7) fairly short as compared with their width; length of pronotum (0.76 mm) in the middle exceeding the combined length of median part of meso- and metanotum (0.30 and 0.35 mm); max. width of pronotum 1.70 mm; max. width of meso- and metanotum 1.65 mm. Colour of terga brownish or yellowish-brown; sometimes dim, blurred, barely visible pale marks present at sides.

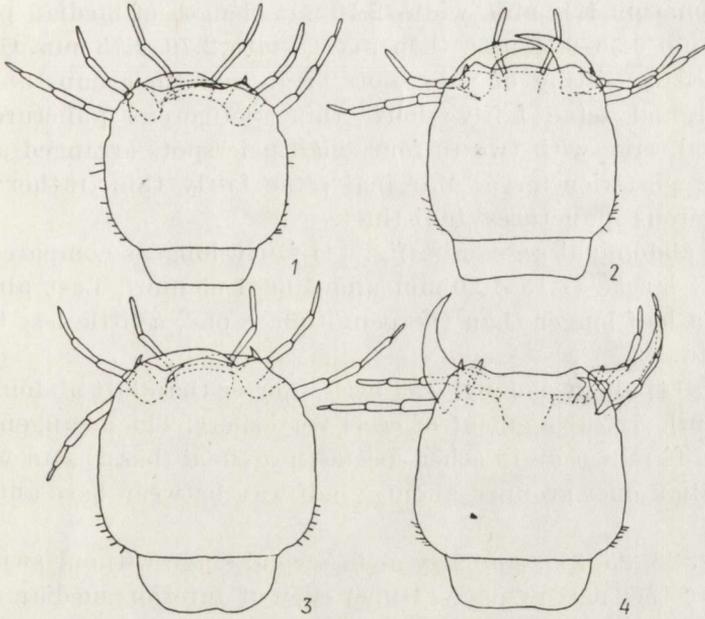
Abdominal terga unicolorous brownish.

Marginal setae on terga well developed, long, though fairly delicate, thin. Setigerous punctures fine, hardly visible.

Last abdominal segments (fig. 13) fairly long (0.70 and 0.97 mm) with very long but thin, hair-like setae and delicate, not numerous spines. Last abdominal segment about twice to twice and a half longer than broad, a little less than twice as long as the penultimate segment.

Cerci (fig. 13) long (1.30–1.40 mm), up to a half longer than last abdominal segment. Apical segment of cerci very long, its length equalling up to a third of length of basal segment (0.30–0.35 mm and 0.95–1.00 mm). Cercal setae fairly long; proximal (basal) seta separated from the other two (median setae); the latter situated fairly close to each other and located about a midway between apex and base.

Legs (figs. 17–19) fairly slender. Upper edge of anterior and median tarsi and tibiae with only apical spines, that of posterior tarsi and tibiae, occasionally with one median spine in addition to the apical ones. Upper edge of anterior and median femora with two basal spines in addition to the apical ones, that of posterior femora with four basal spines. Lower edge of anterior and median tarsi devoid of spines, at most with delicate, soft setae in the apical half, that of posterior tarsi with three spines in the middle part. Lower edge of anterior and median tibiae with 2–3 spines, that of posterior tibiae with 3–4



Figs. 1-4. Heads. 1, 2 - second stage; 3, 4 - third stage; 1, 3 - *A. uliginosus* (L.); 2, 4 - *A. congener* (THUNB.).

spines. Lower edge of anterior, median and posterior femora with 13-18 spines. Tarsal claws fairly long, their length exceeding markedly a half of tarsus length.

Third Stage Larva

Length 9.2-14.5 mm. Dorsal side of body dark yellowish or pale brownish with a slight olive shade.

Head (fig. 3) fairly broad, its width (1.45 mm) slightly exceeding length without neck part (1.27 mm). Neck fairly broad as compared with head width (0.95 mm). Neck length 0.35 mm. Sides of head roughly parallel or slightly converging anteriorly. Anterior edge of clypeus fairly long. Mandibles short with a fairly narrow apical part. Labium fairly broad, about twice as broad as long. Maxillae (stipes) about two and a half times longer than broad. Palpi consisting of fairly short joints. Temporal spines fairly numerous 6-9 in number. Underside with feebly marked spines. Dorsal side of head yellowish or brownish-olive with colour-pattern feebly marked: each side of head with a string of dim, pale spots running into one another anteriorly and prolonged into pale, indistinct areas around eyes; clypeus with several pale spots; two pale spots at posterior clypeus margin fairly conspicuous; part of clypeus along anterior border pale, this pale band connected with pale areas near eyes.

Thoracic terga (figs. 9, 11) rather short as compared with their width;

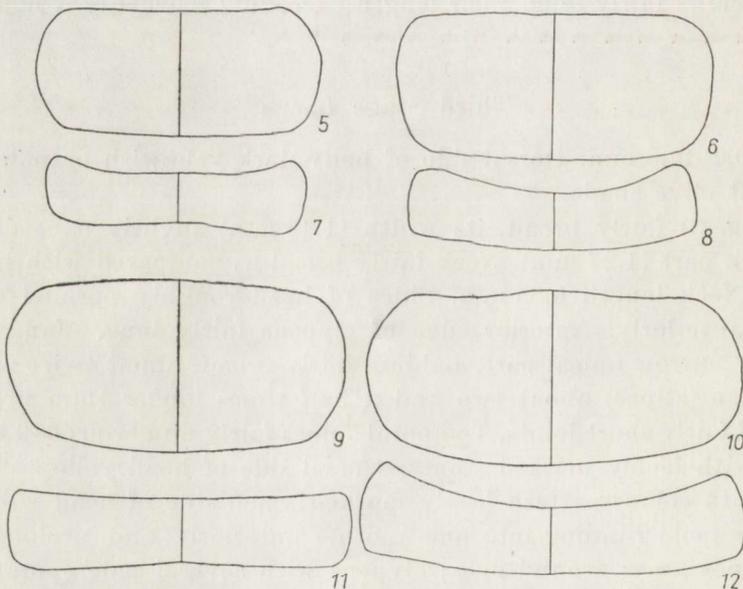
length of pronotum 1.42 mm, width 2.70 mm; length of median parts of meso- and metanotum 0.50–0.52 mm, their max. width 2.70–2.75 mm. Colour-pattern feebly marked consisting of pale spots arranged into groups at each side of tergum. Marginal setae fairly short, thin. Setigerous punctures indistinct.

Abdominal terga with two to four small pale spots arranged at sides; they disappear on posterior terga. Marginal setae fairly thin, rather feebly developed. Setigerous punctures indistinct.

Two last abdominal segments (fig. 14) fairly long as compared with many other *Agabus* larvae (1.15–1.20 mm and 1.60–1.65 mm). Last abdominal segment about a half longer than the penultimate one, a little less than twice as long as broad.

Cerci (fig. 14) about as long, or a little shorter than last abdominal segment (1.40–1.60 mm). Apical segment of cerci very short. The arrangement of seven cercal setae different than in other species: proximal (basal) seta well separated from the median ones grouped about a half way between base and apex. Setae fairly long.

Legs (figs. 23, 25, 27), similarly as in second stage without swimming hairs, consisting of rather narrow parts. Upper edge of anterior, median and posterior tarsi and tibiae with only apical spines. Upper edge of femora with 3–4 distal spines in addition to the apical ones. Lower edge of anterior and median tarsi without spines but with numerous soft, very short setae, that of anterior tibiae



Figs. 5–12. Pronota and mesonota. 5, 6, 9, 10 — pronota; 7, 8, 11, 12 — mesonota 5–8 — second stage; 9–12 — third stage; 5, 7, 9, 11 — *A. uliginosus* (L.); 6, 8, 10, 12 — *A. congener* (THUNB.).

with 1–2 longer spines and numerous short setae; lower edge of median tibiae with 3–4 longer spines and several shorter setae or spines, that of posterior tibiae with 6–7 spines. Lower edge of anterior tarsi with 3 spines. Number of spines on lower edge of anterior femora varying from 14 to 16, that on posterior femora varying from 20 to 24. Tarsal claws of moderate length, equalling about a half of length of tarsus.

Collecting and Rearing Data

Wawrzyszew-Chomiczówka (Warszawa), April 27, 1957, shallow puddles on a meadow, overgrown with *Carex* L. and grasses, about 25 third stage larvae; May 7, 1956, same place, 7 third stage larvae. Zaborów distr. Pruszków, May 5, 1956, very shallow pool on a meadow at forest edge (overflowed ditch), grasses, over 30 third stage larvae, several larvae reared until May 7, then transferred onto damp sand; 7 pupae taken out 15–18 May, 1956; 1 imago — May 28, 1956, 2 imagines May 31, 1956. Same place, May 7, 1954, over 100 third stage larvae. Same locality, May 12, 1955, ditch at forest edge, shallow water, grasses, *Carex* L., *Hottotonia* L., 2 third stage larvae. All leg. and cult. K. GALEWSKI. Same locality as above, May 7, 1954, field pool, 1 second and 1 third stage larvae, leg. hydrob. team of the Institute of Zoology of the Polish Academy of Sciences, Warsaw. Warszawa-Międzyłesie, May 12, 1954, pool on a meadow, grasses, 1 third stage larva, leg. Z. LOREC. Warszawa-Łomianki, May 26, 1954, shallow, water-filled ditch on a meadow, grasses, *Equisetum* L., 1 third stage larva, reared until May 28, 1954, then transferred onto damp sand, pupa — June 2, 1954, imago June 8, 1954. Białowieża distr. Hajnówka, May 8, 1959, small, shallow pool at the edge of National Park (meadow), oaks and elders at places, *Carex* L., grasses (also withered stems), some rotting leaves on the bottom; same locality and date, small, very narrow water-filled drainage ditch on a meadow near Narewka river, overgrown with *Carex* L., grasses and some bog plants, 2 third stage larvae. All leg. and cult. K. GALEWSKI. Mikołajki distr. Mrągowo, May 8, 1956, field pool, bottom overgrown by grasses, no other plants (the grass is mowed down later in summer), 3 third stage larvae; same locality, May 7, 1956, small ponds on a fallowed field, margins with *Alnus* L., paludal plants, 2 third stage larvae; same place, August 16, 1956, 2 third stage larvae, leg. FISCHER; Aug. 28, 1956, 4 third stage larvae and Sept. 15, 1956, 3 third stage larvae. All leg. E. GAJOWNIK. North Germany (Holstein), Plön near Kiel, May 7, 1965, drying pool in an *Alnus* L. grove, grasses, *Scirpus* L., rotting leaves on the bottom (puddles), several third stage larvae, reared until May 9, 1965 when transferred onto damp earth, 6 imagines taken out May 18–20, 1965; same locality, pool in an *Alnus* L. groove overgrown with *Carex* L., grasses, *Scirpus* L., *Equisetum* L., *Iris* L., *Lemna* L. and with rotting leaves on the bottom, May 9, 1965 — 8 second and 2 third stage larvae; May 11, 1965, several third stage larvae reared until May 12, 1965, 3 pupae 19–20 May, 1965; May 14, 1965 — 3 third stage larvae; June 1, 1965 — 2 second and 3 third stage larvae; June 4, 1965 — 5 second and 10 third stage larvae; July 23 1 third stage larva; same locality, puddle in an *Alnus* grove, no vegetation, rotting leaves on the bottom, 5 second and 10 third stage larvae.

Biology

Agabus uliginosus L. occurs in small, ephemeric, shallow water-bodies often with grassy vegetation and rotting leaves on the bottom. It usually frequents shallow puddles and pools in woods or forest edges. The larvae are found in spring, summer and early autumn, though in the summer and later they appear

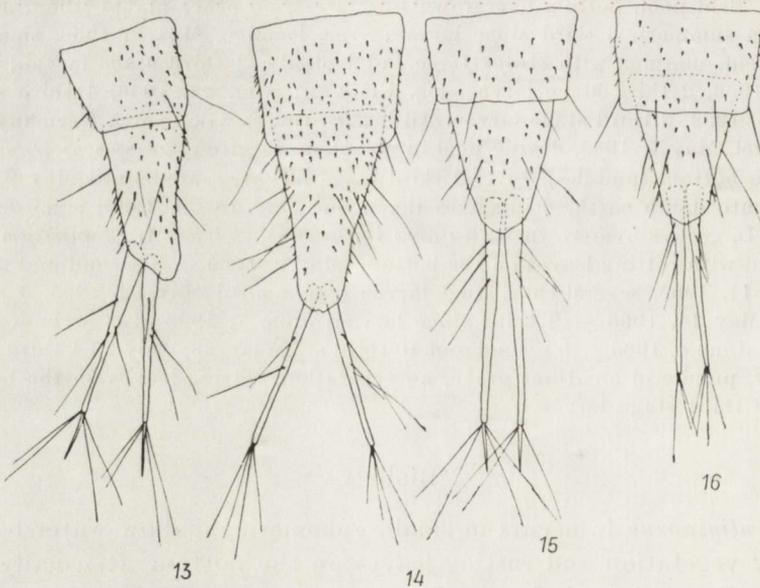
to be rare. It is difficult to say with certainty whether the species, in some places, may have two distinct egg-laying periods. I have never succeeded in taking the larvae in rainpuddles in late summer and in the autumn which could indicate a second generation of eggs, and in deeper water-bodies the oviposition seems to continue through the summer at least (June, July). It is very probable that the larvae found in August and September hatched from the last batch of eggs.

Agabus congener (THUNBERG, 1794)

Second Stage Larva

Length 6.6–9.1 mm. Dorsal side of body darker than in the foregoing species, brown or dark brown.

Head (fig. 2) fairly narrow, distinctly narrower than in *A. uliginosus* (L.). Sides of head subparallel; head length without neck (1.05 mm) roughly equaling width at eyes level (1.10 mm). Neck broad as compared with head width (0.85 mm). Length of neck 0.22 mm. Dorsal side of head dark brown or brown with a slight olive shade, almost unicolorous: ocular areas and anterior part of head along clypeus border paler; in some specimens also lateral edges of head pale and a pale mark at the median suture visible. Palpi and antennae light brown or yellowish-olive. Labium narrower and mandibles with apical part broader than in the foregoing species. Temporal spines less numerous than in *A. uliginosus* (L.), 4–6 in number. Underside yellowish-brown.



Figs. 13–16. Last abdominal segments and cerci. 13, 15 — second stage; 14, 16 — third stage; 13, 14 — *A. uliginosus* (L.); 15, 16 — *A. congener* (THUNB.).

Thoracic terga (figs. 6, 8) longer than in the preceding species; pronotum length 0.87 mm, max. width 1.90 mm; length of median parts of meso- and metanotum 0.30–0.32 mm, their max. width 1.72–1.85 mm. No colour-pattern. Marginal setae shorter than in *A. uliginosus* (L.), but stronger, robuster.

Abdominal terga unicolorous, brown or dark brown with marginal setae shorter and stronger than in the foregoing species; setigerous punctures on posterior terga better marked than in the species mentioned.

Last abdominal segments (fig. 15) definitely shorter than in the preceding species (0.50 and 0.92 mm). Setae on both last segments shorter than in *A. uliginosus* (L.), but both setae and spines stronger than those in the species mentioned.

Cerci (fig. 15) about one and a half to twice longer than last abdominal segment (1.65–1.70 mm), thus definitely longer in proportion to length of last abdominal segment than in *A. uliginosus* (L.). Apical segment of cerci long (0.30–0.35 mm), though shorter in proportion to length of basal segment than in the species mentioned. Cercal setae arranged in a different way: basal (proximal) seta separated roughly as far from the median anterior seta as the median posterior (distal) one: the last two thus not concentrated as is the case in *A. uliginosus* (L.).

Legs (figs. 20–22) slightly robuster than in the preceding species. Upper edge of anterior and median tarsi and tibiae with only apical spines, that of posterior ones with one median seta, in addition to apical ones. Upper edge of femora with two distal spines, in addition to apical ones. Lower edge of anterior and median tarsi without longer spines but with numerous, soft, short setae, that of posterior tarsi with one robuster spine in apical part. Lower edge of tibiae with 2–3 longer spines and several shorter setae, that of femora with 16–20 spines. Tarsal claws slightly longer in proportion to tarsus length than in the foregoing species.

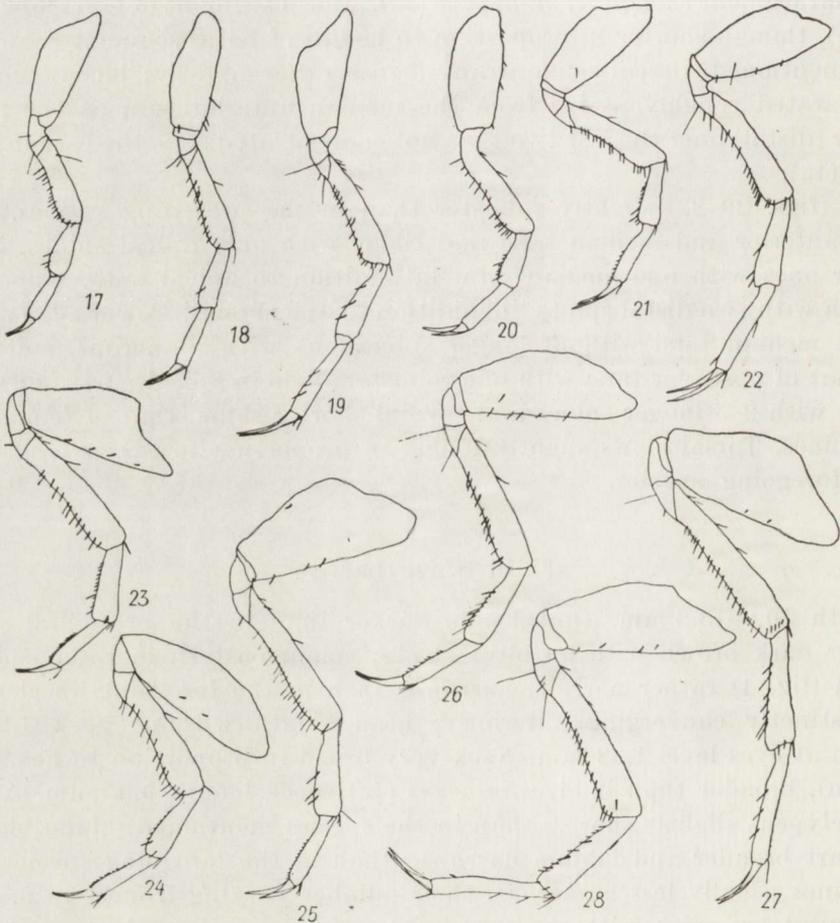
Third Stage Larva

Length 10.0–13.3 mm. Dorsal side darker than in the preceding species, brown or dark brown with an olive shade; colour-pattern more conspicuous.

Head (fig. 4) rather narrow, narrower than in the foregoing species, with sides distinctly converging anteriorly; head length without neck 1.27 mm, its width at eyes level 1.32 mm. Neck very broad in proportion to head width (1.00 mm), broader than in *A. uliginosus* (L.); neck length 0.35 mm. Anterior edge of clypeus slightly shorter than in the species mentioned. Mandibles with apical part broader and labium narrower than in the foregoing species. Temporal spines usually less numerous, their number varying from 4 to 6. Dorsal side of head brownish with more or less conspicuous olive shade. Colour-pattern more conspicuous than in the preceding species: strings of pale spots at sides, however, more isolated, more numerous and smaller; two pale spots

near clypeus suture also smaller but comparatively less distinct than in the species mentioned, sometimes barely visible; tentorial areas, by contrast, well visible, darkly pigmented; whole surface of epieranium sprinkled with dark setigerous punctures — a great difference in this respect from *A. uliginosus* (L.) where the puncturation hardly exists; pale clypeal marks very well marked on a dark background; neck almost entirely pale, yellowish, with two dark streaks, one at each side. Palpi and antennae light brown or yellowish-olive, apical part of joints very slightly darkened. Underside of head yellowish-brown; setigerous punctures more conspicuous than in *A. uliginosus* (L.).

Thoracic terga (figs. 10,12) longer as compared with their width than in the foregoing species; length of pronotum 1.50 mm; max. width of pronotum 3.00–3.20 mm; length of median parts of meso- and metanotum 0.50–0.60 mm,



Figs. 17–28. Legs. 17–22 — second stage; 23–28 — third stage; 17–19, 23, 25, 27 — *A. uliginosus* (L.); 20–22, 24, 26, 28 — *A. congener* (THUNB.); 17, 20, 23, 24 — forelegs; 18, 21, 25, 26 — middlelegs; 19, 22, 27, 28 — hindlegs.

their max. width 3.20 mm. Colour of terga brownish with only a very slight olive shade; pale marks smaller than in the preceding species but more conspicuous. Marginal setae shorter than in *A. uliginosus* (L.), but robuster; setigerous punctures better marked.

Abdominal terga deep brown with pale marks running on to last terga although there they are less conspicuous than on the anterior ones. Olive shade barely discernible. Marginal setae shorter than in *A. uliginosus* (L.), but they seem to be robuster, stronger than in the species mentioned. Setigerous punctures and spines equally more conspicuous.

Last abdominal segments (fig. 16) shorter (0.90 and 1.25 mm) than in the preceding species. Last abdominal segment about a half longer than broad at base. Both segments with well developed spines and setae, however, shorter than in the species in question and less numerous.

Cerci (fig. 16) well exceeding length of last abdominal segment, their length 1.60–1.65 mm. Cercal setae, similarly as in the second stage, well spaced: median anterior seta, however, situated more closely to the basal (proximal) seta than to the median posterior (distal) one. Setae slightly shorter than in *A. uliginosus* (L.).

Legs (figs. 24, 26, 28) without swimming hairs, similarly as in the preceding species, slightly broader, robuster than in the species mentioned. Upper edge of anterior and median tarsi and tibiae with only apical spines, that of posterior tarsi with two and posterior tibiae with one spine, apart from the apical ones. Upper edge of femora with 2–3 spines, in addition to the apical ones. Lower edge of anterior and median tarsi with only soft, short numerous setae, that of posterior ones with four spines. Lower edge of anterior tibiae with two robuster spines in addition to numerous delicate short setae, that of median and posterior tibiae with 4–5 longer spines in addition to short setae. Lower edge of femora with 14–17 spines. Tarsal claws slightly longer as compared with tarsus length, than in the foregoing species.

Collecting and Rearing Data

Tatra Mts., Cyhrla, July 5, 1955, streamlet connected with Toporowy Niżni Pond (forest glade, puddles overgrown with grasses) 3 third stage larvae, 2 larvae reared until July 7–9, 1955, 2 imagines observed July 20, 1955. Tatra Mts, Hala Gąsienicowa (grassland zone), Sept. 2–3, 1955, puddle connected with Litworowy Pond, mosses at margins (open area), 8 second and 3 third stage larvae. Białowieża distr. Hajnówka, Sept. 7–8, 1956, imagines taken in puddles overgrown with *Carex* L. on a meadow near Narewka river; reared in laboratory, several eggs laid on 10–11 Sept., 1956. All leg. and cult. K. GALEWSKI.

Biology

Agabus congener (THUNB.) seems to be in shallow, grassy puddles at home, but, by contrast to the preceding species, it avoids shaded habitats and those filled with rotting leaves or other plants rests, and prefers clear, cold water-

bodies. The species in question is, although also found in lowlands, a typical component of mountain fauna where it can find often most suitable conditions for its existence. Both XAMBEU (1891) and BERTRAND (1928) give ponds as the habitat of the larvae, but I am not sure whether the larvae were found in the ponds or in the puddles connected with them or situated nearby, and, judging from my own collecting experience I am inclined to regard the species as principally puddle-dweller with a liking for clear, cold water.

All my larvae have been collected in summer and in autumn — probably because the late spring in the mountains and fairly severe climatic conditions do not enable the imagines to laid the eggs earlier in the year. The oviposition by adults taken in Białowieża in September and reared in captivity could, however, indicate a possibility of a late oviposition also in in the lowland area.

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 XAMBEU [V.] 1891. Moeurs et metamorphoses d'insectes. Ann. Soc. linn. Lyon, Lyon, and Paris, 38: 135-188.

STRESZCZENIE

Autor opisuje drugie i trzecie stadium larwalne dwu gatunków z rodzaju *Agabus* LEACH: *A. uliginosus* (L.) i *A. congener* (THUNB.).

Jedynie larwa trzeciego stadium *A. congener* (THUNB.) była dotychczas znana, ale jej opis nie był dokładny.

РЕЗЮМЕ

Автор описывает вторую и третью личиночную стадию двух видов из рода *Agabus* LEACH: *A. uliginosus* (L.) и *A. congener* (THUNB.).

До настоящего времени была известна только личинка третьей стадии *A. congener* (THUNB.), но ее описание было неполное.

Redaktor pracy — mgr W. Starega

Państwowe Wydawnictwo Naukowe — Warszawa 1968
 Nakład 1300+90 egz. Ark. wyd. 0,75; druk. 5/8. Papier druk. sat. kl. III, 80 g, B1
 Nr zam. 626/68 — Wrocławska Drukarnia Naukowa — Cena zł 6,-