

## Two new East Palearctic *Agabus* species of the *adpressus*- and *confinis*-groups (Coleoptera, Dytiscidae)

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The *Agabus adpressus*-group is defined and *Agabus udege* sp. n. is described from the Sikhote-Alin mountain range in easternmost Russia. It is the sister-species of *A. adpressus* Aubé, 1837. Some East Palearctic specimens previously assigned to *Agabus discolor* (Harris, 1828), *A. clypealis* (Thomson, 1867), and *A. levanderi* Hellén, 1929, in the literature are described as *Agabus angusi* sp. n. The new species is known from the Lake Baikal region and eastwards to NE Mongolia and northernmost China.

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### 1. Introduction

Among Holarctic *Agabus* Leach, the *confinis*-group includes some 30 species, of which many are poorly differentiated and difficult to delimit. Nilsson (1990) reviewed the Palearctic species, and Larson (1991) revised the Nearctic species. A special source of confusion has been the separation of species with Holarctic distributions, supposed or real. I will here show that *A. levanderi* Hellén sensu Larson & Nilsson (1985) includes two distinct species, of which one must be described as new.

*Agabus adpressus* Aubé is a very characteristic northern Holarctic species placed in its own species group (Larson 1989). I will here show that populations from the Sikhote-Alin mountain range in Primorye in easternmost Russia differ from the rest of the material studied of this species. The documented differences motivate the separation of *A. adpressus* into two species, of which one is described as new.

In the descriptions the following abbreviations are used:

Collections: (BML) The Natural History Museum, London, (CAL) coll. R. B. Angus, London, (CAS) California Academy of Sciences, San Francisco, (CNC) Canadian National Collection, Ottawa, (CNU) coll. A. N. Nilsson, Umeå, (IBPV) Institute of Biology and Pedology, Vladivostok, (MHNP) Muséum d'Histoire Naturelle, Paris, (TMB) Természettudományi Múzeum, Budapest, (ZISP) Zoological Institute, St. Petersburg, (ZMH) Zoological Museum, Helsinki, (ZMUM) Zoological Museum, Moscow Lomonosov State University (ZSM) Zoologische Staatssammlung, Munich.

Measurements: (TL) total length, (MW) maximum width, (WC/WS) ratio between width of metacoxa and width of metasternum (cf. Nilsson 1990). Measurements are given as mean  $\pm$  SD when possible.

### 2. The *adpressus*-group

Sharp's (1882) Group 11 of *Agabus* species included only *A. adpressus* Aubé (plus the junior

synonym *A. sahlbergi* Sharp). Later, Zimmermann (1934) included also *A. wasastjernae* C.R.Sahlberg and *A. opacus* Aubé (as *A. mimmi* J.Sahlberg) in his *adpressus*-group, i.e. he presented a fusion of Sharp's groups 11 and 12. The proximity of these two groups was noted already by Sharp (1882). Recently, Larson (1989) again separated these two groups, naming them as the *adpressus*- and *opacus*-groups. Fery & Nilsson (1993) suggested that the *opacus*-group forms a distinct clade within the Agabini together with the *chalconatus*- and *erichsoni*-groups, and including also the genus *Ilybius*. Based on several characters, e.g. a continuous clypeal bead and a female ovipositor without lateral ridge, it seems clear that *A. adpressus* belongs to another clade than the *opacus*-group. Consequently, I will here follow Larson's (1989) view. However, the study of material from Primorye has revealed the presence of a second species of the now dibasic *adpressus*-group, to be described below. The following combination of characters defines this group: (1) clypeal marginal bead continuous, (2) pronotum with anterior row of punctures continuous and posterior row without sublateral gap, (3) pronotum narrow with anterior bead present only laterally and lateral bead dilated, (4) pronotum in lateral aspect with hypomeron visible as broad triangular piece below lateral bead on apical half, (5) metasternal wing narrow, (6) legs slender with prolonged pro- and mesotarsomere 5, (7) male pro- and mesotarsomeres 1–3 with ventral adhesive scales, (8) penis simple with narrow dorsal groove, and (9) paramere straplike. Characters no. 4–7 fall within the adaptations to high-altitude streams documented among Afrotropical *Agabus* species by Nilsson (1992). To use such characters for group definition includes the risk of making another group paraphyletic. The phylogenetic position of the *adpressus*-group has not been established.

### *Agabus adpressus* Aubé

Figs. 1–4

*Agabus adpressus* Aubé, 1837:169 (orig. descr.); Zaitzev 1910:38 (syn., distr.); Larson & Nilsson 1985:120 (syn., distr.).

*Agabus haeffneri* Aubé, 1837:170 (orig. descr.).

*Colymbetes subquadratus* Motschulsky, 1860:102 (orig. descr.).

*Gaurodytes angusticollis* J.Sahlberg, 1871:408 (orig. descr.).

*Agabus sahlbergi* Sharp, 1882:517 (orig. descr.).

*Agabus solus* Leech, 1949:248 (orig. descr.).

Type localities: of *adpressus* Dauria, of *haeffneri* Sweden, of *subquadratus* Dauria, of *angusticollis* Finnish Lapland, of *sahlbergi* Dauria, and of *solus* SE Alaska.

Type material: syntypes of *adpressus* and *haeffneri* not found in MHNP, syntypes of *subquadratus* seen in ZMUM, holotype of *angusticollis* in ZMH not seen (Biström 1987), syntypes of *sahlbergi* not found in BML, and paratypes of *solus* seen in CAS and CNC by Larson & Nilsson (1985).

Additional material: N Fennoscandia: 20 inds CNU; 4 inds MHNP. Russia: Tomsk 3♂, 2♀; Sibir. arct. J.Sahlberg 1♂, 1♀; Dudinka 1♂ J.Sahlberg; Transbaikalia, Werchne-Udinsk 1♂ MHNP; By R. Lena to 140 km upstream from Yakutsk 27–29.vi.70 1♂, 1♀ leg. R.B.Angus CAL. Mongolia: Koulaja à Ourga 1♂, 2♀ leg. J.Chaffanjon MHNP; Central aimak, Boral, Dzhanthiolin gol, 1500 m, 85 km SO of Ulan-Baator 5.vii.1963 3♂ leg. Z.Kaszab TMB.

Zaitzev (1910) referred to a specimen from Jakutsk identified by Motschulsky as *subquadratus* as the "type" of this species. However, as Motschulsky (1860) in the original description referred only to "Daourie", the specimens in his collection labelled "Dauria" must be considered as syntypes. Motschulsky (1845:129) defined Dauria as: "die Umgegend von Nertschinsk mit den Bergwerken und Gebirgen."

Diagnosis: Within the group *A. adpressus* is characterized by penis shape (Figs. 1–4), and by the female elytral sculpture that is only slightly more deeply engraved than in males.

Variation: Specimens from Fennoscandia and Arctic Siberia tend to be smaller and to have a more deeply engraved microsculpture on the elytra than those from Mongolia and Transbaikalia. I view this variation as intra-specific.

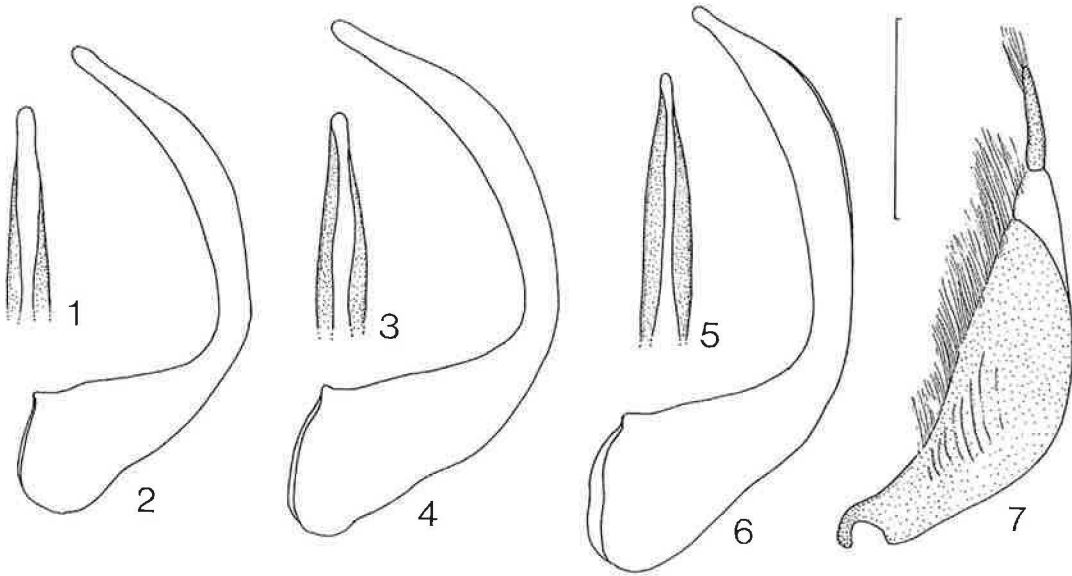
Distribution: This Holarctic species is in North America known from Alaska, Yukon Territory, North-western Territories, and northern British Columbia (Larson & Roughley 1991). The Palearctic distribution ranges from Scandinavia to East Siberia and Mongolia.

### *Agabus udege* sp. n.

Figs. 5–9

*Gaurodytes adpressus* (Aubé, 1837); Zaitzev 1953:230 (in part, misident.); Lafer 1989:244 (in part, misident.).

Type locality. Russia, Primorye, Sikhote-Alin nature preserve.



Figs 1–7. *Agabus adpressus*-group; distal half of penis in dorsal view (1, 3, 5), penis in lateral view (2, 4, 6), and paramere in external view (7). — 1–4. *A. adpressus* Aubé; 1–2 Sweden, Abisko; 3–4 Mongolia. — 5–7. *A. uedege* sp. n. — Scale bar 0.5 mm.

Type material. Holotype ♂ in ZISP labelled "Russia, Primorye, Terneisky distr., Sikhote-Alin Pres. 20.vi.1979 G.Lafer, Mouth of Yasnaya River, under pebbles in water; mixed forest". — Paratypes 10♂,4♀: 1♂ with the same label as holotype; 4♂,1♀ "Russia, Primorye, Partizansky distr. 25.vi.1973 G.Lafer, Watershed of Melniki & Partizanskaya Rivers, stream, 750-800 m a.s.l."; 1♂ dito 8.ix.1971; 1♀ dito 15.ix.1971; 2♂ "Russia, Primorye, Dalnegorsky distr. 14 km N of Taiga 30.vi.1971 G.Lafer, Upper part of Bolshaya Ussurka River, 750-800 m a.s.l."; 1♂ "Russia, Primorye, Terneisky distr, Sikhote-Alin Pres. 16.vi.1979 G.Lafer, 22 km NW of Terney, Serebryany Ruchej River, pebble bank"; 1♀ "Russia, Primorye, Medveditsa River 5/8-93 S.Kholin"; 1♂,1♀ "Russia, Primorye, Lukjanovka 9/8-93 S.Kholin". Paratypes deposited in IBPV (8) and CNU (6). — Note: I have added transcribed and translated locality labels to the specimens collected by Lafer. The original handwritten kyrillic labels are not cited above, but remain on the pins below the new ones. I have also updated the names on some rivers in line with modern topographic maps of Primorye, viz. Tudagou = Melniki, Suchan = Partizanskaya, Iman = Bolshaya Ussurka, and Maisa = Yasnaya River.

Diagnosis: The new species is very similar to *A. adpressus* from which it can be separated on the differently shaped penis of the male (Figs. 5–6), and on the submat elytra of the female.

Description: Total body length  $7.6 \pm 0.3$  mm (length without head  $7.0 \pm 0.2$  mm), maximum

width  $3.9 \pm 0.1$  mm; length to width ratio  $1.9 \pm 0.04$  ( $n = 12$ ). Body elongate with sides somewhat curved and pronotum somewhat narrower than elytra and with sides rounded (Fig. 8); dorsal surface only slightly convex. — Colour. Head black with anterior margin and paired interocular spots rufous. Antenna and palpi rufous, without infuscation. Pronotum black with lateral margins broadly rufous. Elytron black. Legs dark rufous. Ventral surface black; epipleuron, metacoxal processes and posterior tergal margins rufous. — Sculpture and setation. Dorsal surface shiny in male, opaque from coarse microreticulation in female. Head with meshes of unequal shape and size. Frons occasionally with single additional sensillar puncture. Pronotum with meshes larger than on head. Anterior transverse row of punctures continuous; posterior row without short sublateral gap. Elytron with meshes smaller than on pronotum; lines of reticulation very shallowly impressed in male, and very deeply so in female. Meshes smaller in female. Serial rows of punctures distinct in male, obsolete in female. Prosternal process micropunctate. Metasternum medially smooth, sublaterally somewhat rugose. Metacoxal plate with

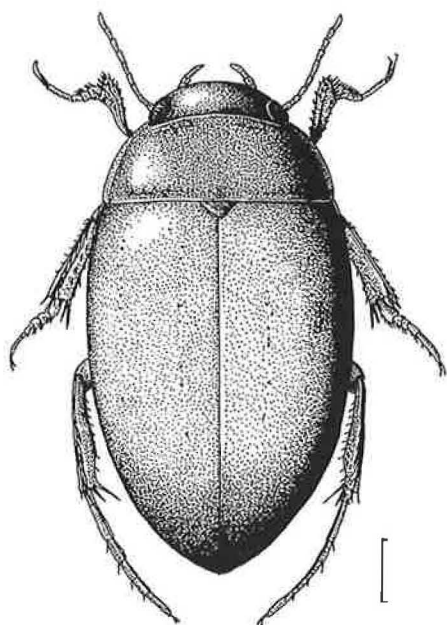


Fig. 8. *Agabus udege* sp. n. Habitus of holotype. — Scale bar 1.0 mm.

relatively large, oblong meshes; striate towards posterior margin. Abdominal sterna 1–3 with fine oblique longitudinal striation; sternum 6 medially with transversely stretched fine reticulation and some coarse punctures. Metafemur posteropically with dense row of about six long stout setae. Metatibia with disc impunctate and with antero-ventral row of punctures confined to basal half in most specimens. Metatarsomere 1 with 4–6 and tarsomere two with 0–1 additional postero-ventral spiniform punctures. — Structural features. Clypeus with anterior bead more or less continuous. Pronotum with anterior bead present only laterally; lateral bead dilated. Prosternal process relatively broad, more or less flat with lateral bead only slightly dilated posterior of procoxae. Metasternum with antero-medial emargination not fully reaching posterior margin of mesocoxae. Metasternal wing narrow, WC/WS  $3.22 \pm 0.17$  ( $n = 11$ ). Hind wing about as long as elytron. Metacoxal lines reaching metasternum. Pro- and mesotarsomeres 1–3 strongly dilated, ventrally clothed with oblong adhesive scales; pro- and mesotarsomere 5 prolonged. Metatarsomeres 1–3 in males provided with

ventral setal fringe; in females metatibia and -tarsus without ventral setal fringe. Hind leg slender with metatarsomere 1 evidently longer than long tibial spur. Protarsal claws elongate, scythiform; about as long as tarsomere 5. Metatarsal claws of equal length. — Male genitalia. Penis simple and narrow with dorsal groove relatively narrow and apex rounded (Figs 5–6). Paramere sclerotized in basal 3/4 and with narrow apical appendage (Fig. 7); setal fringe long and dense. — Female genitalia. Ovipositor rounded, without lateral ridge.

Natural history: All specimens were collected at the margin of mountain streams or in pools with cold water close to streams. The relatively short hind wings suggest a reduced capability for flight.

Distribution (Fig. 9): Seemingly confined to the Sikhote-Alin mountain range in Primorye in easternmost Russia.

Derivation of name: The species is named after the Udege people, native hunters and fishermen of the Sikhote-Alin mountain range. The name is an indeclinable noun.

### 3. The *confinis*-group

Nilsson (1983) applied the Nearctic name *A. approximatus* Fall to Fennoscandian material, but later Larson & Nilsson (1985) concluded that *A. approximatus* is strictly Nearctic and that the Fennoscandian species was *A. levanderi* Hellén. In the same paper, Larson & Nilsson (1985) suggested that earlier East Palearctic records of *A. discolor* (Harris) (Zimmermann 1928, Guéorguiev 1968) referred to *A. levanderi*. More recently, Larson (1991) discussed the status of *A. discolor* and *A. levanderi* suggesting that they may be conspecific. My study of the available East Palearctic material of this complex has convinced me that *A. levanderi* sensu Larson & Nilsson (1985) includes two distinct species, of which one must be described as new.

#### *Agabus angusi* sp. n.

Figs. 9–11

*Gaurodytes discolor* (Harris, 1828): Zimmermann 1928:180 (misident.); Zimmermann 1934:202 (key).

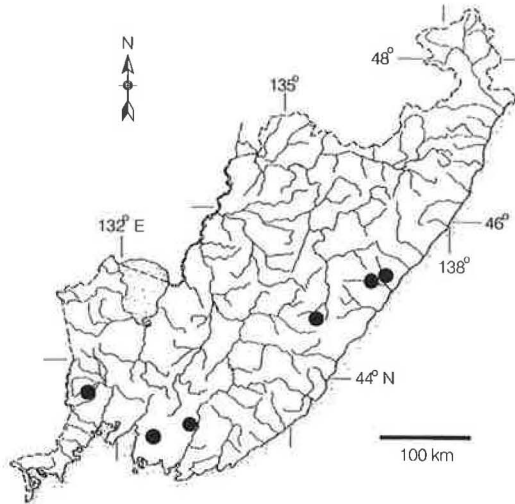
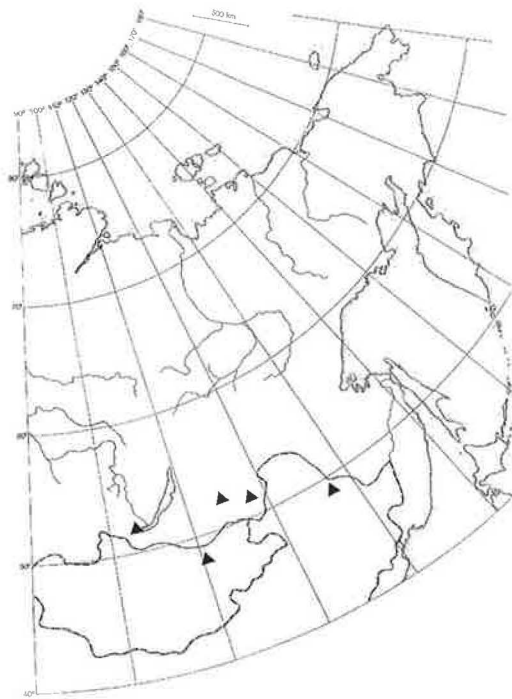


Fig. 9. Known records of *Agabus angusi* sp. n. (▲) and *Agabus udege* sp. n. (●).

*Agabus discolor* (Harris, 1828): Guéorguiev 1968:26 (misident., faun.).

*Agabus clypealis* (Thomson, 1867): Balfour-Browne 1947:443 (misident.).

*Agabus levanderi* Hellén, 1929; Larson & Nilsson 1985:128 (in part, misident.).

Type locality. Russia, Irkutsk, Tibelti.

Type material. Holotype ♂ in ZISP labelled "Siberia, Irkutsk obl. Tibelti, Irkut valley 28 km W of L. Baikal R.B. Angus, 8-15.vi.70". — Paratypes 3♂, 2♀; 1♂ in CAL labelled "Siberia, Irkutsk obl. Tibelti, Irkut valley 28 km W of L. Baikal R.B. Angus, 8-15.vi.70"; 1♂ in IBPV labelled "Chitinsk. obl., Aleksandr. zavod, 13.7.1977 A. Egorov", "on top of small hill" (here translated from Russian); 1♂ in CAS labelled "Cheng-chin Lesser Khingan Manchoukus", "20.VI.38 M. Weymarn", "H.B. Leech Collection", "Agabus clypealis Thoms. J. Balfour-Browne det."; 2♀ in TMB labelled "Mongolia: Chentej aimak 20 km SW von Somon Norovlin, 900 m Exp. Dr. Z. Kaszab, 1965", "Nr. 448.19.VIII.1965", "discolor Harris det. V. Guéorguiev"; and my paralectotype labels.

Additional material. Russia: Chitinsk, Chita leg. Frieb 1♀ ZSM.

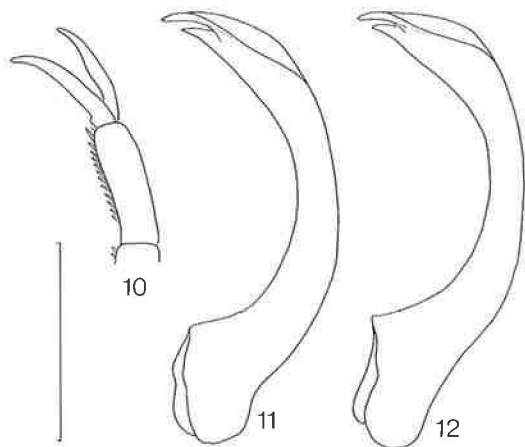
Diagnosis: Within the *confinis*-group, *A. angusi* is characterized by the following combination of characters: (1) pronotum with lateral margin rufous inside bead, (2) elytron with

meshes of reticulation relatively small and regular, (3) metasternal wing broad, (4) male protarsal claws about as long as protarsomere 5, and (5) penis slightly broadened at level of subapical spine.

*Agabus angusi* can be added to Nilsson's (1990:152) key to Palearctic *confinis*-group species for males by expanding couplet 12 as follows:

- 12. Elytron with meshes of reticulation relatively small, rounded and regular in size. Pronotum with lateral margin rufous inside bead ..... *A. angusi* sp. n.
- Elytron with meshes of reticulation relatively large and of irregular shape and size. Pronotum only with lateral bead rufous ..... 12a

Description: TL 7.4–7.8 mm, MW 4.0–4.4 mm. Body elongate oval, TL/MW 1.77–1.92. — Colour: Head black with narrow anterior margin and two postero-median spots rufous; antenna and palpi rufous with apex of ultimate segment infusate. Pronotum black with lateral bead rufous, disc narrowly rufopiceous mesad to bead. Elytron rufous to rufopiceous. Ventral surface mainly black with epipleuron, metacoxal processes and apical margin of abdomen rufous. Legs rufous with femora rufopiceous. — Sculpture



Figs 10–12. *Agabus*, male protarsomere 5 with claws, anterior aspect (10), and penis, lateral aspect (11–12). — 10–11. *A. angusi* sp. n. — 12. *A. congener* (Thunberg), Tjita. — Scale bar 0.5 mm.

and setation. Clypeus with anterior bead almost continuous, broken medially into closely spaced transverse punctures. Dorsal reticulation simple, on head with small irregular meshes that occasionally have a central micropuncture. Frons with 1–3 additional sensillar punctures on each side. Pronotum with anterior submarginal row of punctures continuous; lateral bead well-defined and of more or less equal width; reticulation on disc with small meshes irregular in size and shape. Elytron with longitudinal series of punctures distinct, reticulation with meshes generally small and regular in shape and size, occasional meshes fused. Prosternal process glabrous. Metacoxal plate with rather coarse irregular reticulation and with irregular transverse wrinkles, meshes longitudinally stretched towards posterior margin. Metafemur ventrally with fine longitudinal reticulation and spread micropunctures. Metatibia ventrally with fine transverse reticulation, disc impunctate, antero-ventral margin with row of punctures more or less confined to basal third. Metatarsomere I with 3–4 posteroventral spines. — Structural features: Prosternal process narrow and evenly rounded in cross-section, lateral bead well-defined. Metasternum with antero-median emargination attaining level of hind margin of mesocoxa. Metasternal wing broad, WC/WS

2.14–2.30. Metafemur slender, postero-apical angle not produced posteriorly. Metatarsomere I longer than longer tibial spur. Pro- and mesotarsomeres 1–3 narrowly dilated; protarsomere 5 1.5–1.6 × as wide as tarsomere 5; protarsal claws about as long as protarsomere 5 (Fig. 10). Metatarsomeres 1–3 provided with ventral setal fringes. — Male genitalia: Penis slightly broadened at level of subapical spine (Fig. 11). Paramere stylate.

Natural history: At Tibelti the species was collected in small taiga pools near the village, probably in wet spruce forest (Angus in litt.).

Distribution (Fig. 9): The new species occurs from Lake Baikal to northernmost China via Transbaikalia and NE Mongolia.

Derivation of name: The species epithet is a noun in the genitive case derived from the name of Dr Robert B. Angus, who collected the holotype.

*Agabus angusi* differs from *A. discolor* and *A. levanderi* in the shape of the penis (cf. Nilsson 1990), that is somewhat broadened at level of the subapical spine. As seen in the table given by Larson & Nilsson (1985:128) the metasternal wing is wider in *A. angusi* (Transbaikal and Mongolia samples) than in *A. levanderi* (Kamchatka and Sweden samples) or in *A. discolor* (Nearctic samples).

The separation of *A. angusi* from the true *A. levanderi* results in that a large part of the difference in metasternal wing width between *A. levanderi* and *A. discolor* disappears (cf. Larson 1991:1274). Consequently, the case for a synonymization of these two species is strengthened.

Zimmermann (1928) mentioned three specimens assigned to *A. discolor*. In 1983 I borrowed the female from Tschita from ZSM and returned it after examination. However, this specimen could no longer be found (Scherer in litt.). Another specimen from the same locality in coll. Frieb was examined by Zimmermann (1928). I have seen a male so labelled (in ZSM), but based on the penis shape (Fig. 12) and the more irregular elytral reticulation I have identified it as *A. congener* (Thunberg).

The presence of *A. clypealis* in the East Palearctic needs verification, as this species earlier was confused with *A. levanderi* (Zimmermann 1934; Kamchatka) or *A. angusi* (Balfour-Browne 1947; Manchuria).

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