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## Description of two new Oriental *Aradus* species, with a new subgenus

(Heteroptera: Fam. Aradidae)

by T. Vásárhelyi

**Abstract:** A new subgenus (*Miraradus*) of *Aradus* Fabricius, 1803 is erected for four Oriental species: *A. mirabilis* Bergroth, 1892, *A. foliaceus* Kormilev, 1957, *A. oervendetes* n.sp. and *A. himalayensis* n.sp. The most important characters of the new subgenus are: antennal segment I surpassing apex of clypeus, pronotum alate, connexival plates with 1–6 large teeth, trochanter and femur fused on all legs. *A. mirabilis* is redescribed, the male and probably the Vth instar larva of *A. foliaceus* is described and a key is given to the four species of the subgenus.

*Aradus mirabilis* Bergroth, 1892 was described in Latin without drawings. KIRITSHENKO (1913) placed it at the end of a list of species headed by *orientalis* Bergroth, 1885. KORMILEV (1957) when describing *foliaceus* suggested a distinct subgenus for it but deferred from describing it. Because the type of *mirabilis* was unavailable to entomologists two specimens of the two new species might be misidentified as *mirabilis*. Through the kindness of several colleagues I was able to study all published materials, and contribute to the knowledge of this group of curious and “pretty” species.

**Comparative notes:** KIRITSHENKO (1913) suggested a grouping of some allied species (*orientalis* Bergroth, 1885, *bergrothianus* Kiritshenko, 1913, *compar* KIRITSHENKO, 1913) and put *mirabilis* at the end of the list. They show relations in many ways, however, *mirabilis* and the other species treated here form a quite distinct natural group. They are Oriental in distribution and have two characters not shared by any other species investigated: the trochanter and femur are fused on all legs and the first antennal segment surpasses the apex of the clypeus. Other characters may be common to other species or species-groups. Antennal segment III is yellow or depressed in some species, and both characteristics can be found in some species of the *flavicornis*-group of circumtropical species. The alate pronotum and the highly extended connexival plates are unique, but less modified forms can be found in the *orientalis*-group and in a few other species. According to USINGER and MATSUDA (1959) the fused trochanter and femur is characteristic of some

genera of Carventinae but, in Aradinae (*Aradus*) the two joints are distinct on the hind legs. The place of articulation is marked by a fine suture or by coloration on the other legs. According to USINGER and MATSUDA (1959) a 2:2:1 pattern of ventral glabrous areas should be characteristic of the genus. It holds for some species of the *betulae*-group, but investigating some Palearctic species a colorful picture was found. Different patterns from 1(2):2:1 (lateral areas not distinct or deviations at intraspecific or even individual level) to 1:1:1 were observed. Note that the number of ventral glabrous areas may change during ontogeny (VÁSÁRHELYI, 1978, Štys, verbal communication), i.e. the anterior midlateral area may disappear while the lateral glabrous area may divide into two.

### *Aradus*. (*Miraradus* n. subg.)

Head with first antennal segment slightly or strongly surpassing apex of clypeus, antennal segment III yellow apically, more or less depressed. Pronotum alate, margin with teeth; macropterous. Trochanter and femur fused on all legs. Abdomen with extended connexival plates, borders with 1–6 large and sometimes with some smaller teeth. Spiracles II–VI ventral, far from border, VII lateral or near to border, VIII lateral. Pattern of ventral glabrous areas 1:2:1 or 1(2):2:1. Tergite IX and parandrium strongly reduced. Distribution Oriental.

Type species: *Aradus mirabilis* Bergroth, 1892.

#### Key to the four species of the subgenus

- 1 (6) Preocular tubercles short. Pronotum less than 4 times as wide as long. First antennal segment much surpassing apex of clypeus. Spiracle VII lateral.
- 2 (3) (♂) Antenniferous tubercles reaching about  $\frac{1}{2}$  of clypeus. Antennal segments III and IV about equally long, segment III slightly depressed but without furrow **oervendetes** n. sp.
- 3 (2) Antenniferous tubercles almost reaching apex of clypeus. Antennal segment III much longer than IV, with a wide furrow on depressed sides.
- 4 (5) (♂) Almost unicolorous blackish brown, apical  $\frac{3}{4}$  of antennal segment III and base of corium yellow. Connexival plates with 2–3 teeth **himalayensis** n. sp.
- 5 (4) (♀) Brown, apical  $\frac{4}{5}$  of antennal segment III, base of corium, preapical part of scutellum and hind border of connexival expan-

sion yellow. Connexival plates IV–VIII with 3 larger teeth

*mirabilis* Bergroth, 1892

- 6 (1) Preocular tubercles long, spine-like. Pronotum 4.1–4.2 times as wide as long. First antennal joint only slightly surpassing apex of clypeus. Spiracle VII ventral

*foliaceus* Kormilev, 1957

**Redescription of *Aradus mirabilis* Bergroth, 1892. Figs 1–2.**

♀, macropterous, blackish brown with yellow markings. Pronotal margin and connexiva widened, with acute flattened teeth of various size (Figs 1–2.)

Head as long as wide across eyes, antenniferous tubercles with tooth basally, acute, curving laterally, almost reaching rounded tip of strong anterior process of head. Preocular tubercles acute, not reaching beyond lateral margin of head. Eyes protruding, pedunculate. Postocular tubercles with two small teeth posterolaterally. Vertex with two large and four small callous spots. Antennae long, slender, segment I much surpassing tip of clypeus, segment II the longest, cylindrical, III flattened with shallow furrow on depressed sides, yellow with the exception of the basal part, segment IV cylindrical more slender than II. Relative length of antennal segments I to IV: 27:44:40:28. Labial atrium widely open, rostrum almost reaching hind margin of prosternum, tip between two small tubercles, proportions of rostral joints: 25:23:20.

Pronotum much wider than long (20:71) with alate pronotal margins directed laterodorsally. Disc with four longitudinal carinae, some tubercles marking the lateral ones. Anterior part with smooth spots. Pronotal margin yellow anteriorly and basally with teeth of various size anteriorly and laterally and tubercles posterobasally.

Scutellum large, subpentangular (74:52), flat, lateral margins raising subbasally and apically. Converging lateral borders straight, tip widely rounded. Disc with a low triangular elevation, basally brown, subapically yellow, apically black.

Hemelytra reaching beyond basal margin of tergite VIII. Corium basally expanded, basal margin with tubercles, lateral margin straight, reaching slightly beyond anterior margin of connexivum V. Corium brown with yellow spot basally and yellow tubercles along some veins, membrane brownish with light white markings.

Abdomen strongly widened with expanded connexival plates. Connexival plate II small, acute, III with 2 teeth IV with 2 teeth on right side and 3 teeth on left side, V–VIII with 3 conspicuous large teeth and

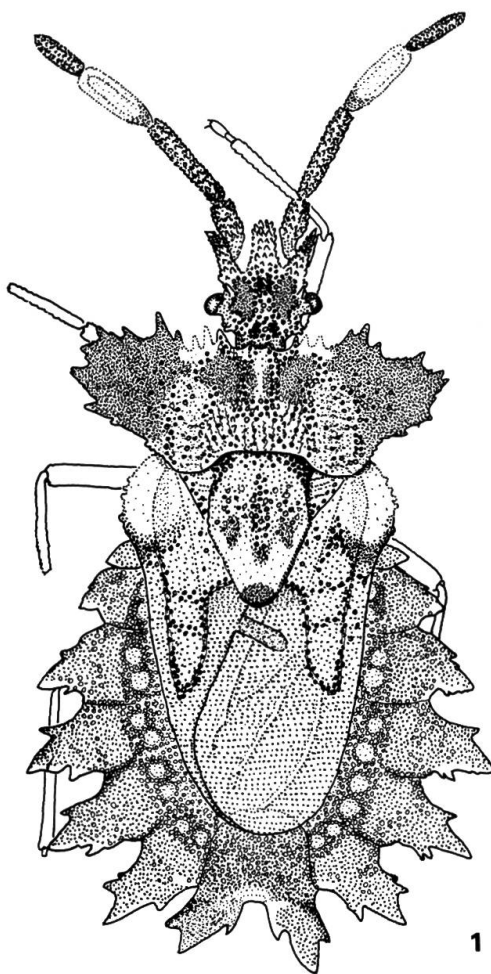


Fig. 1: *Aradus mirabilis* Bergroth, 1892.

sometimes with several small tubercles, hind margin of each plate yellow. Lateral glabrous areas large, rounded, surrounded by small tubercles. Connexival plate VIII bent downwards on left side. Spiracles II–VI ventral, latter closer to border than former ones, VII–VIII lateral. Lateral glabrous areas on ventral side not divided.

Legs long, slender, tibiae with yellow rings. Trochanter and femur fused on each leg, suture visible on hind leg.

Measurements: total length of body 9.1 mm; length of head 1.4 mm; width of head 1.4 mm; length of pronotum 1.3 mm; width of pronotum 4.7 mm; length of scutellum 2 mm; width of scutellum 1.4 mm; maximum width of body across segment V 5.5 mm; length of antenna 5.5 mm.

Holotype: "Carin Cheba, 900–1100 m, L. Fea V. XII.–88"; "Typus"; "*mirabilis* Bergr."; "Museo Civ. Genova"; "*Aradus mirabilis*

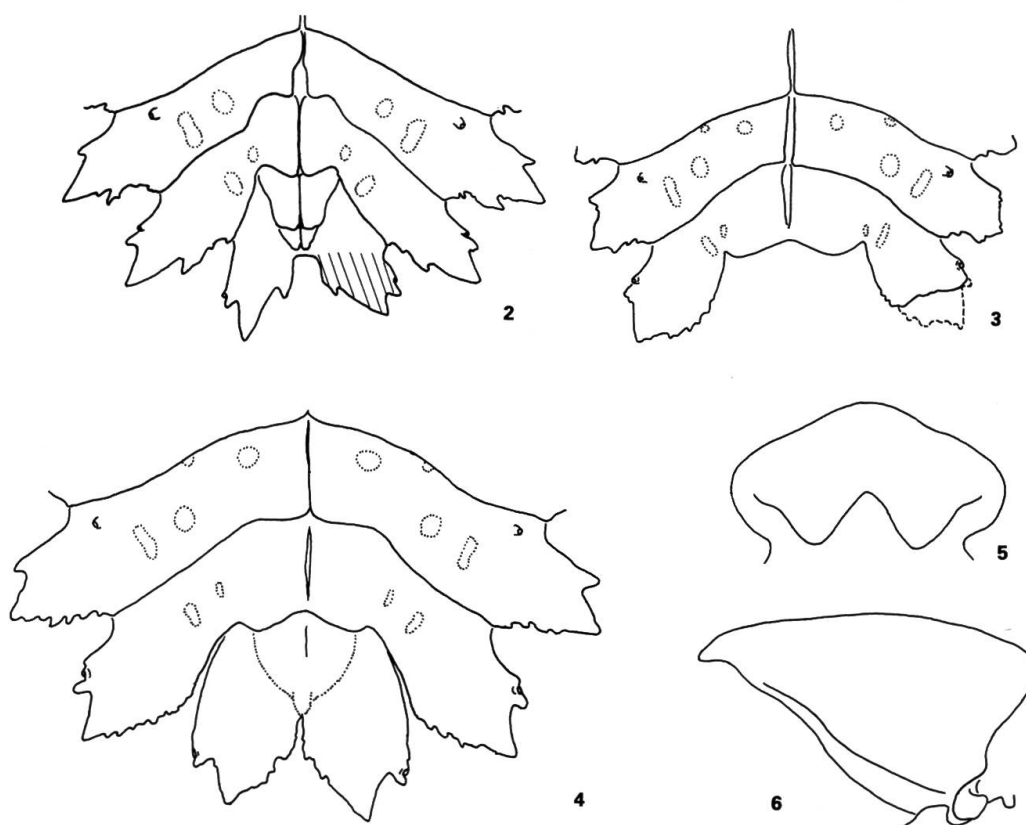
Bergr. typus!". Deposited in the Museo Civico di Storia Naturale, Genova.

**Aradus oervendetes** n.sp. Figs 3, 7.

*Aradus mirabilis* BERGROTH: Kormilev and Heiss 1975, p.94, Foto 1.

♂ macropterous, dark brown with yellow markings on some parts of body, pronotal margin and connexival plates with protruding teeth (Figs 3, 7).

Head about as long as wide (38:42) across eyes. Clypeus strong, reaching slightly beyond half of first antennal segment. Antenniferous tubercles pointed, reaching about half of clypeus, apex yellow, laterally with a tooth. Antennae long, subcylindrical, segment I club-shaped, II cylindrical slightly thickening apically, both dark brown, granulated. Segment III slightly depressed dorsoventrally but without furrow, basal  $\frac{1}{3}$  brown otherwise yellow, segment IV subcylindrical, blackish brown,



Figs 2–6: 2, *Aradus mirabilis* Bergroth, 1892, tip of abdomen. 3, *A. oervendetes* n.sp., tip of (damaged) abdomen. 4–6. *A. himalayensis* n. sp.: 4, tip of abdomen. 5, tergite IX. 6, right paramer.

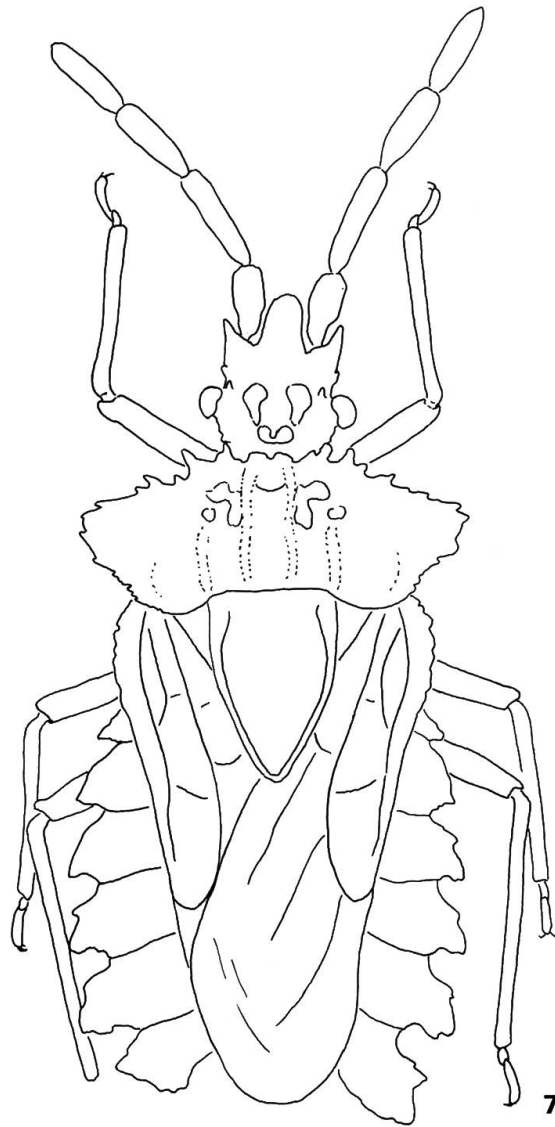


Fig. 7: *Aradus oervendetes* n. sp.

apex oblique. Relative length of antennal segments I to IV: 17:28:23:23. Preocular tubercles short and blunt, yellowish. Eyes pedunculate, postocular tubercles short and thin. Rostrum reaching hind margin of prosternum, relative length of rostral joints: 20:15:18.

Pronotum 3.2 times as wide as long (31:98) alate. Disc with two longitudinal carinae and with granules suggesting lateral ones. Two black callous spots on anterior part of disc. Lateral margin wing-like expanded, with large yellow teeth basally on anterior margin and smaller brown ones along other margins. Hind margin sinuate.

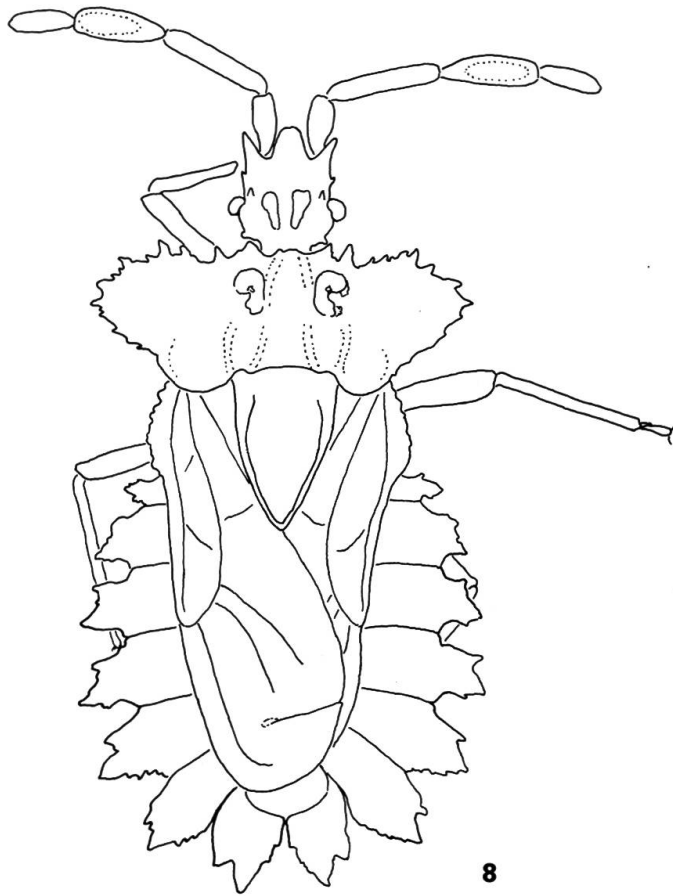


Fig. 8: *Aradus himalayensis* n.sp.

Scutellum pentangular, 1.5 times as long as wide (47:31), blackish brown except curling margin converging posteriorly. Disc with granules more dense on median part, anteriorly elevated.

Hemelytra reaching much beyond hind border of segment VII. Corium expanded and yellow at base, with some yellow spots and granules along veins. Membrane with only three longitudinal subparallel veins, brown with light yellow markings.

Abdomen widest across segment V, only moderately widening laterally. Connexival plates II–IV with one tooth, V with two, VI–VII with three larger teeth much less developed than on related species. Tip of abdomen missing. Tip of teeth and posterolateral glabrous areas yellow. Spiracle II far from lateral border, III–VI about equally near to it, VII lateral.

Legs long and slender, trochanter and femur fused on each leg but suture slightly visible. Tibia with two yellow rings, femur blackish brown.



Measurements: total length of body (without segment VIII) 5.3 mm; length of head 1 mm; width of head 1.1 mm; length of pronotum 0.85 mm; width of pronotum 2.6 mm; length of scutellum 1.25 mm; width of scutellum 0.85 mm; maximum width of body across segment V 2.7 mm.

Holotype: ♂ "Thimphu, 31.5.72."; "Nat.-Hist. Museum Basel-Bhutan Expedition 1972"; "*Aradus mirabilis* Bergroth, det. Heiss 74." Deposited in the Naturhistorisches Museum, Basel.

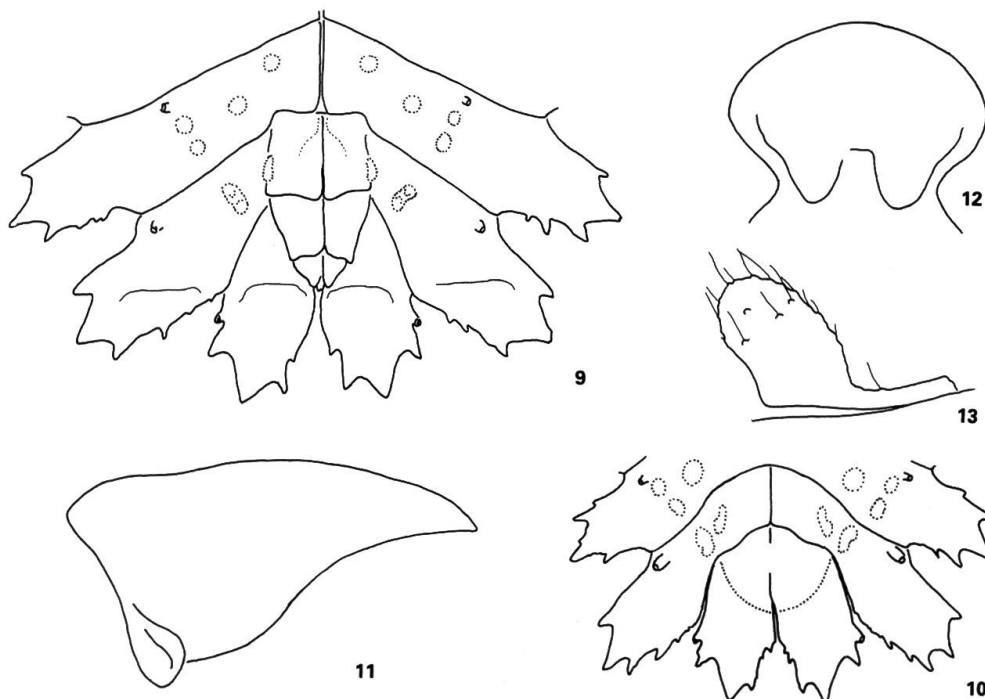
Unfortunately the tip of abdomen is missing, thus the genital apparatus could not be investigated. The species is, however, so interesting, morphologically as well as systematically, that I feel myself forced to describe it.

*Aradus himalayensis* n. sp. Figs 4–6, 8.

*Aradus mirabilis* Bergroth: Kormilev 1977, p.: 604.

♂, macropterous, dark blackish brown except apical  $\frac{3}{4}$  of antennal segment III; with acute teeth on lateral borders (Figs 4–6, 8).

Head about as long as wide (45:47). Clypeus reaching almost half of first antennal segment. Antenniferous tubercles acute, pointed, almost reaching tip of clypeus, with a strong tooth laterally. Antenna



Figs 9–13: *Aradus foliaceus* Kormilev, 1957: 9, tip of abdomen ♀. 10, tip of abdomen ♂. 11, left paramer. 12, tergite IX. 13, right parandrium.



Fig. 14: *Aradus foliaceus* Kormilev, 1957, male.

long, segment I club-shaped, II cylindrical, both granulated. Segment III depressed with fine wide furrow on depressed sides, basally brown, otherwise yellow. Segment IV black, subcylindrical apically oblique. Relative length of antennal segments I to IV: 24:45:37:23. Eyes pedunculate protruding. Preocular tubercles short and blunt, postocular tubercles slender. Vertex with two large smooth spots. Rostrum not reaching hind margin of fore coxae, relative length of rostral joints: 25:19:17.

Pronotum alate, 3.3 times as wide as long (18:60). Disc with four longitudinal carinae, median ones converging anteriorly, and with two large and some smaller callous spots. Margings with acute teeth, S-shaped anteriorly, almost straight posteriorly. Hind border medially sinuate.

Scutellum 1.5 times as long as wide, pentangular. Basal part some-

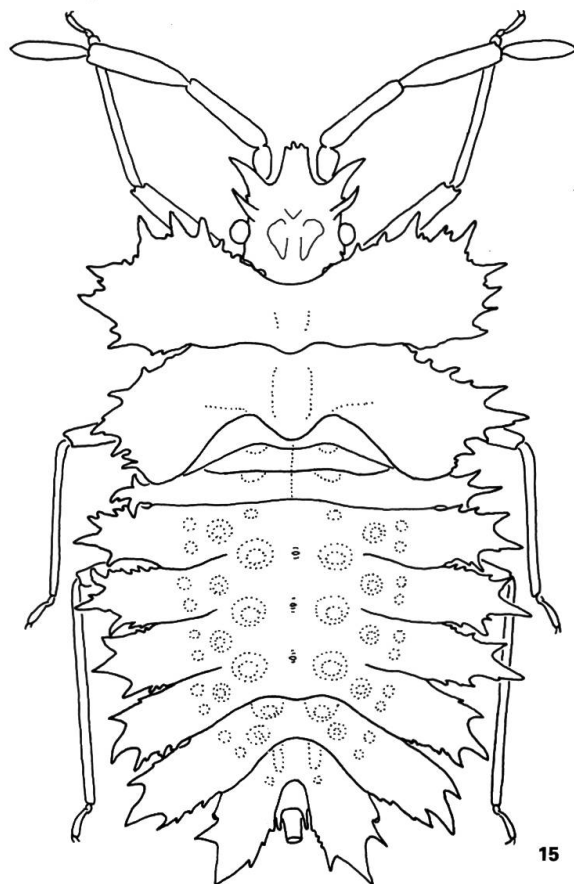


Fig. 15: *Probably Aradus foliaceus* Kormilev, 1957, Vth instar larva.

what elevated with two rounded callous spots, apical part transversely rugose, rugosity covered by granulations. Margin curling upwards.

Hemelytra almost reaching hind margin of segment VIII. Corium at base pale yellowish-brown, lateral margin slightly expanded basally. Membrane brown.

Abdomen rounded, connexival plates with 2–3 large teeth. Surface covered with granules and finely rugose spots laterad of lateral glabrous areas. Lateral glabrous areas not bordered by sharp rows of granules. Ventral lateral glabrous area not divided on segment VII, segments III–VI with two continuous centres visible. Spiracle II missing, a yellow spot marking its place, III–VI ventral, equally far from border, VII–VIII lateral. Tergite IX reduced to two triangular flattened scales, paramere broad, curved, parandrium even less developed than on *foliaceus*.

Legs long and slender, trochanter and femur fused on each leg, tibia with one pale ring.

Measurements: total length of body 8 mm; length of head 1.2 mm; width of head 1.25 mm; length of pronotum 1.2 mm; width of pronotum 4 mm; length of scutellum 1.7 mm; width of scutellum 1.1 mm; maximum width of body across segment V 4.1 mm.

Holotype: ♂, "Nepal: 9 mi W Hitaura 400 m, 23.XI.1961." "Collectors: E.S.Ross, D.Q.Cavagnaro", "Collection of the California Academy of Sciences, San Francisco, Calif."; "*Aradus mirabilis* Bergroth, det. N.Kormilev, 76." Deposited in the California Academy of Sciences, San Francisco.

### On *Aradus foliaceus* Kormilev, 1957 Figs 9–15.

Since the species was described on the basis of a single female specimen (female abdomen, Fig. 9), some characteristics of the male are also given. General shape similar that of the female but abdomen narrower, sides almost parallel (Fig. 14). Segments VI–VII somewhat wider than II–V. Connexival plate VIII with 5–6 teeth. Genitalia: (Figs 10–13.) tergite IX reduced to two small flat scales. Paramere curved, broad, parandria strongly reduced, short.

Measurements: total length of body 8.8–9.2 mm; length of head 1.4–1.5 mm; width of head 1.4 mm; length of pronotum 1.4 mm; width of pronotum 5.8–5.9 mm; length of scutellum 1.6–1.7 mm; width of scutellum 1.1–2! mm; maximum width of body across segment VI 4.5–4.7 mm.

Material examined: Tonkin: Hoa binh, leg. R.V. de Salvaza; Vietnam, Hon-Gai, 10–20. I. 1962. leg. Kabakov (1 ♂); Vietnam, 20 km S Kya-Pao, 200–700 m, 9.XII.1963. leg. Kabakov (1 ♂, 1 ♀). Latter ones from Zoological Institute, Leningrad.

There is one larval specimen, in the Hungarian Natural History Museum, belonging probably to this species (Fig. 15.) Head similar, eyes not pedunculate, preocular tubercles long, spine-like, antennae surprisingly similar to that of adult. Pro- and mesonotum with large teeth laterally. Connexival plates with 3 or more teeth. Tergites III–VI are completely fused medially. Trochanter and femur are fused on each leg. Ventral lateral glabrous area not devided; the ovipositor is marked by two small ridges.

Material: Vietnam, Cuc Phuong, Ninh binh, 3.V.1966. leg. Gy. Topál.

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