ISSN 0013-8738, Entomological Review, 2021, Vol. 101, No. 2, pp. 224–231. © Pleiades Publishing, Inc., 2021.
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# A New Genus and Two New Species of the Family Kinnaridae (Cicadina) from India and Iran

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Received October 24, 2019; revised December 8, 2019; accepted December 15, 2019

**Abstract**—A new genus, *Ptorthus* **gen. n.** with the type species *Ptorthus kermanicus* **sp. n.,** is described from Iran (Fars Province), and *Adolenda marusiki* **sp. n.,** from India (Uttar Pradesh State, Himalaya).

**Keywords:** Homoptera, Cicadina, Kinnaridae, new genus, new species, India, Iran

**DOI:** 10.1134/S0013873821020081

The small family Kinnaridae was established rather late: it was described by Muir only in 1925 (Muir, 1925). This taxon was distinguished as such, and already in the rank of a family, considerably later than, for example, the derived family Meenoplidae established by Fieber as long ago as 1872 (Fieber, 1872). However, in the Metcalf's catalog (Metcalf, 1945), the genera *Southia* Kirkaldy, 1904, *Micrixia* Fowler, 1904, and *Adolenda* Distant, 1911 were still included in the family Cixiidae. The external similarity between the representatives of Kinnaridae and Cixiidae, in which the former had been earlier placed, let down the researchers even after the publication of Muir's contributions and conclusions (Dlabola, 1957, 1981). The most striking and significant differences of this family from Cixiidae are the reduced ovipositor of Kinnaridae, against that well-developed in Cixiidae, and the presence of wax-pore plates on abdominal tergites VI–VIII, which are missing in Cixiidae.

It is reasonable to assume that the limits of the distribution of the family have not been quite determined. This is evidenced by rather recent unexpected records of its representatives in Afghanistan (Dlabola, 1957), Iran (Dlabola, 1981; Emeljanov, 1984), the Canaries (Remane, 1985), the mountains of Middle Asia (Emeljanov, 1984, 1990), in Southern China (Liang, 2001), the United Arab Emirates (Wilson, 2010,) Somalia (Van Stalle, 1986), Reunion Island (Synave, 1958), and Chile (Emeljanov, 2016; Campodonico and Emeljanov, 2017).

Two genera of Kinnaridae were described from India: *Adolenda* Distant, 1911 and *Paramicrixia* Distant, 1911 (Distant, 1911). The genus *Adolenda* is known from the Himalayas and the Tien Shan Mt. Range; the genus *Paramicrixia* may also be Himalayan, since it recorded for Bengal without exact indication of the locality, and the territory of the historical Bengal reaches the Himalayas in the north. In Iran, the first records of the family were made by N.A. Zarudny as long early as 1901 but were described much later (Emeljanov, 1984) already after Dlabola's (1981) publication.

The type specimens of the species described in the present paper are deposited in the collection of the Zoological Institute, Russian Academy of Sciences, St. Petersburg (ZIN) and in Hayk Mirzayans Insect Museum, Iranian Research Institute of Plant Protection, Tehran, Iran (HMIM). The terminology follows that used in section "Auchenorrhyncha" in the Key to the Insects of the Far East of the USSR (Anufriev and Emeljanov, 1988).

***PTORTHUS*** Emeljanov, gen. n.

Type species *Ptorthus kermanicus* sp. n.

**Description.** Fore wings steeply roof-shaped folded. Head (Fig. 1, *1*, *2*) nearly half as wide as pronotum. Coryphe with sharp straight anterior and lateral carinae, with concave surface not elevated posteriorly toward margin, remaining sulciform. Posterior margin of coryphe deeply rectangularly emarginate, with narrowly

rounded apex of emargination, without distinct marginal carina; anterior margin rather wide; lateral margins diverging posteriorly at an acute angle; posterior width of coryphe subequal to its entire length. Anterior margin of coryphe nearly on a level with anterior margins of eyes. Posterior emargination of coryphe occupying about half of its entire length. Median carina absent. Face narrow, elongate. Metope sulciform, without median carina; length of metope more than thrice its maximum width (at margin of clypeus); lower margin of metope weakly concave. In lateral view, lateral carinae of metope almost continuing the line of coryphe margin , steeply curved dorsally, gently arcuate ventrally. In frontal view, lateral carinae of metope weakly convex, diverging from coryphe to clypeus in such a way that distance between them doubling. Median ocellus large, situated at most clypeal margin. Lateral carinae of postclypeus high, forming an integrated whole with lateral carinae of metope, approximate with each other on postclypeus at the border with anteclypeus and approaching it very closely; median carina sharp but not elevated. Anteclypeus without lateral carinae, with median carina continuing carina of postclypeus in basal half (0.45–0.55), without carinae distally. Postclypeus about 2/3 as long as metope; anteclypeus slightly shorter than postclypeus. Rostrum projecting beyond apices of hind coxae, slightly shorter than cranium; apical segment of rostrum 2/3 as long as subapical one; apex of the latter at a level with apices of hind coxae. Genae below antennae with unsharp, obliquely transverse carina (edge of gently roof-shaped elevation) running from lower margin of antennal socket to lower part of lateral carina of metope; this may be homologous with typical carina of many Derbidae. Antennal socket occupying about half of gena length . Eyes rather small, reniform, with gently concave lower margin adjoined by antennal socket. Antennae simple; scape ring-shaped; pedicel oviform, weakly elongate.

Pronotum rather extended antero-posteriorly; disc rather long with well-developed lateral carinae. Anterior margin of disc projecting anteriad in the form of an approximately right angle, rounded apically, occupying posterior emargination of coryphe; lateral carinae diverging posteriorly; posterior margin obtuse-angularly concave. Carinae of anterior margin sharp, high; lateral and median carinae moderately projecting, less strong; posterior margin without distinct carina. In connection with steeply roof-shaped position of wings at rest, paradiscal fields rather steeply descending laterally, bending along lateral carinae of disc. Posterior margin of pronotal dorsum smoothly convexly bending before tegulae, turned antero-laterally in the usual way. Sharp carina of anterior margin of disc, as a whole, continuing as anterior (postocular) carina of flanks of pronotal dorsum (its paradiscal fields) and connected at acute angle with similar sharp lateral carina; collateral carina absent. Paranotal lobes bounded to lateral carina dorsally, diamond-shaped. Tegulae without carinae. Mesoscutal disc (scutellum) large; its anterior margin obtuse-angularly projecting; posterior margin subrectangular; longitudinal carinae of scutellum distinct; lateral carinae slightly diverging posteriorly. Lateral lobes of scutellum, as well as paradiscal lobes of pronotum, rather steeply inclined laterally.

Fore wings subparallel-sided, only slightly widened towards membrane. Costal area moderately wide, subparallel-sided. Membrane occupying about 1/3 of entire length of wing, regularly rounded apically. Common base of veins (*ScRM*) in the area of basal cell and before separation of *ScR* and *M* highly keel-shaped, especially at basal cell. Basal vein of stigmal cell (*Sc*) ill-defined, membranous, pale (Fig. 1, *3*). First branchings of stems of *ScR* and *M* lying slightly basal to nodal cross-veins. Stigmal cell with 1 cross-vein, almost not widened in the area of postnodal cross-vein (*ra–rp*); medial area not narrowed there. Insular cell (fork of *CuA* closed distally) small. Apical branchings of veins *RP*, *MA*, and *MP* lying slightly distal to postnodal row of cross-veins. Combined claval vein (*Pcu + A1*) rather steeply arcuately curved before running into posterior margin of wing. Cross-vein lying at apex of clavus ill-defined similar to basal vein of stigma (Fig. 1, *3*). Proportions of legs medium; hind tibia without lateral teeth, with 3 + 5 teeth at apex. 1st segment of hind tarsus with 7 teeth bearing no subapical setae, with lateral teeth weakly varying in size; 2nd segment with 6 teeth, with large lateral teeth bearing no subapical setae, with 4 inner teeth bearing subapical setae.

Abdomen of female with waxpore plates on tergites VI–VIII. Female genitalia (not dissected) on the whole typical of the family. Appendages of segment VIII (presumably, fused rudiments of basicoxites and valves) appearing as an integral formation resembling apical half of a spoon. More pigmented lateral parts (presumably valvifers) and less pigmented and less sclerotized middle

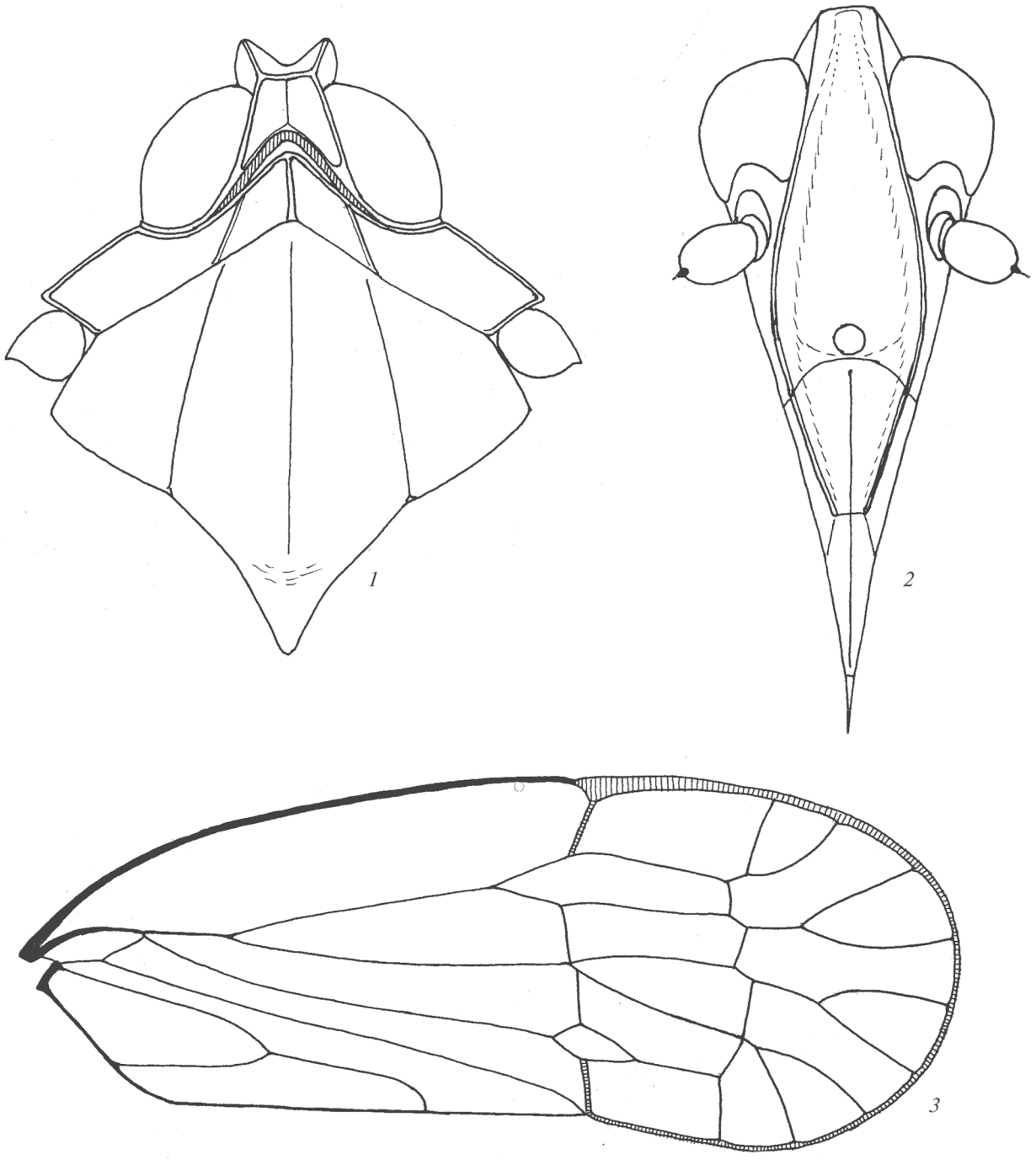


**Fig. 1.** *Ptorthus kermanicus* gen. et sp. n.: (*1*) anterior part of body in dorsal view, (*2*) head in fronto-ventral view (face), (*3*) fore wing.

parts (presumably valves) can be distinguished. Sheaths densely closed along midline. Depression above 1st sheaths bounded laterally with tergite's margins converging dorsally toward base of anal tube; anal tube rather narrow, concealing most part of the depression and leaving unconcealed slit between it and 1st sheaths.

**Etymology.** From the ancient Greek πτορθος (an offshoot).

**Discussion and diagnosis.** The new genus is related to the genera *Perloma* Emeljanov, 1984 and *Adolenda* Distant, 1911. It differs from them in steeply roof-shaped

folded wings and, consequently, in the lateral parts of the pronotum and mesoscutellum more steeply inclined laterally. The obtuse-angled bend between the planes of the pronotal disc and its paradiscal lobes is outlined by the discal lateral carinae missing in the other representatives of the tribe Adolendini which are characterized by the uniform discal-paradiscal field either flat or gently transversely convex similarly to that in, for example, *Adolenda marusiki* sp. n. (Fig. 1, *4*). In addition, the pronotum in the new genus is longer, similarly to that in the tribe Prosotropini, but differs in the degree of its development and in the configuration of the carinae. The new genus, in addition, has an inconspicuous subantennal genal carina already mentioned in the description; a similar carina is also present in the representatives of the genus *Perloma.*

***Ptorthus kermanicus*** Emeljanov, sp. n.
(Fig. 1)

**Material.** Holotype female: Iran, Fars Province, nr. Dashte Arzhan, 2218 m, 29°33.139′N, 51°57.058′E, 14.VI.2019, V.M. Gnezdilov leg. (ZIN). Paratype, 1 female: Iran, Fars Province, nr. Dashte Arzhan, 2218 m, 29°33.139′N, 51°57.058′E, 14.VI. 2019, V.M. Gnezdilov leg. (HMIM).

**Description.** Coloration. On the whole, grayish brown tones prevailing. Legs and dorsal median stripe running along body from coryphe to apex of clavus (when wings folded) pale. Coryphe and upper part of metope between eyes pale, yellowish with weak orange-brown tint; head below grayish, with vague passage to darkening. Ocelli pale. Vague pale spot lying above genal carina. Upper margin of lora with pale, nearly white transverse spot. Pronotal disc white; other parts brownish gray. Mesoscutal disc nearly white, with weak brownish tint; paradiscal fields brownish gray; at sides of pale lateral carinae, coloration of paradiscs deepened up to black in the form of a narrow stripe with vague outer margin. Tegulae pale. Fore wing mainly grayish brown. Corium and membrane brownish gray or grayish brown, with soft small pale spots; clavus and basal half (0.45–0.55) of cubital area of corium without spots. Veins dark. Base of fore wing paler at the level of basal cell. Chain of elongate pale small spots extending before vein *ScR*; narrow dark borders between these spots oblique, appearing as outlined (long) oblique lines crossing entire costal area, as those in some Kinnaridae, for example, in *Adolenda fuscofasciata* Liang, 2001 and in the other Fulgoroidea. Cuneiform, indistinctly bounded pale spots lying on membrane between terminal veins and originating from margin of wing; apices of veins becoming darker. Clavus with entirely pale (up to white) marginal area, with pale vein *A1* and its continuation *Pcu* + *A1*; *A1* briefly darkened only slightly basal to fork; apex of *Pcu* + *A1* also darkened; pale spot extending to apex of clavus and finishing pale dorsal stripe; described dark projections on vein *A1* and on apex of *Pcu* + *A1* forming constrictions on this stripe. Abdomen dark brown.

Length of female 5.6–5.8 mm.

**Note.** According to V.M. Gnezdilov report, this species was collected by sweeping trees in a rather sparse wood with oak, hawthorn, maple, and pistachio.

**Etymology.** Derived from the name of the Iranian province of Kerman, where the species was found.

Genus ***ADOLENDA*** Distant, 1911

***Adolenda marusiki*** Emeljanov, sp. n.
(Fig. 2, Fig. 3)

**Material.** Holotype male: India, Uttar Pradesh, Babind Ghat village, 30°37.5′N, 79°33.5′E, 1750–1900 m, 17–23.V.1999, Yu.M. Marusik leg. (ZIN). Paratypes: 1 male, 3 females, India: Uttar Pradesh, Babind Ghat village, 30°37.5′N, 79°33.5′E, 1750–1900 m, 17–23.V.1999, Yu. M. Marusik leg. (ZIN).

**Description.** This species is similar to the type species of the genus, *Adolenda typica* Distant, 1911, to which it is apparently closely related (the genitalia of *A. typica* have not been examined). Anterior margin of coryphe narrow; coryphe sulciform, separated anteriorly by its anterior carina, not closed posteriorly; furrow not partitioned. Posterior margin deeply acute-angularly emarginate; emargination narrowly rounded apically, reaching approximately level of middle of eyes (in dorsal view). Coryphe and metope fused in lateral view at an obtuse angle close to 90. Metope without median carina, also sulciform, with foliate lateral carinae, trapeziform in cross-section ventrally, nearly cuneiform dorsally. Lateral carinae slightly concave in upper half (0.45–0.55), more clearly convex in lower part and smoothly, without bend passing into postclypeal lateral carinae approximating and descending to anteclypeus;

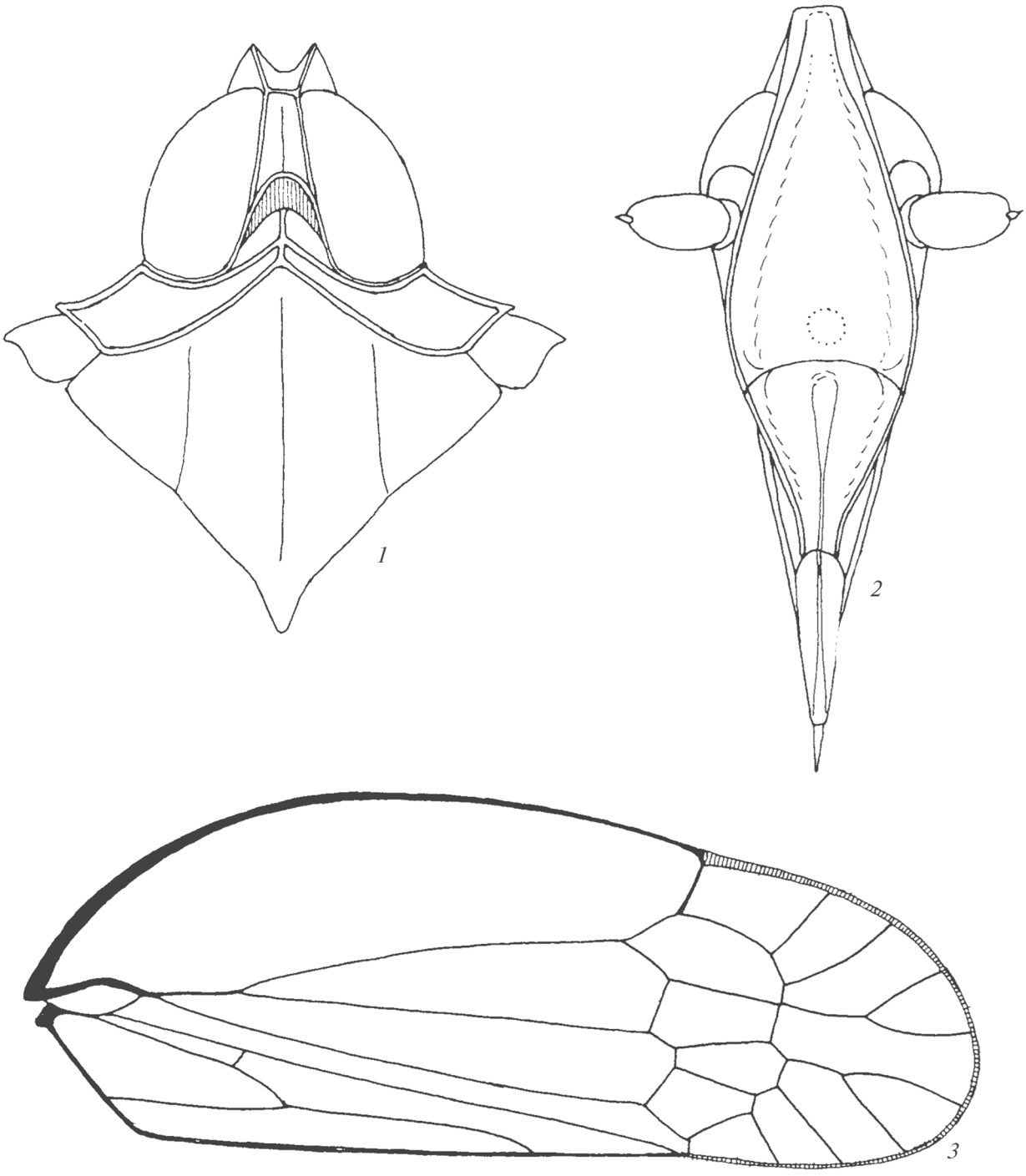


**Fig. 2.** *Adolenda marusiki* sp. n.: (*1*) anterior part of body in dorsal view, (*2*) head in fronto-ventral view (face), (*3*) fore wing.

before anteclypeus, these carinae slightly deflexed outwards and becoming parallel. Border between metope and clypeus straight, sulciform depressed. Median ocellus large, shifted from suture approximately for 1/3 of its diameter. Rostrum moderately long; in male, it nearly reaching anterior margin of pygophore, with base at a level with apices of hind coxae. Pronotum short, especially in middle part where anterior and posterior carinae approximate to such extent than distance between them subequal to 1 or 1.5 their own width. Posterior and anterior carinae sharp, connected at sides by similarly sharp lateral carinae of pronotal dorsum. Median carina

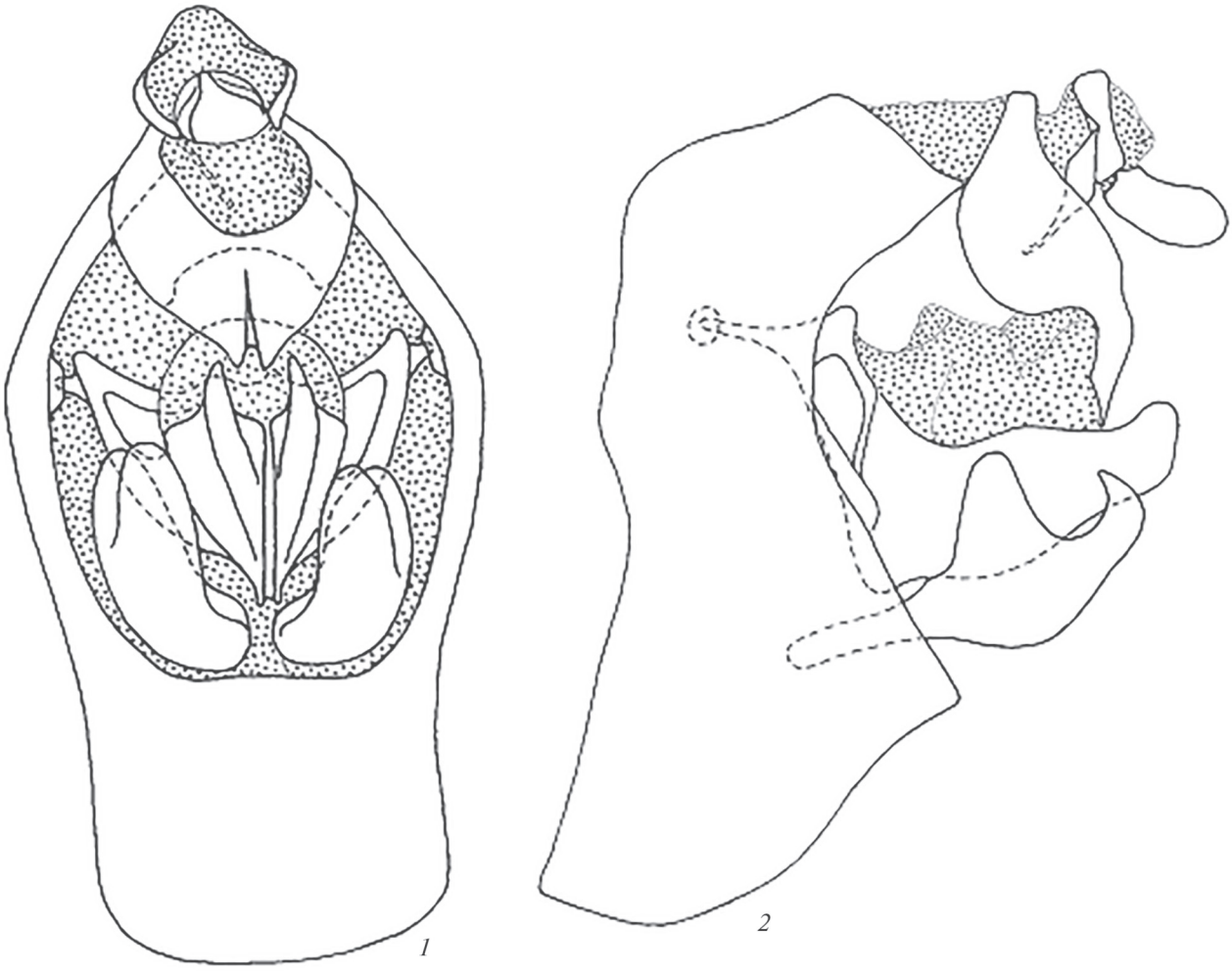


**Fig. 3.** *Adolenda marusiki* sp. n., male genitalia: (*1*) posterior view, (*2*) lateral view.

of pronotal disc protruding anteriorly from point of connection of parts of anterior carina. Scutellum large; its visible anterior margin outlined by posterior margin of pronotum, weakly obtuse-angled; posterior margin subrectangular; lateral carinae diverging posteriorly less strongly than those in *A. typica* after the drawing by Distant (1911, 1916). Fore wing of *A. marusiki* differs from those in *A. typica* in a wider costal area and in a more steeply curved costal vein. 1st poststigmal vein *RP1* originating as 2nd stigmal vein. Interradial vein connected posteriorly not with common stem of *RP* but with its 1st branch *RP1* near base of the stem; apical interradial cell thus appearing as a part of stigma but not dense in contrast to stigma. In *A. typica*, judging by Distant's drawing (l. c.), stigma also monocelled and compressed, but 1st poststigmal vein originating separately from stem of *RP* or from point of connection of vein *ir* with *RP*. Apex of hind tibia with 7 teeth (3 + 4). 1st segment of hind tarsus with 7 teeth bearing no subapical setae; 2nd segment with 6 teeth among which 4 inner teeth bearing subapical setae.

Coloration mainly pale brown; carinae pale, nearly white. Lateral foliate carinae of head brownish with pale ridges. Ocelli pale. Rostrum dark brown. Tegulae brownish with widely pale margins. Fore wing hyaline with brownish veins. Membrane with darkened, brownish compressed stigma and postclaval marginal cell. Cross-veins of nodal row and areas of longitudinal veins connecting them darker; in postnodal row, veins *rm* and *im* darkened. Membrane with white veins *MA1* and *MA2* bordering cell between them in anteapical row and also vein originating from apex of this cell. All

apical veins of membrane darkened, becoming darker toward margin of wing. Vein *MP* between postnodal row and base of apical fork also pale. Clavus with 2 dark spots: 1 at its apex and 1 in fork between vein *Pcu* + *A1* and margin of wing. Fore and middle femora brown with pale carinae; tibiae more regularly brown; tarsi slightly darker than tibiae; occasionally femora and tibiae almost entirely pale. Hind femur brownish with pale carinae; hind tibia pale brown with black teeth at apex; tarsus also pale brown with black teeth. Abdomen dark brown; posterior margins of segments paler. Genitalia in both sexes paler, with vague darker spots, as though faded.

**Male genitalia.** Pygophore short and high; its height more than twice its maximum width. Lateral part of posterior margin gently arcuately concave; upper part above junction with anal tube also gently arcuately concave; projection for junction with anal tube rectangular with sharply pronounced apex. Ventral wall of pygophore longitudinally and transversely convex, turned dorso-caudally; thus, posterior opening in sclerotization of pygophore lower than anterior one. Anal tube with short dorsal wall; lateral walls wide, with lower margin arcuately projecting ventrally; lower margin sharply narrowed before apical processes in such a manner that these processes continuing dorsal surface of tube. Processes wide, flattened dorso-ventrally; their medial margins closely approximate, fused nearly up to apices, separated by dorsal furrow; free apices pointed. Posterior opening in sclerotization of pygophore roundly pentagonal, about 1.5 times as high as wide. Upper 1/3 of inner surface of lateral walls of pygophore with a pair of "cups" of junction with phallobase. Phallobase with triangular base; apex turned ventrally; condyles running into the above-mentioned "cups" on pygophore walls situated near its lateral corners. In upper part, side of phallobase appearing as a framework owing to its thickened margins. A pair of elongate compressed, apically rounded, posteriorly directed lobes originating from phallobase closer to its midline. Amorphous membranous, wad-shaped part of penis situated between and above lobes. Styli situated under phallobase, occupying entire space down to lower margin of posterior opening of pygophore; styli typical of the family, arcuate on the whole, thick, with apices deflexed dorsally, bearing thick subbasal projections on dorsal side.

Length of male 5.2; length of female 5.4–5.6 mm.

**Comparative notes.** The new species differs from the type species *A. typica* in (1) a narrower coryphe weakly widened posteriorly, (2) a wider metope with convex, instead of straight, lateral carinae and with subparallel, instead of substantially diverging posteriorly, lateral carinae of the scutellum, (3) a wider costal area with a more steeply curved costal vein, and (4) the first poststigmal vein *RP1* originating as the second stigmal vein, since the cross-vein *ir* is attached to *RP1* and not to the common stem of *RP* before its first branching, in contrast to that in *A. typica.*

**Etymology.** The species is named after the well-known arachnologist Yu.M. Marusik who collected it.

## ACKNOWLEDGMENTS

The study was performed within the framework of state project no. AAAA-A19119020690101-6.

## COMPLIANCE WITH ETHICAL STANDARDS

All applicable international, national, and institutional guidelines for the care and use of animals were followed. All procedures performed in studies involving animals were in accordance with the ethical standards of the institution or practice at which the studies were conducted.

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