

To the Knowledge of the African Fauna of the Family Issidae (Hemiptera, Auchenorrhyncha: Fulgoroidea) with Descriptions of New Genera and New Species¹

V. M. Gnezdilov

Zoological Institute, Russian Academy of Sciences, St. Petersburg, 199034 Russia

e-mail: vmgnezdilov@mail.ru, vgnezdilov@zin.ru

Received September 21, 2016

Abstract—Two new genera and two new species of the family Issidae are described from Cameroon and the Republic of the Congo; two new species of the genus *Issus* Fabricius are also described from Libya (the Barka Peninsula) and Morocco; a new species of the genus *Kovacsiana* Synave is described from northeastern Nigeria. Supplemented descriptions of *Chimetopon camerunensis* Schmidt, 1910, *Hemisobium hammersteini* Schmidt, 1911, and *Kovacsiana abyssinica* Synave, 1956 are provided based on examination of the type specimens. A new subtribe is erected in the tribe Issini for accommodation of the genera *Chimetopon* Schmidt, 1910, *Cascaruna* gen. n., and *Ikonza* Hesse, 1925. *Hysteropterum horvathi* Melichar, 1906 and *H. vibex* Melichar, 1906 are transferred to the genus *Kovacsiana*. *Issus acuminatus* Lethierry, 1876 is placed in synonymy to *I. patruelis* Stål, 1861 and transferred to the genus *Semissus* Melichar, 1906. The faunal species-richness and pattern of the distribution of the family Issidae in Africa are briefly discussed.

DOI: 10.1134/S0013873816090074

The African fauna of the family Issidae has been studied extremely irregularly. Most data concern the Mediterranean (Palearctic) part of the continent: 17 genera with 55 species are known from Egypt, Libya, Tunisia, Algeria, and Morocco; 4 genera (*Lindbergatium* Dlabola, 1984, *Lethierium* Dlabola, 1980, *Semissus* Melichar, 1906, and *Sfaxia* Bergevin, 1917) are endemic to this region (Gnezdilov et al., 2014). Though the fauna of tropical Africa is distinctly less rich and has been less completely studied, it is of great interest due to its plentifulness with relict forms (Gnezdilov, 2016a, 2016b). As I have noted earlier (Gnezdilov, 2013), the Afrotropical fauna of Issidae is rather poor and currently includes only 20 species belonging to 6 genera: *Chimetopon* Schmidt, 1910, *Hemisobium* Schmidt, 1911, *Ikonza* Hesse, 1925, *Katonella* Schmidt, 1911, *Kivupterum* Dlabola, 1985, and *Kovacsiana* Synave, 1956. The majority of the species of the genera *Katonella* Schmidt, *Kivupterum* Dlabola, and *Kovacsiana* Synave are associated with the mountain and savannah biotopes of eastern Africa, except for *Kivupterum kivuense* (Synave, 1957) which was recorded from “wet forest biotopes” of Sudan (Linna-

vuori, 1973). The Issidae fauna of equatorial Western Africa has been very poorly studied.

The material of the genus *Issus* Fabricius from Libya was granted to the collection of the Zoological Institute of the Russian Academy of Sciences by the late Dr. Hani Abdul-Nour (Lebanon) who also supplemented our collection with material on a variety of Lebanese endemics. One more species of the genus *Issus* is described from Henri Vaucher’s collections made in 1900 in Morocco (without indication of an exact locality). Both the new species are similar to *Issus lauri* Ahrens, 1814 but clearly differ in the structure of the male genitalia.

The record of a representative of the genus *Issus*, *I. tubiflexus* sp. n., is of great interest, since this genus has not been recorded until now from Mediterranean Northeastern Africa; the nearest records from this region are represented by *Issus abdunnouri* Dlabola, 1987 from Turkey, Lebanon, and Israel (Dlabola, 1987; Gnezdilov et al., 2004; Gnezdilov, 2011).

The two monotypical genera of the family Issidae from Cameroon and the Republic of the Congo and the new species of *Kovacsiana* from Nigeria described below considerably expand our conception of the distribution of the family Issidae in tropical Africa.

¹ This article was originally submitted by the author in Russian and is first published in translation.

In particular, *Carydiopterum genimaculatum* gen. et sp. n. from the Republic of the Congo (Brazzaville) is the only, apart from *Chimetopon camerunensis* Schmidt, 1910 (Cameroon, Gabon), representative of the family found in Equatorial Africa; *Kovacsiana niger* sp. n. from Northeastern Nigeria is the first species of the genus *Kovacsiana* recorded from Western Africa; the other species of this genus are known from Eritrea, eastern Ethiopia, and northeastern Tanzania. Material of *Kovacsiana* from Djibouti is also listed below. In addition, I know one non-identified species of this genus from southwestern Yemen.

Species of the genera *Ikonza* and *Chimetopon* and herein described *Cascaruna* gen. n. (Figs. 36, 43, 64) with developed three-lobed hind wings are distributed in Western and Southwestern Africa and can be attributed to relicts—a new subtribe is erected here to accommodate these genera. In particular, *Chimetopon* and *Cascaruna* gen. n. were recorded from Equatorial Western Africa (Cameroon and Gabon) (Schmidt, 1910; Gnezdilov, 2013). Phylogenetic relicts of birds are also known from this region (Fjeldså and Lovett, 1997). Studies of the African ornithological fauna have revealed that the phylogenetic relicts are rather uniformly distributed in the Guinea-Liberia, Ghana, Cameroon-Gabon, and Eastern-Congo lowlands, with an insignificant number of the species occurring in the western part of the basin of the Congo. The distribution of the plants is similar (Friis, 1992; Fjeldså and Lovett, 1997), with the phylogenetic relicts concentrated in the rain forests of Cameroon and Gabon, in the southwestern part of the Congo forests, and on the eastern mountain ridge in Tanzania.

The material examined, including the type specimens of the species described below, is deposited in the collections of the Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia (ZIN), the Zoologisches Museum Hamburg, Germany (ZMH), Museum and Institute of Zoology, Polish Academy of Sciences, Warsaw, Poland (MIZ), the Hungarian Natural History Museum, Budapest, Hungary (HNHM), Museum national d'Histoire naturelle, Paris, France (MNHN), the National Museum, Prague, the Czech Republic (NMPC), Moravian Museum, Brno, the Czech Republic (MMBC), the Zoologisches Museum, Humboldt Universität, Berlin, Germany (ZMHB), and the Natural History Museum, London, United Kingdom (BMNH).

The terminology used here follows Gnezdilov (2002, 2003) and Gnezdilov et al. (2014). The photographs were taken by means of microscopes Leica Z16 APOA with a Leica DFC490 videocamera and Leica MZ 95 with a Leica DFC 290 videocamera and subsequently processed with Leica Application Suite, Auto-Montage Essentials, Helicon Focus, and Adobe Photoshop software. The figures were performed using a Leica MZ95 microscope and a drawing tube.

Family **ISSIDAE** Spinola

Tribe Issini Spinola

Subtribe Issina Spinola

Genus ***Issus*** Fabricius, 1803

Issus Fabricius, 1803 : 99.

Type species *Cicada coleoprata* Fabricius, 1781.

The genus belongs to the basal group of the subtribe Issina, comprising the taxa with bilobed hind wings (Figs. 22–24). The range of this western Palearctic taxon extends from the Canaries and Madeira, across the entire Mediterranean Area and Europe, to the Caucasus (Gnezdilov, 2013, 2016c; Gnezdilov et al., 2014).

The genus comprises 30 species; *I. analis* Brullé, 1833 was recently transferred to the genus *Zopherisca* Emeljanov, 2001 (Gnezdilov and Bourgoïn, 2017); *I. patruelis* Stål, 1861 is a senior synonym of *Semissus acuminatus* (Lethierry, 1876) (see below). The status of the four species known only from the original descriptions (*I. bellardi* Melichar, 1906, *I. cinereus* (Olivier, 1791), *I. fieberi* Melichar, 1906, and *I. pallipes* Lucas, 1853) requires verification.

Issus coleopratus (Fabricius, 1781) and *I. muscaeformis* (Schrank, 1781) are widely distributed in Europe, except for the Iberian Peninsula with only *I. coleopratus* occurring there and the Scandinavian Peninsula with only *I. muscaeformis* known from there. The former species is also known from Hong Kong (it was described from there under the name *Issus quadriguttatus* Walker, 1851 (Walker, 1851; Gnezdilov et al., 2004)) and from Saint Helena Island in the Atlantic (Synave, 1976). In my opinion, the record of the species from Hong Kong might result from an erroneous labeling of the specimen described by Walker, and introduction of the species to Saint Helena Island could occur during historical time

(Gnezdilov, 2013). The record of *I. coleoptratus* from Algeria (Lethierry, 1889) is disputable and appears to be relevant to *I. kabylicus* Dlabola, 1989. Among the other species, only *I. lauri* Ahrens, 1814 is widely distributed in Mediterranean Europe (from Corsica in the west to Albania in the east); the overwhelming majority of the other species are strict endemics (Gnezdilov et al., 2014). Though most of the species described (16) are known from the Canary Islands, R. Remane (1985), distinguishing these species, noted that he described them “for the future” because of difficulties in their differentiation.

According to Bartlett et al. (2014), *Issus servillei* Spinola, 1839 from North America has the status of an “incertae sedis” species. *Issus walkeri* Metcalf, 1958 (the replacing name for *Issus ellipticus* Walker, 1852, nec *Issus ellipticus* Germar, 1830) from the Philippines (Metcalf, 1958) should also be attributed to the same category, as its taxonomic position is vague and the type material is inaccessible for examination.

Comparative morphological analysis has shown essential differences in the structure of the phallobase between the species of the genus *Issus*. In particular, *I. lauri* differs in the presence of a strong cariniform process in the basal part of the phallobase (the carina of the phallobase). A similar process was found in *I. tubiflexus* sp. n. (Fig. 6, *cph*). In *I. afroauri* Sergel, 1986, this process is considerably reduced but still bears the carina (Sergel, 1986b). In *I. climacus* sensu Sergel (Sergel, 1986a), this process is weak but still visible; in all the other characters, this species is closely related to the *I. canariensis* group whose members have lost both the process and the carina of the phallobase. An insignificant projection (a carina) is also present in *I. muscaeformis*, *I. pospisili* Dlabola, 1958, and *I. kabylicus*. *Issus coleoptratus*, *I. abdulnouri* Dlabola, 1987, and *I. vaucheri* sp. n. have no projection (Fig. 15).

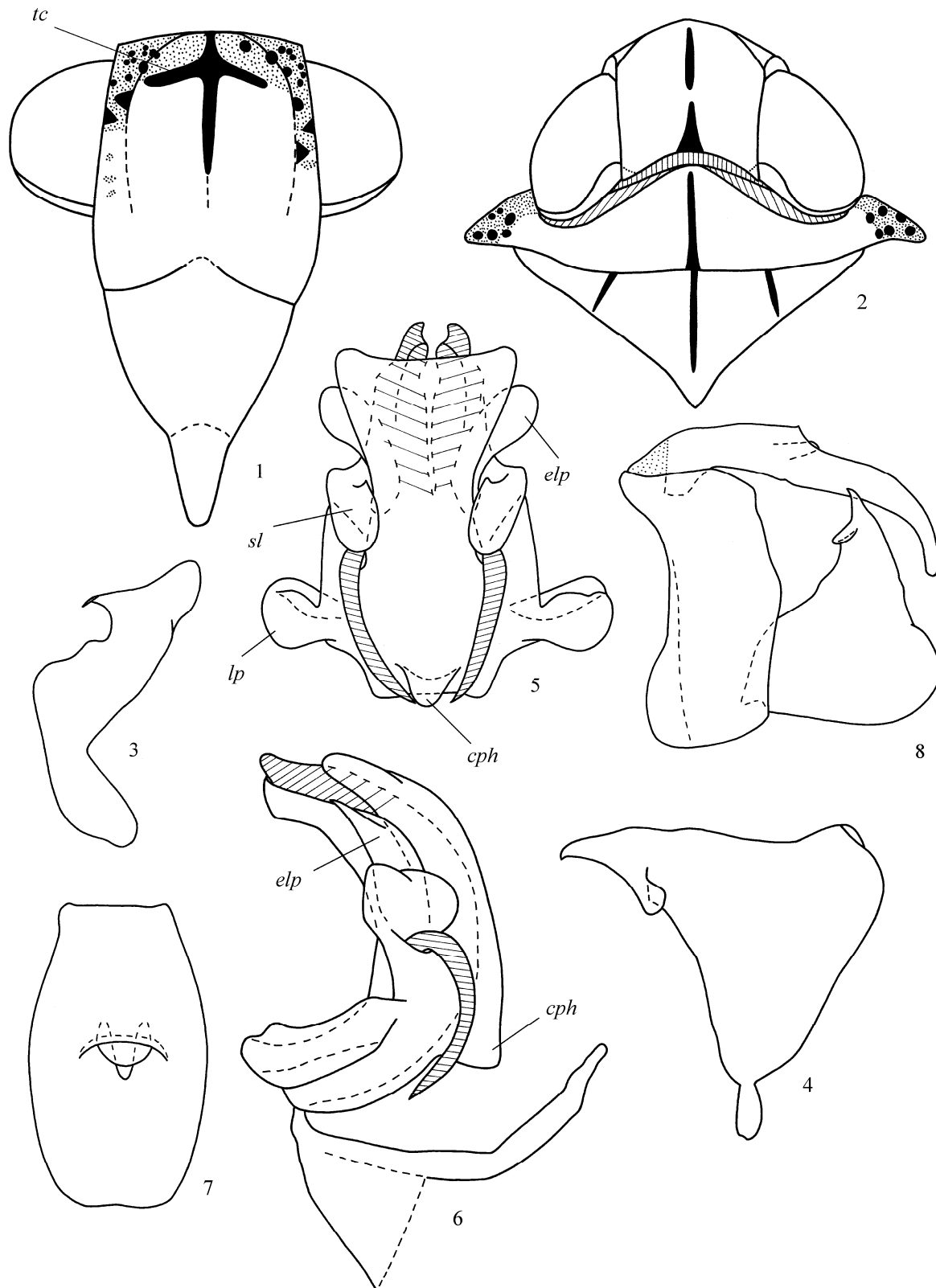
Issus tubiflexus Gnezdilov, sp. n.
(Figs. 1–8, 14, 94, 95)

Description. Metope wide, flat, slightly widened above clypeus, with short median carina extending from its upper margin to middle. Sublateral carinae of metope faint, distinct only in its upper part. Pair of transverse carinae originating from median carina in upper part of metope and running between sublateral and median carinae (Fig. 1, 94, *tc*). Metope with row of pustules (traces of larval sensory pits) along lateral

margins. Metopeclypeal suture deeply depressed. Postclypeus large, smooth. Proboscis reaching hind coxae. 2nd and 3rd segments of proboscis subequal in length; 3rd segment cylindrical (not narrowed toward apex). Ocelli absent. Pedicel oblong cylindrical. Coryphe subsquare, with median carina; its anterior margin convex, posterior margin weakly concave (Fig. 2). Pro- and mesonotum subequal in length along midline, both with median carina. Paradiscal fields of pronotum wide. Paranotal lobes with 2 rows of 8 pustules. Tegulae concealed by paradiscal fields. Fore wing narrowed toward apex, with narrow and short hypocostal plate. Basal cell small (Fig. 14). *R* 2 (furcating closely to basal cell), *M* 2 and *CuA* 2 (both furcating about at one level in proximal part of wing before apex of clavus). Cross-veins abundant. Clavus open. Hind wing reaching base of pygophore, bilobed—only with vannal emargination; vannus reduced to small appendage with simple *A*₂ (Fig. 24): *R* 4 (first furcating near middle of wing; two succeeding furcations at apex) r-m 5 *M*1 m-cua 5 *CuA* 2 (furcating apically) cua-cup1 *CuP* 2 (furcating apically) *Pcu* 1 *A*₁ 1 *A*₂ 1 (not reaching margin of wing). *M* and *CuA* originating from basal cell, apparently from one point. Reduction of wing resulting in increase of number of cross-veins and in “pressing” of longitudinal veins owing to reduction (narrowing and diminution) of vannus—*CuP* and *Pcu* fused along significant distance from base but separate distally, with cross-veins between branches; anal lobe bearing only *A*₂. Hind tibia with 2 lateral spines subapically. Apices of tibiae with 10 spines. 1st and 2nd tarsomeres of fore and middle legs subequal in length, at least twice as long as 3rd tarsomere. 1st and 2nd metatarsomeres subequal in length, both with long hair-like setae on ventral surface; 3rd metatarsomere distinctly shorter. 1st metatarsomere with 2 lateroapical and 7 or 8 intermedial spines.

Metope pale yellow, except for black stripe with yellow pustules below its upper margin (Figs. 1, 94). Coryphe, pronotum, and mesonotum pale yellow (Fig. 95). Paranotal lobes yellowish pale brown, with black spots at base and with 2 rows (4 in each) of yellow pustules (Fig. 2). Fore wing yellowish at base, with greenish veins in basal part and yellowish pale brown cells (Fig. 95). Hind wing yellowish pale brown. Ventral surface yellowish pale brown. Claws, apex of proboscis, and apices of spines on legs black.

Male genitalia (Figs. 3–8). Pygophore wide, with posterior margin clearly convex in median part (lateral view) (Fig. 8). Anal tube long, wide, slightly narrowed



Figs. 1–8. *Issus tubiflexus* Gnezdilov, sp. n., male: (1–2) holotype; (3–8) paratype [(1) head, front view; (2) head and pro- and mesonotum, dorsal view; (3) stylus, dorsal view; (4) stylus, lateral view; (5) penis, ventral view; (6) penis and connective, lateral view; (7) anal tube, dorsal view; (8) anal tube, pygophore, and stylus, lateral view]; *lp*, lateral processes at phallobase base; *elp*, processes of inner walls of dorsolateral lobes; *cph*, carina of phallobase; *tc*, transverse carina of metope; *sl*, subapical lobe of phallobase.

at base and at apex, with median emargination apically, typically deflexed to conceal styli on outer side (Fig. 7, 8). Anal column short, 1/6 as long as anal tube. Phallobase wide (ventral view), with large carina (*cph*) sharply projecting in lower half (lateral view) and with pair of large lateral processes at base (ventral view) (Fig. 5). Phallobase with large rounded sublateral lobes concealing ventral hooks of aedeagus (*sl*), and with earlike process (*elp*) on its inner wall at each side (Fig. 6). Apical processes of aedeagus projecting beyond apex of phallobase, wide, narrowed toward apices. Ventral lobe of phallobase wide, widened toward apex, with wide and shallow emargination apically (ventral view), shorter than dorsal part of phallobase (lateral view) (Fig. 5). Aedeagus with pair of short (about 1/4 as long as phallobase) ventral hooks narrowed toward apices and directed to base of aedeagus but distinctly not reaching it (lateral view). Stylus with slightly concave hind margin, with caudodorsal angle widely rounded, almost without neck (Fig. 4). Capitulum lanceolately narrowed toward apex (dorsal view), with wide lateral tooth (Fig. 3).

Length of body of male 5.5–5.8 mm.

Material. Holotype, ♂: **Libya**, Ras el Hillal, 22.V.2005, P. Weill leg. (ZIN). Paratype: ♂, Lybia, Ras el Hillal, 22.V.2005, P. Weill leg. (ZIN).

Etymology. The name of the species is derived from the Latin words “tubus” (a tube) and “flexus” (deflexed) and emphasizes such a morphological character of the species as the deflexed apex of the male anal tube (Fig. 8).

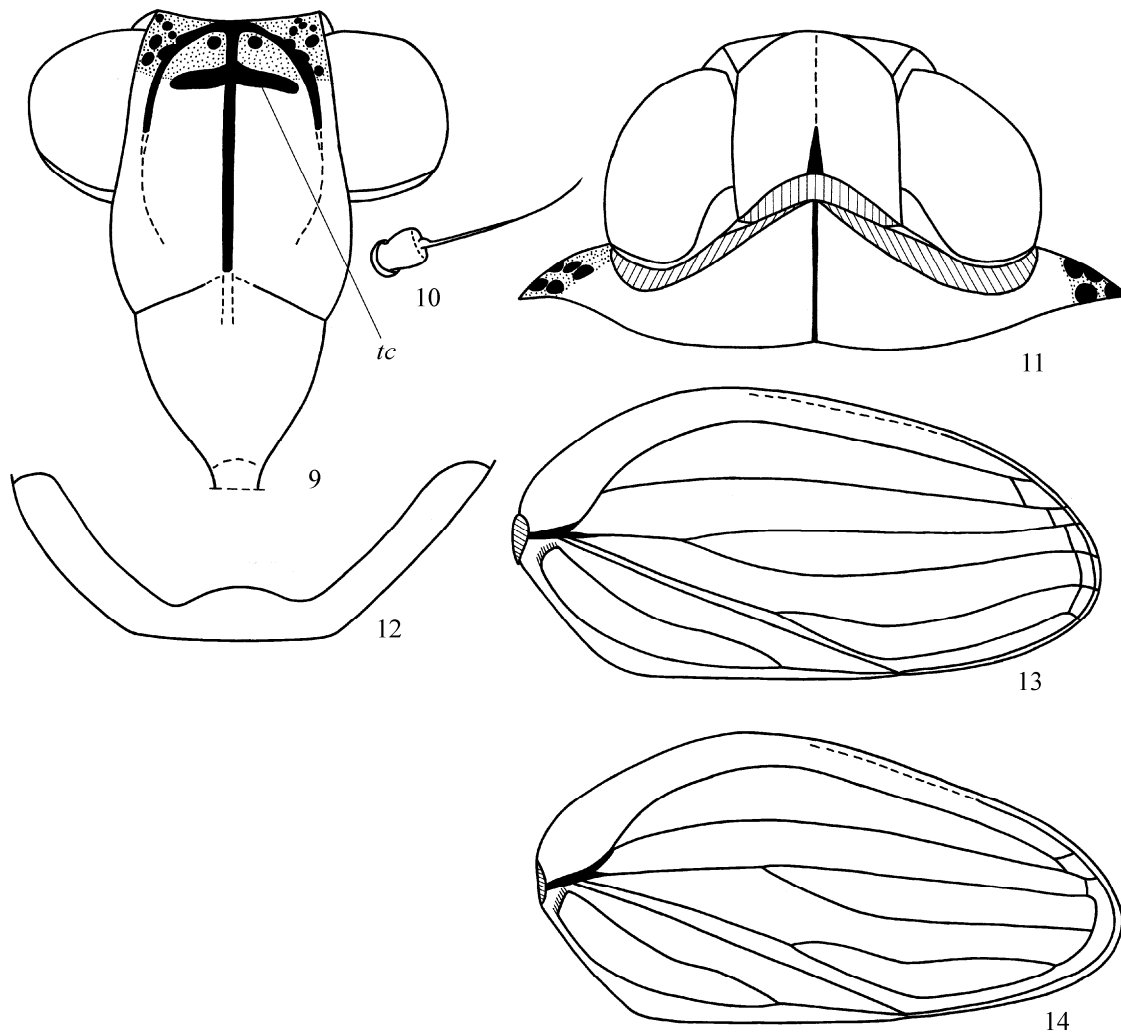
Comparative notes. The new species is most closely related to *I. lauri* Ahrens (Ahrens, 1814; Holzinger et al., 2003; Gnezdilov et al., 2014) in the yellowish green coloration and in the presence of a strong carina of the phallobase but clearly differs in a deflexed apex of the male anal tube and in rather short ventral hooks of the aedeagus (Figs. 6, 8).

Issus vaucheri Gnezdilov, sp. n.
(Figs. 9–13, 15–21, 96–98)

Description. Habitus similar to those of *I. lauri* and *I. tubiflexus* sp. n. Metope 1.5 times as long (along midline) as wide, smoothly widened toward clypeus, with distinct median carina extending from its upper margin to metopeclypeal suture which deeply depressed and curved toward metope (Figs. 9, 98). Median and sublateral carinae of metope connected near

its upper margin. Sublateral carinae less strong than median carina, curved toward median carina above metopeclypeal suture. Postclypeus without median carina. Upper part of metope with transverse carina between median and sublateral carinae. 2nd and 3rd segments of proboscis subequal in length; 3rd one weakly conically narrowed toward apex. Ocelli absent. Pedicel cylindrical, with rows of rhinaria. Coryphe about as wide as long along midline; anterior margin arcuately convex; posterior margin arcuately concave; lateral margins parallel (Figs. 11, 96, 97). Median carina extending from posterior margin of coryphe to its middle. Pronotum about as long as coryphe but shorter than mesonotum, with weak median carina. Paradiscal fields and paranotal lobes wide. Mesonotum with median and lateral carinae. Fore wing with short and narrow hypocostal plate. Basal cell small (Fig. 13). *R* 2 (furcating near basal cell) *M* 2 (in one of males, left wing with *M* 3; furcating behind *R* in 1st quarter of wing) *CuA* 2 (in one of females, left wing with *CuA* 3; furcating near middle of wing). Cross-veins abundant. Hind wing reaching base of pygophore, bilobed—only with vannal emargination; vannus reduced to small appendage with simple *A*₂ (Fig. 23): *R* 4 (first furcation near middle of wing, two succeeding furcations at apex; 2 more cross-veins running toward costa) *rm* 7 *M* 2 (furcating behind middle of wing; 3 cross-veins present between branches of median vein) *m-cua* 5 *CuA* 1 *cua-cup* 2 *CuP* 1 *cup-pcu* 8 *Pcu* 2 (furcating near middle of wing; 6 cross-veins present between branches and marginal vein) *A*₁ 1 *A*₂ 1 (not reaching margin of wing). *M* and *CuA* originating from one point on basal cell. *CuA* and *CuP* fused in distal half of wing. *CuP* and *Pcu* and also *Pcu* and *A*₁ not fused. Hind tibia with 2 lateral spines in distal half. Apices of tibiae with 7 or 8 spines. 1st metatarsomere nearly as long as 2nd and 3rd metatarsomeres combined, with 2 lateroapical and 6 intermedial spines. 2nd metatarsomere only with 2 lateroapical spines. Claws with apices only slightly projecting beyond straight margin of pretarsus. Laterodorsal plates of pretarsus wide.

Males mostly yellowish pale brown, except for pale green fore wings (Figs. 97, 98). Metope with dark brown transverse band at upper margin and with pale yellow pustules—traces of larval sensory pits (Figs. 9, 98). Dark brown spot lying below eye. Apical half of pedicel brown to dark brown. Apex of proboscis dark brown. Pronotum and mesonotum pale yellow (Fig. 97). Paranotal lobes darkened. Hind wing matte,



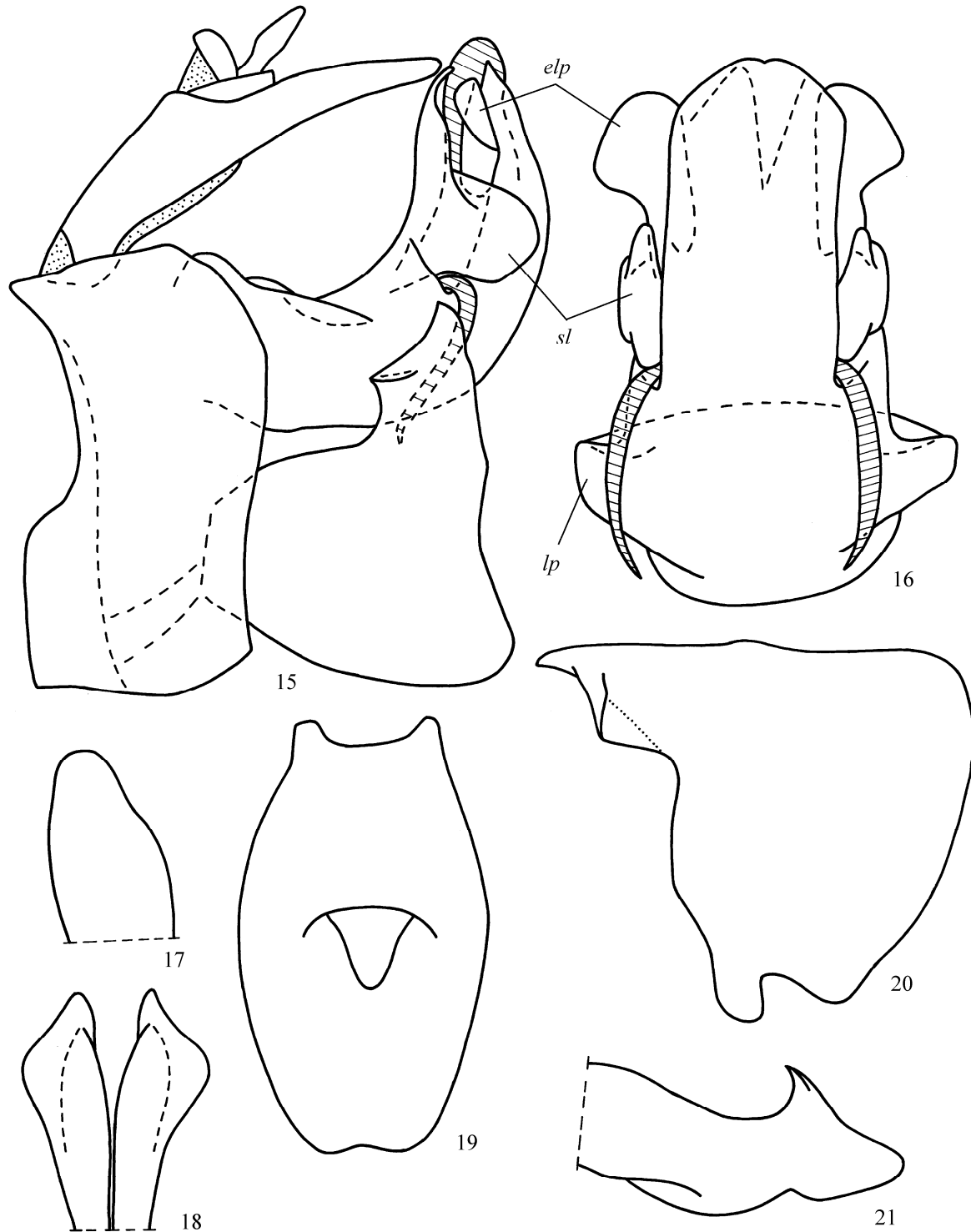
Figs. 9–14. *Issus* spp., external structure: (9–13) *I. vaucheri* Gnezdilov, sp. n.; (14) *I. tubiflexus* Gnezdilov, sp. n. [(9) holotype, head, front view; (10) holotype, antenna; (11) holotype, head and pronotum, dorsal view; (12) paratype, posterior margin of sternite VII of female; (13) paratype (male), fore wing, scheme; (14) holotype, fore wing, scheme]; *tc*, transverse carina of metope.

with pale brown veins. Episterna and epimera of thorax brown. Claws, dorsolateral plates of pretarsus, and apices of spines on legs dark brown to black.

Females mostly yellowish pale brown, including fore wings. One of females with fore wing bearing dark brown to black spot in proximal 1/4 of wing at each side from anterior branch of radius and with dark brown to black transverse band behind apex of clavus (Fig. 96). Postclypeus brown to dark brown. Black spot lying below eye. Paranotal lobes darkened. Episterna and epimera of thorax brown to dark brown. Hind coxae brown to dark brown. Gonoplags with dark brown areas along posterior margin.

Male genitalia (Figs. 15–21). Pygophore wide, with convex posterior margin (lateral view) (Fig. 15).

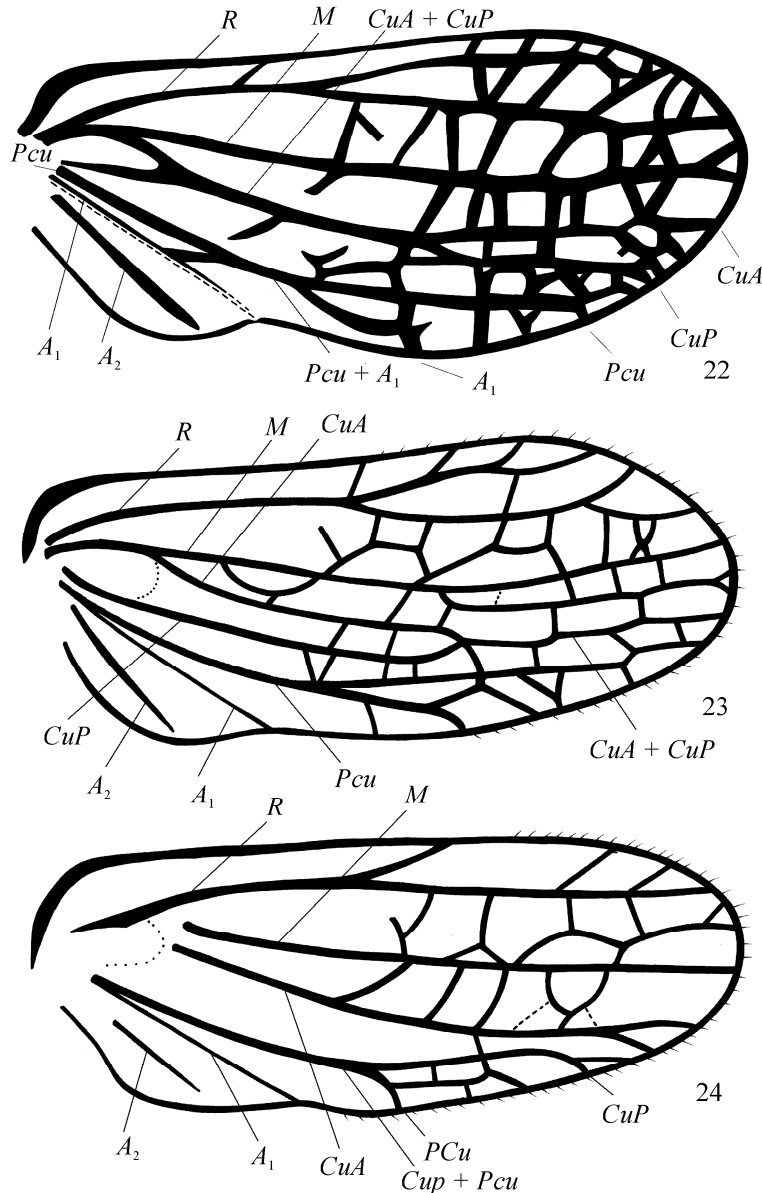
Anal tube long, wide, slightly narrowed at base and at apex (dorsal view); apex with weak median emargination (Fig. 19). Contour of lower margin of anal tube nearly straight (lateral view) (Fig. 15). Anal column short, 1/5 as long as anal tube. Phallobase wide (lateral and ventral view), without carina, with large rounded sublateral lobe above ventral hooks (*sl*) and with earlike process on its inner wall (*elp*) at each side (Figs. 15, 16). Base of phallobase widened, with lateral projections (*lp*) (ventral view) (Fig. 16). Ventral lobe of phallobase wide, long (reaching apices of dorsolateral lobes), narrowed toward apex, with median emargination apically. Apical processes of aedeagus projecting beyond apex of phallobase, wide, narrowed toward apices (ventral view) (Figs. 17, 18). Aedeagus with pair of short (about 1/4 as long as



Figs. 15–21. *Issus vaucheri* Gnezdilov, sp. n., holotype, male genitalia: (15) genital complex, lateral view; (16) penis, ventral view; (17) apex of apical process of aedeagus, lateral view; (18) apical processes of aedeagus, ventral view; (19) anal tube, dorsal view; (20) stylus, lateral view; (21) capitulum of stylus, dorsal view; *lp*, lateral processes at phallobase base; *elp*, processes of inner walls of dorsolateral lobes; *sl*, subapical lobe of phallobase.

phallobase) ventral hooks narrowed to apices and directed toward base of aedeagus but distinctly not reaching it (lateral view); apices of hooks directed

inwards. Stylus large, with concave hind margin, with subrectangular caudodorsal angle (Fig. 20). Capitulum of stylus on wide neck, lanceolately nar-



Figs. 22–24. *Issus* spp., hind wing: (22) *I. pospisili* Dlabola (after Gnezdilov, 2016a, with changes); (23) *I. vaucheri* Gnezdilov, sp. n.; (24) *I. tubiflexus* Gnezdilov, sp. n.

rowed toward apex (dorsal view), with wide lateral tooth (Fig. 21).

Female genitalia. Posterior margin of sternite VII labelliform convex in median part (Fig. 12). Anal tube elongate, narrowed toward obtuse apex (dorsal view).

Length of body 5.8–6.0 mm in males, 6.2 mm in females.

Material. Holotype, ♂: **Morocco**, “Morocco / (Vaucher) 1900” (ZIN). Paratypes: 1 ♂, 2 ♀, “Morocco / (Vaucher) 1900” (ZIN).

Etymology. The species is named in honour of the collector Henri Vaucher.

Comparative notes. The new species is most closely related to *I. tubiflexus* sp. n. in coloration but differs in the phallobase without a carina and with the ventral lobe narrowed toward the apex (Figs. 15, 16). The latter character also distinguishes this species from *I. kabylicus* Dlabola described from northeastern Algeria (Dlabola, 1989). *Issus abdounouri* Dlabola distributed in Israel, Lebanon, and Turkey (Dlabola, 1987; Gnezdilov, 2011) and also possessing the phallobase without a carina differs from the new spe-

cies in large semicircular processes of the male anal tube.

Issus kabylicus Dlabola, 1989

Material. **Algeria.** 1 ♂, “Africa sept.: Algeria / Yacouren (Park national) / 21–23.VI.1971 / A. Hoffer et J. Horák” (NMPC).

Genus *Semissus* Melichar, 1906

Semissus Melichar, 1906 : 112.

Type species *Issus acuminatus* Lethierry, 1876.

Semissus patruelis (Stål, 1861), comb. n.

Issus patruelis Stål, 1861 : 210.

Issus acuminatus Lethierry, 1876 : 76, **syn. n.**

Issus patruelis was described based on a female collected from northwestern Algeria (Oran) (Stål, 1861). The record of this species from Morocco (Gnezdilov, 2002) should be attributed to *I. vaucheri* sp. n., and that from northwestern Tunisia (Linnavuori, 1965) should be verified. Judging from C. Stål’s brief diagnosis in the original description, the type specimen of *I. patruelis* is grayish yellow with dark veins of the fore wing and with two black spots on the metope; its coryphe bears a median carina, and the metope bears a complete median carina and shortened sublateral carinae—“griseo-flavescens ... tegminibus fusco-venosis ... vertice medio carinato ... fronte carinis tribus percurrentibus, media distinctiore, lateralibus curvatis ... inter hanc carinam et basin nigro-bimaculata” (Stål, 1861, p. 210). This characteristic quite fits *Semissus acuminatus* (Lethierry, 1876) (Gnezdilov and Wilson, 2005, figs. 5, 9) which was also described from Oran (Lethierry, 1876). Thus, *I. patruelis* Stål, 1861 can be considered a senior synonym of *Issus acuminatus* Lethierry, 1876. Unfortunately, I have failed to ascertain the depository place of the type of *I. patruelis*; according to Dr. G. Lindberg, the curator of the collection in Stockholm, this species is missing in C. Stål’s material.

Genus *Carydiopterum* Gnezdilov, gen. n.

Type species *Carydiopterum genimaculatum* sp. n.

Description. Metope wide, convex, with median carina and with transverse carina formed by upper (horizontal) parts of sublateral carinae; lateral (vertical) parts of sublateral carinae unpronounced (Figs. 26, 102). Transverse carina of metope clearly distant from

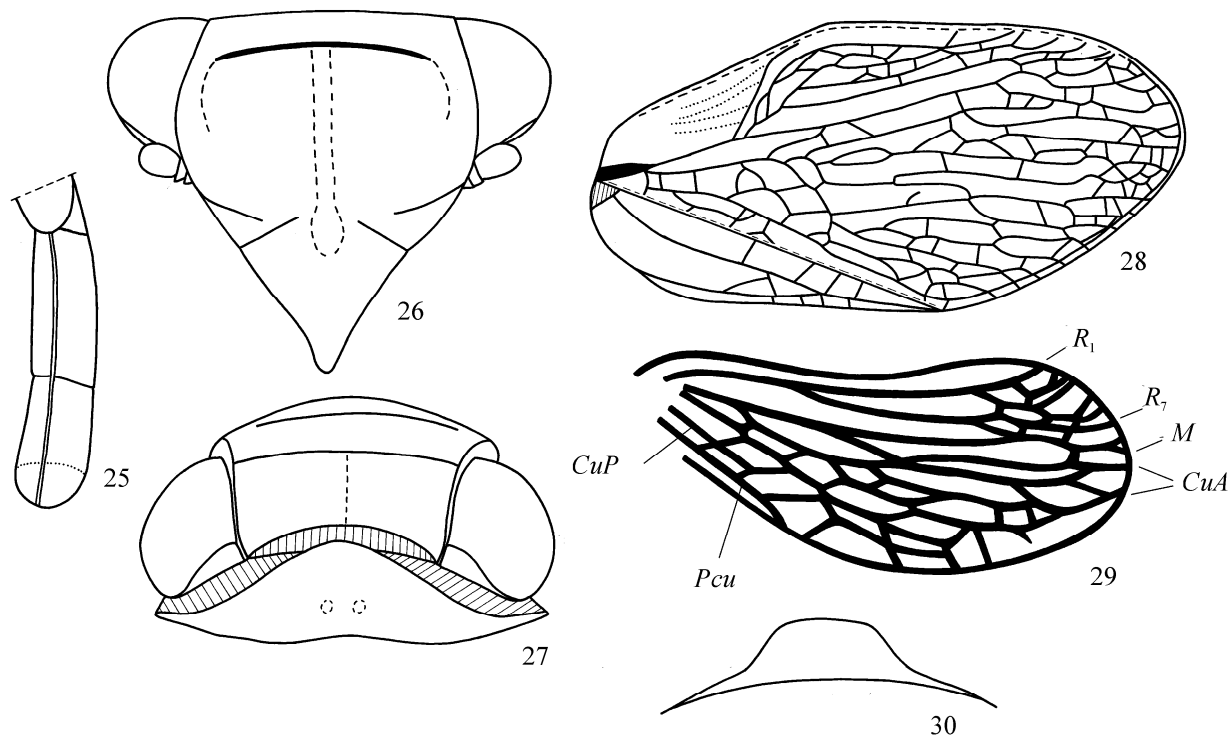
its upper margin. Median carina of metope wide, unsharp, crossing metopeclypeal suture but not extending far onto postclypeus. Metopeclypeal suture obtuse-angularly cuneiformly running into metope. Lateral margins of metope arcuately convex. Clypeus without carinae. Ocelli absent. Pedicel subspherical, with rows of rhinaria. Coryphe transverse, nearly flat, with margins not projecting (Figs. 27, 100). Anterior margin of coryphe straight; lateral margins parallel; posterior margin gently concave. Proboscis with cylindrical (not narrowed apically) 3rd segment which 0.67 times as long as 2nd one (Fig. 25). Pronotum and mesonotum without carinae, subequal in length along midline. Pronotum with very narrow paradiscal fields and with pair of punctiform depressions lateral to midline. Paranotal lobes wide. Fore wings narrowed apically (lateral view), with apices overlapped each other (dorsal view); without hypocostal plate; genual projections prominent (Figs. 28, 100, 101). Basal cell narrowly oval, small. Longitudinal veins multiply furcating, with great number of cross-veins between them (Fig. 28). Radius and median vein originating from one point. *CuA* indistinct at base. Clavus open (*Pcu* + *A*₁ running into its apex). Hind wing nearly as long as fore wing, one-lobed—vannus nearly disappearing (Fig. 29): *R* 7 (first furcation in proximal half of wing, additional furcation at apex) *r-m* 2 *M* 1 *m-cua* 2 *CuA* 2 (about 8 cross-veins between 2 main branches) *CuP* 1 (running into *CuA*₂ in proximal half of wing) *Pcu* 1 (running into marginal vein corresponding to *A*₁). Hind tibia with 2 lateral spines; apices of tibiae with 7 or 8 spines. 1st and 2nd metatarsomeres subequal in length. 1st metatarsomere with 2 lateroapical and 5 intermediate spines forming continuous row. 2nd metatarsomere only with 2 lateroapical spines. Claws projecting beyond apex of pretarsus (dorsal view). Posterior margin of sternite VII of female with large semicircular median process (Fig. 30).

Etymology. The name is derived from the Greek words “καρύδι” (a nut) and “φτερό” (a wing) to emphasize a characteristic rugose structure of the fore wings.

Comparative notes. The genus is peculiar within Issidae because of a rugose structure of the fore wings and carination of the metope.

Carydiopterum genimaculatum Gnezdilov, sp. n.
(Figs. 25–30, 100–102)

Description. Metope black, except for pale yellow lower margin (area above metopeclypeal suture)



Figs. 25–30. *Carydiopterum genimaculatum* Gnezdilov, sp. n., holotype, external structure: (25) proboscis, dorsal view; (26) head, front view; (27) head and pronotum, dorsal view; (28) fore wing; (29) hind wing; (30) posterior margin of sternite VII.

(Fig. 102). Gena above antenna pale yellow. Post- and anteclypeus dark brown to black, except for pale yellow base of postclypeus. Proboscis brownish yellow with dark brown apex. Scape pale yellow. Pedicel dark brown. Temple black, with pale brown spot at place of rudiments of ocelli. Coryphe brown or dark brown, with yellowish posterior margin (Fig. 100). Pronotum dark brown, with pale yellow traces of larval sensory pits and narrow stripe along midline. Mesonotum dark brown, with yellowish pale brown stripes forming turned letter “V” and with yellowish pale brown stripe at anterior margin. Fore wing dark brown, with large white spot at costal margin behind gential projection (Figs. 100, 101). Hind wing brown. Gonoplacs and anal tube dark brown to black. Sternite III yellow. Sternites IV–VI brownish pale yellow in median part basally, with dark brown lateral and pale yellow posterior margins. Sternite VII dark brown, with pale yellow posterior margin. Hind coxa yellowish brown. Hind femur and tibia dark brown. Fore and middle coxae, tibiae, and femora black. Fore and middle trochanters pale yellow. Fore and middle tarsi dark brown. Hind tarsus yellowish pale brown. Spines on legs black.

Length of body of female 5.7 mm.

Material. **The Republic of the Congo.** Holotype, ♀: “Soil-Zoological Exp. / Congo-Brazzaville / Sibiti IRHO / rain forest,” “26.11.1963. No 251 / beaten / on forest border / leg. Endrődy-Younga” (HNHM).

Etymology. The name of the species is formed by combination of the Latin words “genu” (a knee) and “macula” (a spot) and reflects the presence of a pair of large white spots at the costal margin of the fore wing immediately behind the gential projection.

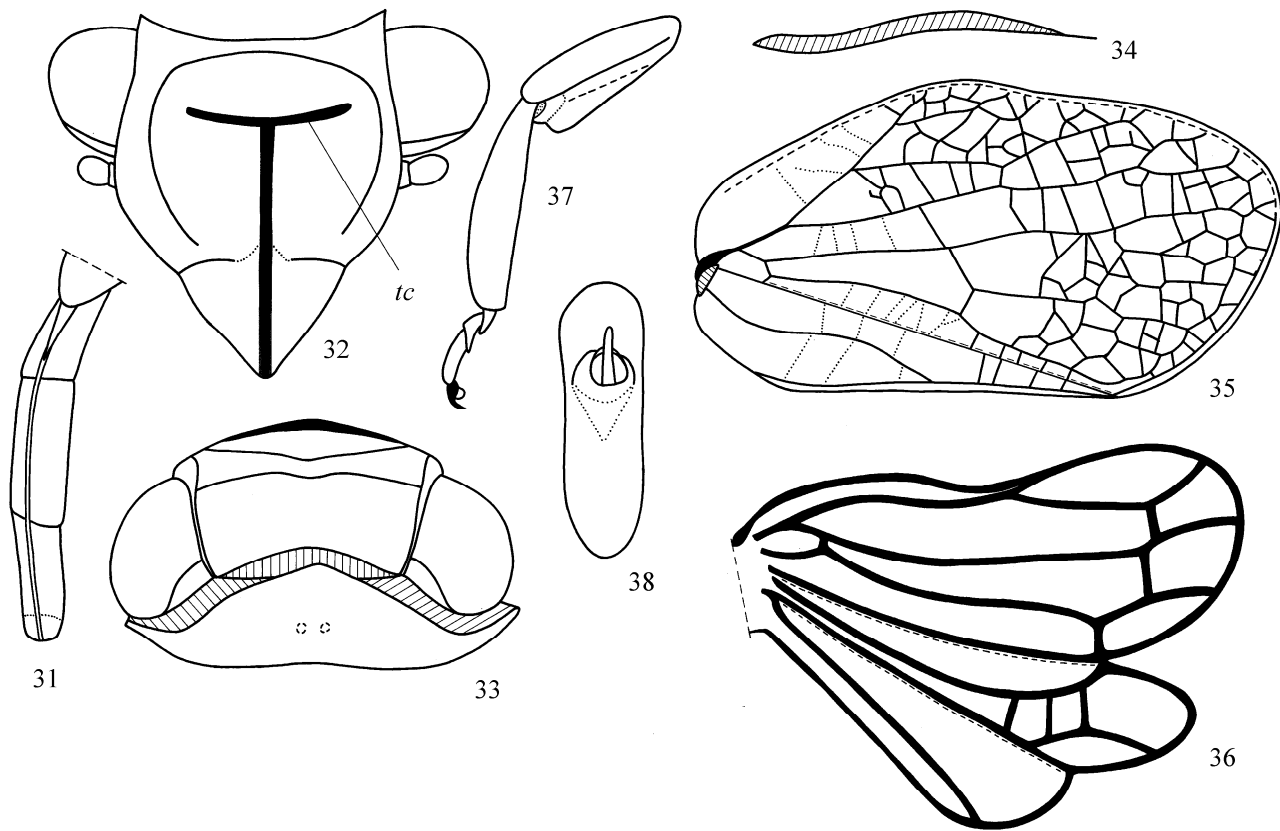
Ecology. According to the data on the label (see above), the species was collected from the border of rainfall forest.

Comparative notes. The new species is similar to *Tetrica suffusa* Melichar, 1906 (Issidae) and *Togoda africana* Melichar, 1906 (Tropiduchidae) in the venation of the fore wings (multiply furcating longitudinal veins with abundant cross-veins).

Genus *Hemisobium* Schmidt, 1911

Hemisobium Schmidt, 1911 : 259.

Type species *Hemisobium hammersteini* Schmidt, 1911.



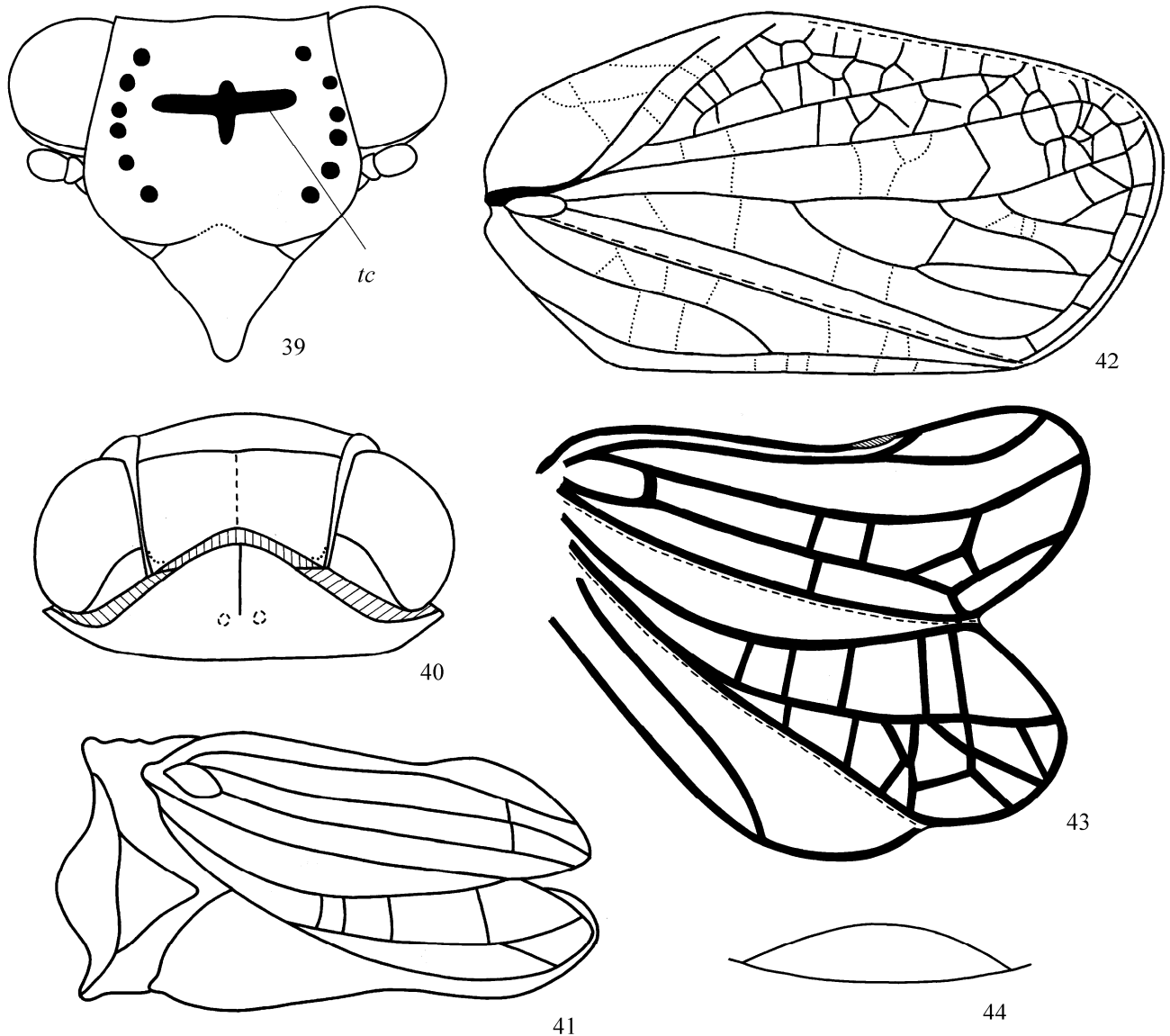
Figs. 31–38. *Cascaruna grumosa* Gnezdilov, sp. n., external structure. (31–35) holotype; (36–38) paratype; (31) proboscis, dorsolateral view; (32) head, front view; (33) head and pronotum, dorsal view; (34) hypocostal plate of fore wing; (35) fore wing; (36) hind wing; (37) fore left leg; (38) anal tube, dorsal view; *tc*, transverse carina of metope.

***Hemisobium hammersteini* Schmidt, 1911**
(Figs. 66–70, 111–113)

Hemisobium hammersteini Schmidt, 1911 : 261.

Description. Metope wide, with lateral margins convex and upper margin obtuse-angularly emarginate. Sublateral carinae connected in shape of horseshoe with horizontal part rather far distant from upper margin of metope (Figs. 66, 113). Lateral (vertical) parts of sublateral carinae weakening downwards, not reaching metopeclypeal suture. Lateral margins of metope peak-like hanging above antennae, arcuately curved toward metopeclypeal suture which sharply curved toward metope. Pedicel oblong cylindrical, with longitudinal rows of rhinaria (4 in each row). Clypeus without carinae. Coryphe transverse, with keel-like projecting margins (Figs. 67, 111). Lateral margins of coryphe weakly diverging toward apex; anterior margin gently arcuately convex; posterior margin concave. 3rd segment of proboscis slightly shorter than 2nd, conically narrowed toward apex.

Pronotum with relatively wide paradiscal fields, without carinae. Mesonotum longer than pronotum, without carinae. Fore wing suboval, weakly narrowed toward rounded apex, with hypocostal plate (Figs. 68, 111, 112). *R* 4 (furcating in proximal half of wing) *M* 3–4 (first furcation near middle of wing) *CuA* 1. Clavus open, with *Pcu+A*₁ running into its apex. Hind wing subequal in length to fore wing, one-lobed—vannus reduced: *R* 2 (furcation in proximal half of wing; one cross-vein present between branches of radius in distal half of wing) *r-m* 3 *M* 1 *m-cua* 5 *CuA* 6 (first furcation in proximal half of wing, succeeding one closer to apex of wing; in total, 7 cross-veins present between branches) *cua-cup* 5 *CuP* 1 *cup-pcu* 6 *Pcu* 1 (running into marginal vein) (Figs. 69, 111). Hind tibia with 2 lateral spines in its distal half. 1st and 2nd metatarsomeres subequal in length. 1st metatarsomere with 2 lateroapical and 3+1 intermedial spines. 2nd metatarsomere only with 2 lateroapical spines.



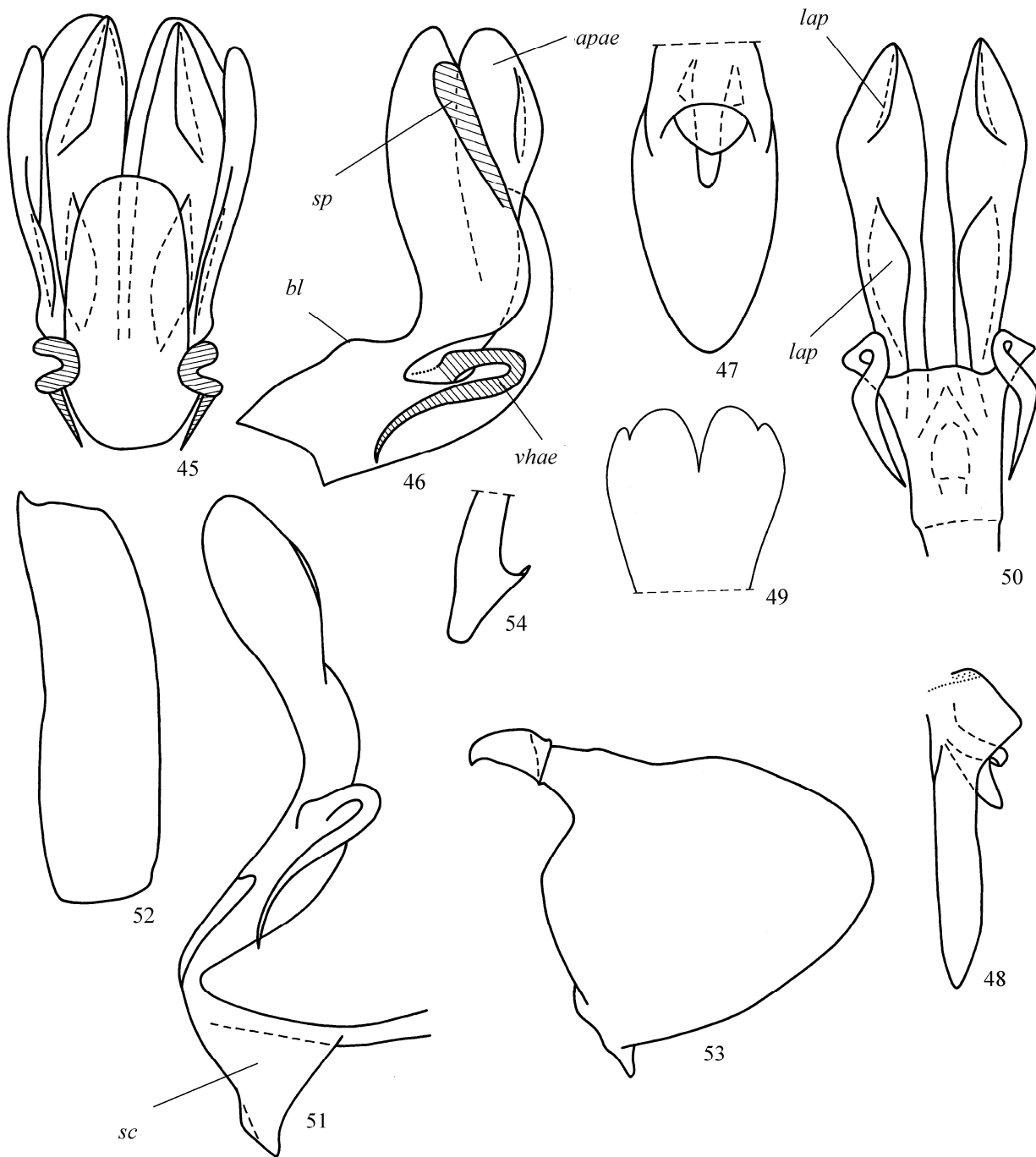
Figs. 39–44. *Chimetopon camerunensis* Schmidt, external structure: (39) head, front view; (40) head and pronotum, dorsal view; (41) mesonotum and hind wing at rest under fore wing (removed), dorsal view, scheme; (42) fore wing (after Gnezdilov, 2016a); (43) hind wing (after Gnezdilov, 2016a); (44) posterior margin of sternite VII of female; *tc*, transverse carina of metope.

Female genitalia (Fig. 70). Posterior margin of sternite VII very gently emarginate. Anal tube oblong-oval. Anal column short.

Length of body of female 6.8 mm.

Material. **Tanzania.** Holotype, ♀: “Type” (printed), “D.Ost-Africa / Kiomoni / Hammerstein S. / 11.6.1910” (printed and hand-written), “*Hemisobium hammersteini* Schmidt / ♀. Edm. Schmidt / determ. 1910” (printed and hand-written), “MIZ 231920” (printed) (MIZ).

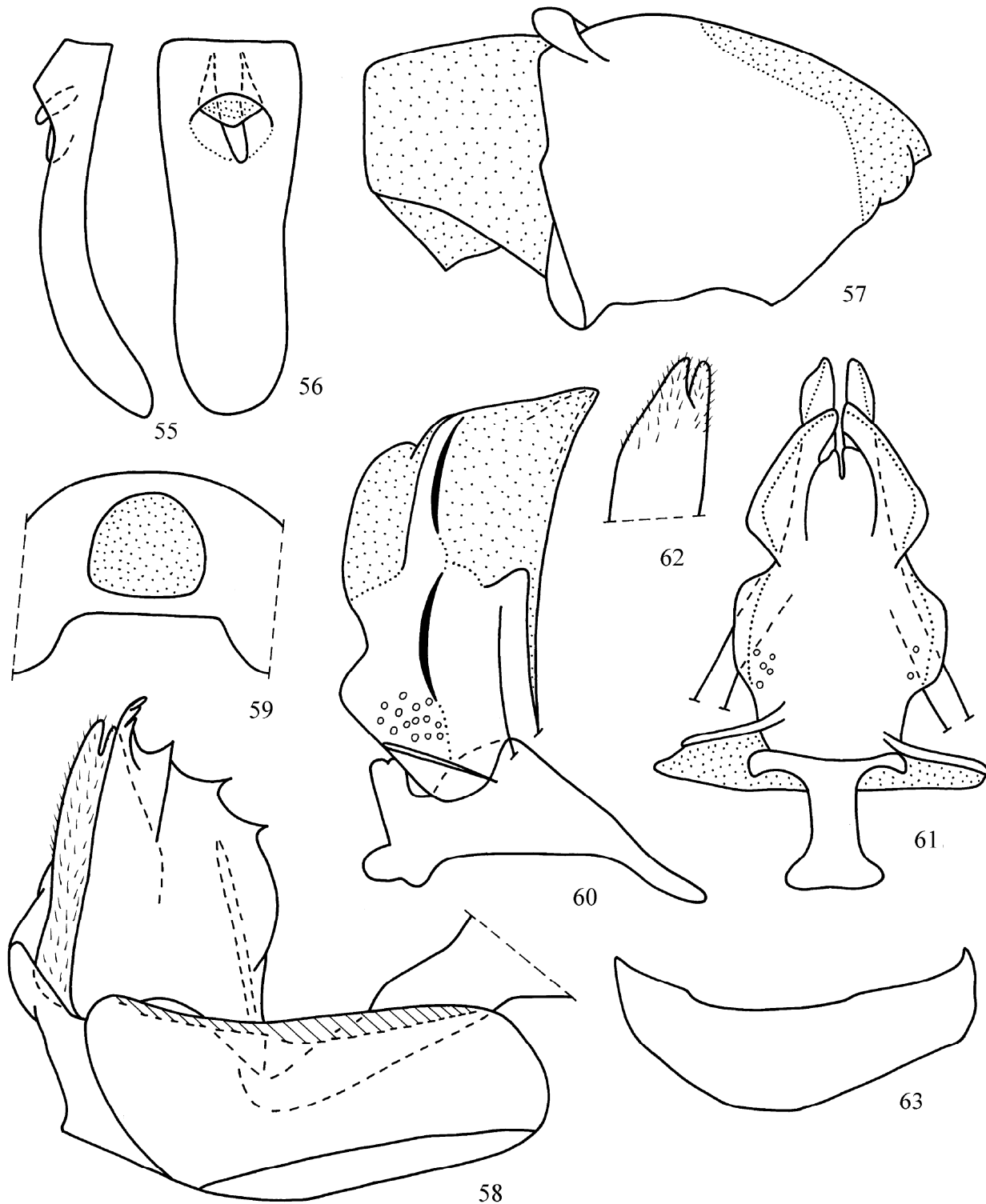
Notes. Examination of the material on *Hemisobium* Schmidt has shown that this genus is monotypical (with the type species *Hemisobium hammersteini* Schmidt, 1911), and two other species, *H. horvathi* (Melichar, 1906) and *H. vibex* (Melichar, 1906) originally described by L. Melichar (1906) within the genus *Hysteropterum* Amyot et Serville, 1843 and later included by E. Schmidt (1911) in the genus *Hemisobium*, should be attributed to the genus *Kovacsiana* Synave (see below) according to the characters of their external structure, in particular, the degree of devel-



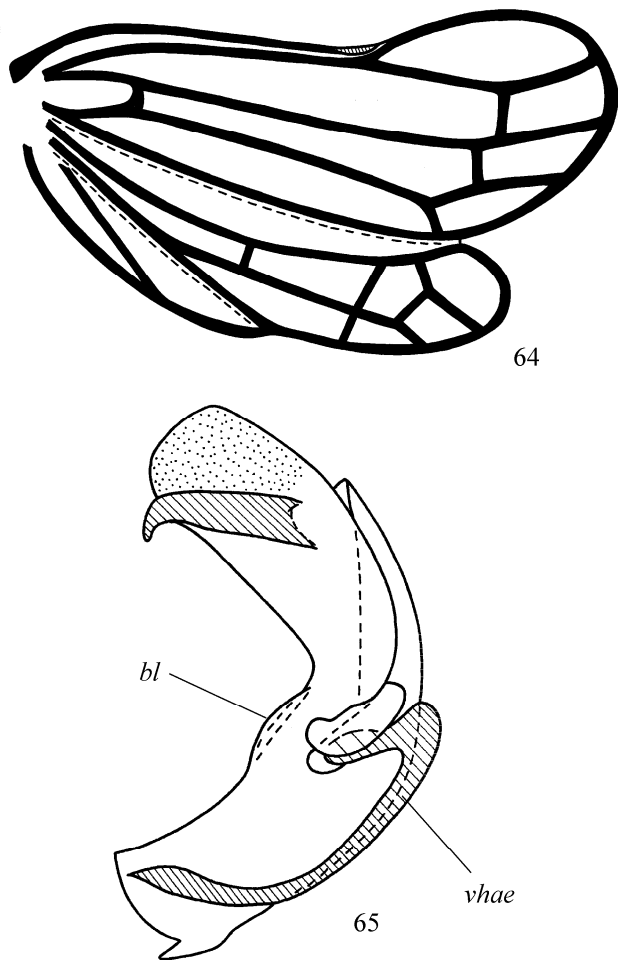
Figs. 45–54. *Chimetopon camerunensis* Schmidt, Cameroon (Ebom), male genitalia: (45) penis, ventral view; (46) penis, lateral view; (47) anal tube, dorsal view; (48) anal tube, lateral view; (49) dorsoapical part of phallobase, posterior view; (50) aedeagus, ventral view; (51) aedeagus and connective, lateral view; (52) pygophore, lateral view; (53) stylus, lateral view; (54) capitulum of stylus, dorsal view; *apae*, apical processes of aedeagus; *sp*, subapical process of dorsolateral lobe of phallobase; *bl*, basal lobe of phallobase; *vhae*, ventral hooks of aedeagus; *lap*, lobes of apical processes of aedeagus; *sc*, scoop of connective.

opment of the carinae of the metope. *Hemisobium* s. str. is characterized by the absence of a median carina and by the sublateral carinae of metope weakened laterally (Fig. 66); whereas in the representatives of

the genus *Kovacsiana*, the median carina is present (occasionally weakened), the sublateral carinae are always distinct, and, in addition, the transverse carina (*tc*) is present between the carinae (Figs. 71, 85).



Figs. 55–63. *Chimetopon camerunensis* Schmidt, Cameroon (Ebom), female genitalia: (55) anal tube, lateral view; (56) anal tube, dorsal view; (57) gonoplacs, lateral view; (58) anterior connective lamina of gonapophyses VIII and gonocoxa VIII, lateral view; (59) subtubular bridge of pygophore at base of anal tube; (60) posterior connective lamina of gonapophyses IX and bridge of gonospiculum, lateral view; (61) posterior connective laminae of gonapophyses IX and bridge of gonospiculum, ventral view; (62) endogonocoxal process, lateral view; (63) sternite VII.



Figs. 64–65. *Ikonza angolensis* Gnezdilov (after Gnezdilov, 2016a, with changes): (64) hind wing; (65) penis, lateral view; *bl*, basal lobe of phallobase; *vhae*, ventral hooks of aedeagus.

According to the fore-wing venation, in particular, the 3- or 4-furcate radius (Figs. 68, 73, 87), and also to a rather well-developed one-lobed hind wing (Figs. 69, 74), the genera *Hemisobium* and *Kovacsiana* are undoubtedly closely related.

Genus *Kovacsiana* Synave, 1956

Kovacsiana Synave, 1956 : 12.

Type species *Kovacsiana abyssinica* Synave, 1956.

Kovacsiana abyssinica Synave, 1956
(Figs. 71–84)

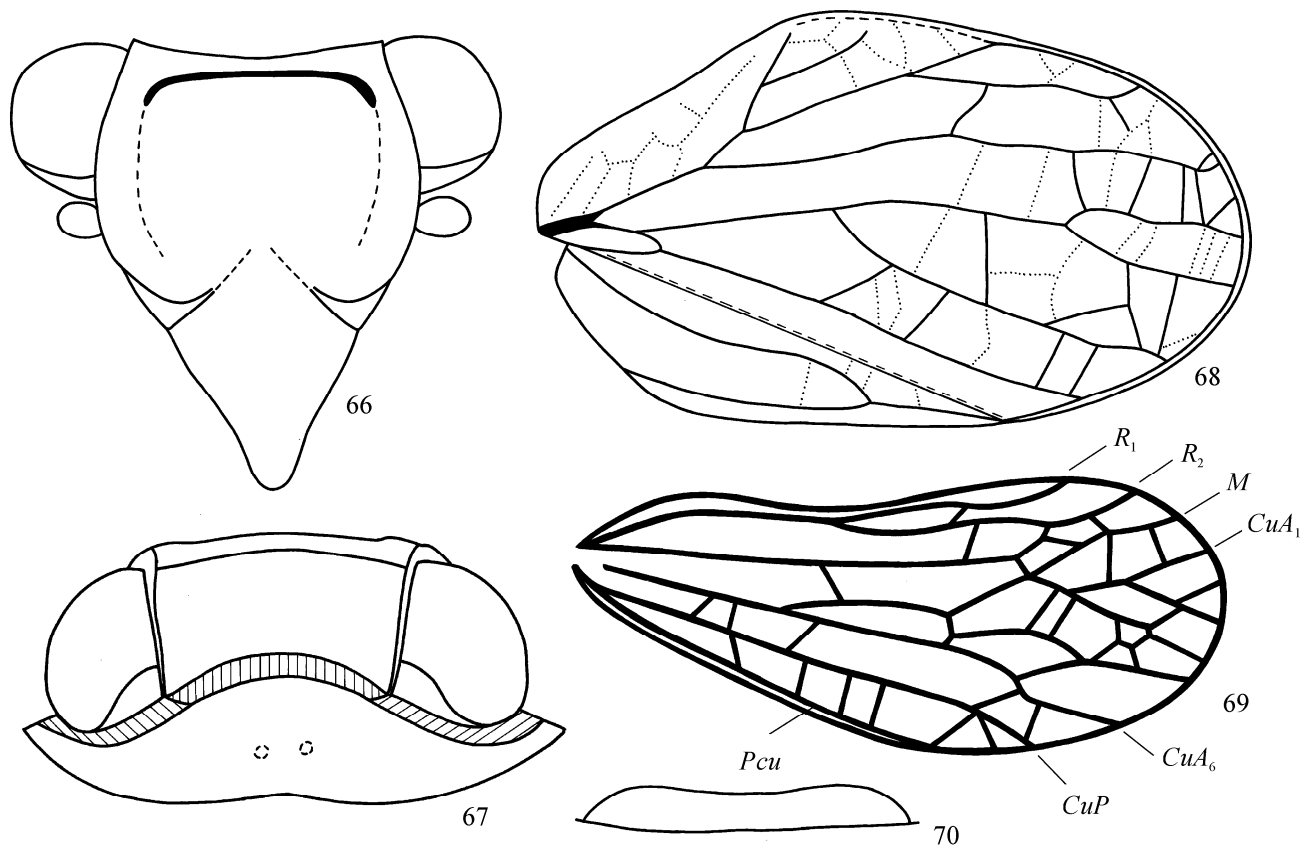
Kovacsiana abyssinica Synave, 1956 : 14.

Kovacsiana abyssinica: Gnezdilov, 2002 : 622, figs. 56–58.

Description. Sublateral carinae connected in shape of horseshoe with horizontal part rather significantly

distant from upper margin of metope (Fig. 71). Lateral (vertical) parts of sublateral carinae not reaching metopeclypeal suture, curved toward median carina. Sublateral carinae of metope connected below its upper margin in shape of horseshoe. Median carina of metope distinct, originating from its upper margin. Transverse carina visible between sublateral carinae (Fig. 71). Coryphe transverse, twice as wide as long along midline; its anterior margin gently arcuately convex; posterior margin arcuately concave, without carinae (Fig. 72). Fore wing with obtuse-angularly convex costal margin, without hypocostal plate: *R* 3 (both furcations in proximal half of wing), *M* 3 (first furcation in proximal half of wing, second immediately behind middle of wing), *CuA* 1 (Fig. 73). Hind wing reaching posterior margin of tergite VII, one-lobed; vannus lost: *R* 1 (6 cross-veins present in pre-costal area) r-m 1 *M* 3 (furcating apically) m-cua 1 *CuA* 1 cua-cup 2 *CuP* 1 *Pcu* 1 (running into marginal vein) (Fig. 74). *CuA* and *CuP* fused beginning from base along most part of their length, but separate apically. Hind tibia with 2 lateral spines in its distal half (in male paratype, left tibia with 1 lateral spine). 1st metatarsomere with 2 lateroapical and 2 intermedial spines. Posterior margin of sternite VII of female labelliformly convex in middle part (Fig. 75).

Male genitalia (Figs. 76–84). Posterior margin of pygophore convex in middle part (lateral view) (Fig. 82). Anal tube oval, rounded apically (dorsal view) (Fig. 78). Anal column long (1/3 as long as anal tube) (Fig. 79). Dorsoapical part of phallobase weakly sclerotized. Ventral margin of phallobase lobiformly convex (lateral view) below hooks of aedeagus (Fig. 77). Each dorsolateral lobe of phallobase with furcating (furcation subrectangular) subapical process (*sp*), without teeth. Ventral lobe of phallobase long but distinctly not reaching apices of dorsolateral lobes, not narrowed toward rounded apex (Fig. 76). Apical processes of aedeagus wide, long, projecting beyond apices of dorsolateral lobes (lateral view) (Fig. 77), bifurcate apically; their ventral processes rounded, with earlike lobes, and their dorsal processes narrowed toward apices (Fig. 76). Ventral hooks of aedeagus long (half as long as phallobase), narrowed toward peak-like apices, directed toward base of aedeagus. Stylus with very gently emarginate hind margin (Fig. 80). Capitulum of stylus on long neck (lateral view), wide, truncate apically (dorsal view), with tooth on side opposite to lateral tooth (Fig. 81); lateral tooth narrow. Connective with large scoop (Figs. 83, 84).



Figs. 66–70. *Hemisobium hammersteini* Schmidt, holotype, external structure: (66) head, front view; (67) head and pronotum, dorsal view; (68) fore wing; (69) hind wing; (70) posterior margin of sternite VII.

General coloration pale brown with dark brown spots and dots, without spots on paranotal lobes. Hind wing brown to dark brown. Apices of spines on legs dark brown to black.

Material. Ethiopia. 1 ♂, 1 ♀, “Abyssinia / Kovács,” “Vallis/Erer,” “Coll. Mus. / Nat. Hung.,” “Paratype” (red), “Hung. Nat. Hist. Mus. / Budapest / coll. Hemiptera” (printed) (HNHM). 1 ♂, 2 ♀: “Abessinia or., Harrar, 5–17.III.1899, Dmitriev leg.” (ZIN).

Notes. The holotype is a specimen from Erer (Synave, 1956).

Kovacsiana horvathi (Melichar, 1906), comb. n.

Hysteropterum horvathi Melichar, 1906 : 153.

Hemisobium horvathi: Schmidt, 1911 : 258.

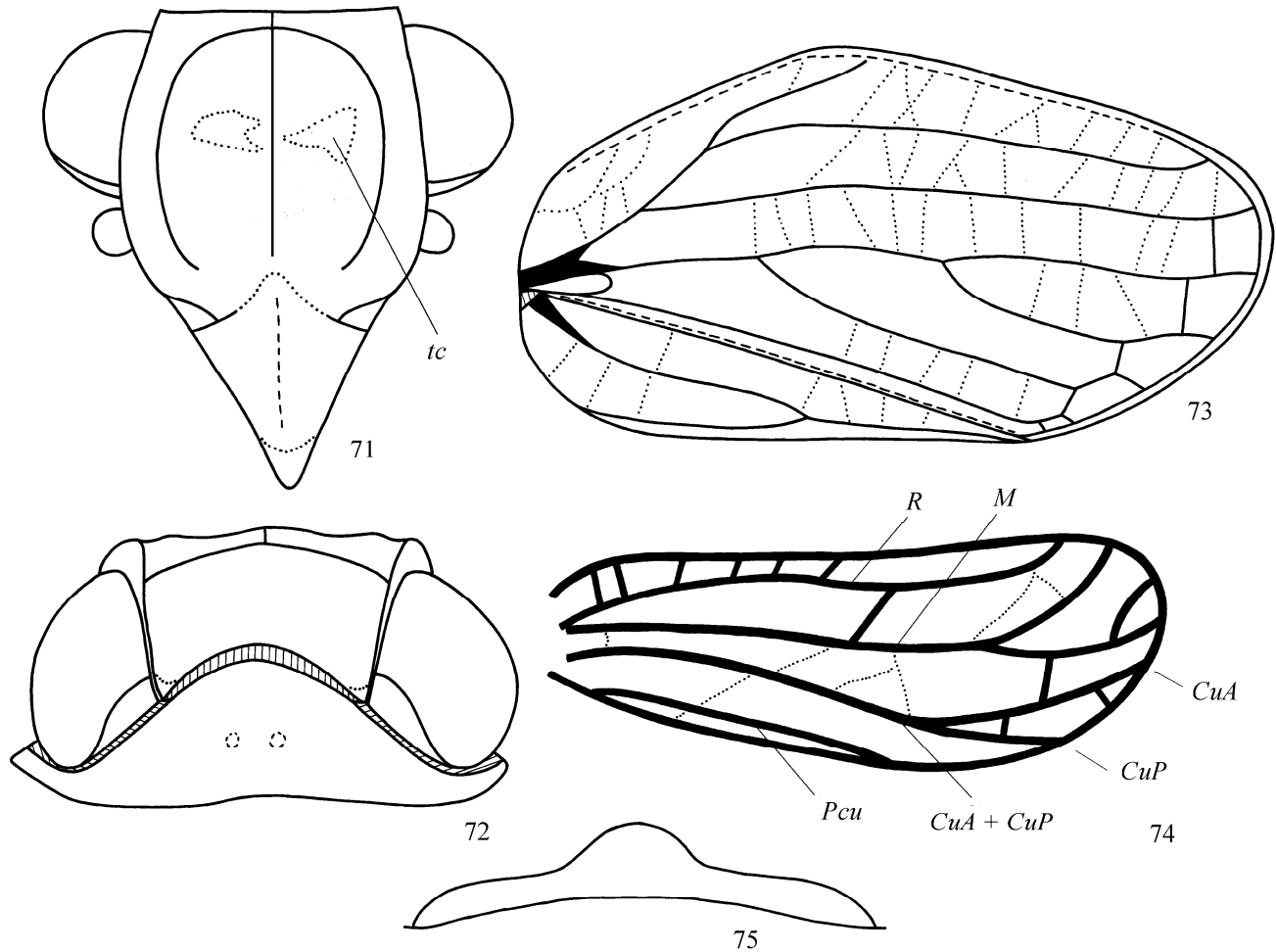
Description. Metope wide; median carina weak; transverse carina visible between sublateral carinae. Coryphe transverse, without carinae. Fore wing without hypocostal plate. *R* 3 (anterior branch short) *M* 3

CuA 1. Hind wing rudimentary. Hind tibia with 2 lateral spines in its distal half. 1st metatarsomere with 2 lateroapical and 3+1 intermedial spines (in male).

General coloration pale brown with dark brown spots and dots. Each paranotal lobe with large oval black spot.

Material. Tanzania. 1 ♂, “Bumbuli” (red, handwritten with ink), “Collectio / Dr. L. Melichar / Moravské museum Brno” (printed), “*horvathi* / det. Melichar” (printed and hand-written), “Transcriptio / *Hysteropterum horvathi* ♂ Melichar / L. Melichar det.” (printed and hand-written), “Transcriptio *Hemisobium horvathi* ♂ (Melichar) / L. Melichar det. 1911” (printed and hand-written), “Neni č lenem typové serie / P. Lauterer det. 1987” (printed and hand-written) (MMBC).

Notes. The species was described based on a single male from Kilimanjaro (Coll. Bornemisza); the type specimen is deposited at the Hungarian Natural History Museum in Budapest (Melichar, 1906).



Figs. 71–75. *Kovacsiana abyssinica* Synave, external structure: (71–73) paratype, male; (74, 75) paratype, female [(71) head, front view; (72) head and pronotum, dorsal view; (73) fore wing; (74) hind wing (after Gnezdilov, 2016a, with changes); (75) posterior margin of sternite VII]; *tc*, transverse carina of metope.

Kovacsiana vibex (Melichar, 1906), comb. n.
(Figs. 106, 107)

Hysteropterum vibex Melichar, 1906 : 154.

Hemisobium vibex: Schmidt, 1911 : 258.

Description. Median carina reaching metopeclypeal suture (Fig. 106). Coryphe transverse; anterior margin weakly arcuately convex; posterior margin arcuately concave. Pronotum with arcuately convex anterior margin and straight posterior margin. Pronotum and mesonotum without carinae, subequal in length along midline. Paradiscal fields wide. Fore wing without hypocostal plate. *R* 3 (*R*₁ short, not reaching margin of wing) *M* 3 *CuA* 1 (Fig. 107). Hind wing rudimentary. Hind tibia with 2 lateral spines distally. 1st metatarsomere with 5 intermedial spines apically.

Metope yellowish pale brown, with dark brown stripe between its upper margin and sublateral carinae.

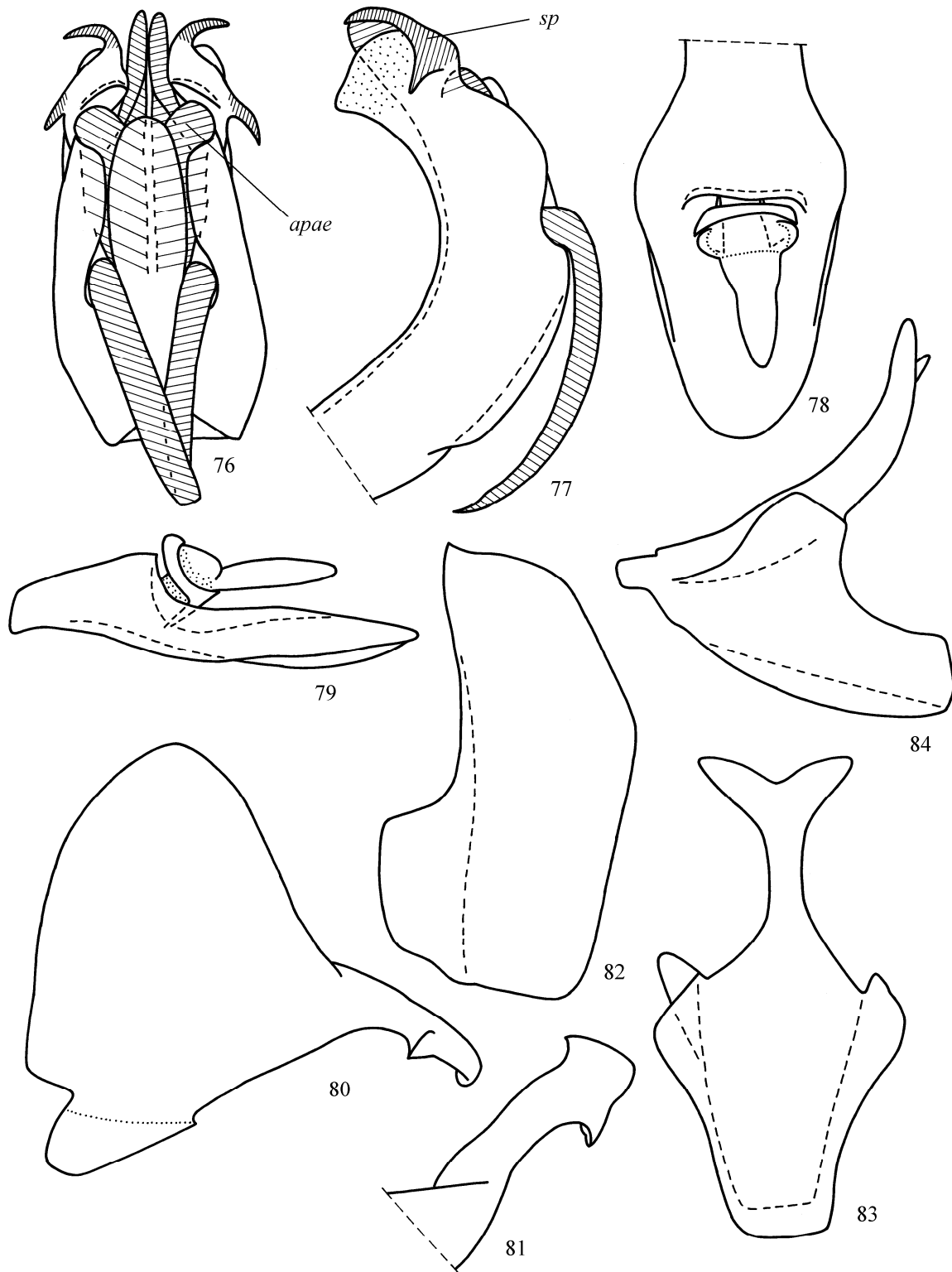
Each paranotal lobe with large oval black spot (Fig. 106). Fore wing weakly shining, yellowish pale brown (Fig. 107).

Length of body of male 5.2 mm.

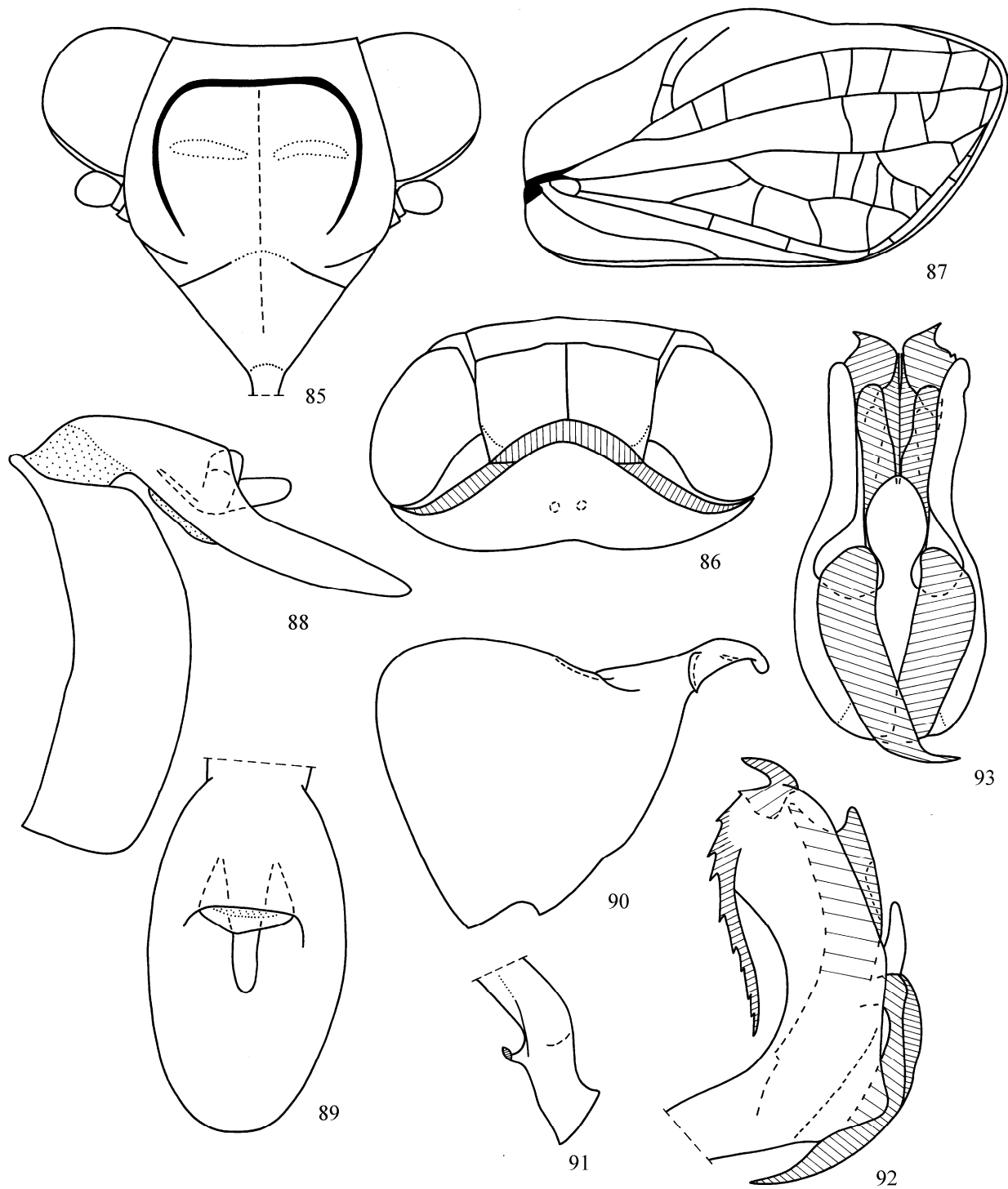
Material. Tanzania. Holotype, ♂: “Usambara / Nguelo / Linnaca Y.” (Blue, by hand), “Usambara / Nguelo” (printed), “*vibex* / det. Melichar.” (Printing and hand-written), “Type” (red, printed) (ZMHB).

Kovacsiana niger Gnezdilov, sp. n.
(Figs. 85–93, 99, 114, 115)

Description. Metope wide, widened above clypeus, convex (visible in dorsal view), with weak median carina which beginning under upper crossbar of horseshoe formed by sublateral carinae and continuing onto postclypeus (Figs. 85, 114). Sublateral carinae distinct, in shape of horseshoe with vertical parts curved to-



Figs. 76–84. *Kovacsiana abyssinica* Synave, paratype, male genitalia: (76) penis, ventral view; (77) penis, lateral view; (78) anal tube, dorsal view; (79) anal tube, lateral view; (80) stylus, lateral view; (81) capitulum of stylus, dorsal view; (82) pygophore, lateral view; (83) connective, dorsal view; (84) connective, lateral view; *apae*, apical processes of aedeagus; *sp*, subapical process of dorsolateral lobe of phallobase.



Figs. 85–93. *Kovacsiana niger* Gnezdilov, sp. n., holotype: (85) head, front view; (86) head and pronotum, dorsal view; (87) fore wing; (88) pygophore and anal tube, lateral view; (89) anal tube, dorsal view; (90) stylus, lateral view; (91) capitulum of stylus, dorsal view; (92) penis, lateral view; (93) penis, ventral view.

ward midline and not reaching metopeclypeal suture. Metopeclypeal suture distinct laterally, convex toward metope. Weak transverse carina present between sublateral and median carinae. Postclypeus with wide median carina in its proximal part (from metopeclypeal suture). Pedicel oblong cylindrical. Coryphe transverse, about twice as wide as long, with weak median carina; its anterior margin arcuately convex; posterior margin arcuately concave (Figs. 86, 99). 3rd segment of proboscis shorter than 2nd, weakly conically narrowed toward apex. Pronotum and mesonotum without carinae. Paradiscal fields narrow. Paranotal lobes wide, round. Fore wing elongate, considerably projecting beyond apex of abdomen, without hypocostal plate; caudodorsal angle equal to 130–150°; *R* 4 (furcating in proximal part, closer to basal cell) *M* 3 (furcating near middle of wing) *CuA* 1 (Fig. 87). Hind wing one-lobed, as long as fore wing; *R* 2 *M* 3 *CuA* 2 (Fig. 115). Radius and median vein furcating near middle of wing; cubitus anterior furcating proximally. Hind tibia with 2 lateral spines in its distal half. 1st metatarsomere with 2 lateroapical and 2 intermediate spines.

General coloration yellowish pale brown with dark brown spots. Metope between its upper margin and horseshoe formed by sublateral carinae black because of merged black punctures—traces of sensory pits (Fig. 114). Metope between its lateral margins and sublateral carinae and above clypeus pale yellow with black punctures—traces of sensory pits. Basal part of postclypeus below metopeclypeal suture pale yellow. Upper part of postclypeus and entire anteclypeus dark brown. Proboscis yellowish brown. Genae pale yellow. Temples dark brown with pale yellow spots on places of reduced ocelli. Scape pale yellow. Pedicel dark brown. Coryphe pale yellow, with dark brown spots at its anterior and posterior margins and with dark brown lateral margins (Fig. 99). Pronotum yellowish brown, with row of dark brown spots along anterior margin. Mesonotum yellowish brown. Fore wing pale yellow, with large dark brown spots on corium and clavus (Fig. 99). Hind wing brownish yellow. Fore and middle coxae and trochanters pale yellow. Fore and middle femora and tibiae black, except for pale yellow apices of femora and bases of tibiae. Hind leg yellowish brown. Fore and middle tarsi brown. Hind tarsus yellow. Apices of spines on legs black. Abdominal tergites and sternites yellow. Styli brown. Anal tube yellow, except for brown base.

Male genitalia (Figs. 85–93). Pygophore with posterior margin weakly regularly convex (Fig. 88). Anal tube oblong-oval, rounded apically (dorsal view) (Fig. 89). Anal column long (1/3 as long as anal tube). Phallobase weakly curved (lateral view), with ventral margin sharply convex (lateral view) below hooks of aedeagus (Fig. 92). Each dorsolateral lobe of phallobase with pair of apical processes: one wide hook-shaped on inner wall, directed upward and other long, narrow, directed toward base of lobe, with serrate margin. Ventral lobe of phallobase short, oviform, narrowed toward apex (Fig. 93). Apical processes of aedeagus wide, long but not reaching apices of dorsolateral lobes, furcating apically; ventral processes rounded, and dorsal processes narrowed toward apices. Ventral hooks of aedeagus wide, long (half as long as phallobase), narrowed toward peak-like apices, directed toward base of aedeagus. Stylus with convex hind margin (Fig. 90). Capitulum of stylus truncate apically (dorsal view), on short neck; lateral tooth distinct (lateral view) (Fig. 91).

Length of body of male 4.0 mm.

Material. Nigeria. Holotype, ♂: “Nigeria, Yankari, NE State / 29 Dec 1968 / Col. J.T. Medler,” “R.I.Sc. N.B. / I.G.24.288” (printed and hand-written) (BMNH).

Notes. The Yankari National Park lies in northeastern Nigeria, in the southern part of the Sudan Savannah, is composed of savannah grassland with well-developed patches of woodland; its relief is presented by hills ranging in height from 200 to 400 m (the highest point is 640 m) (http://en.wikipedia.org/wiki/Yankari_National_Park).

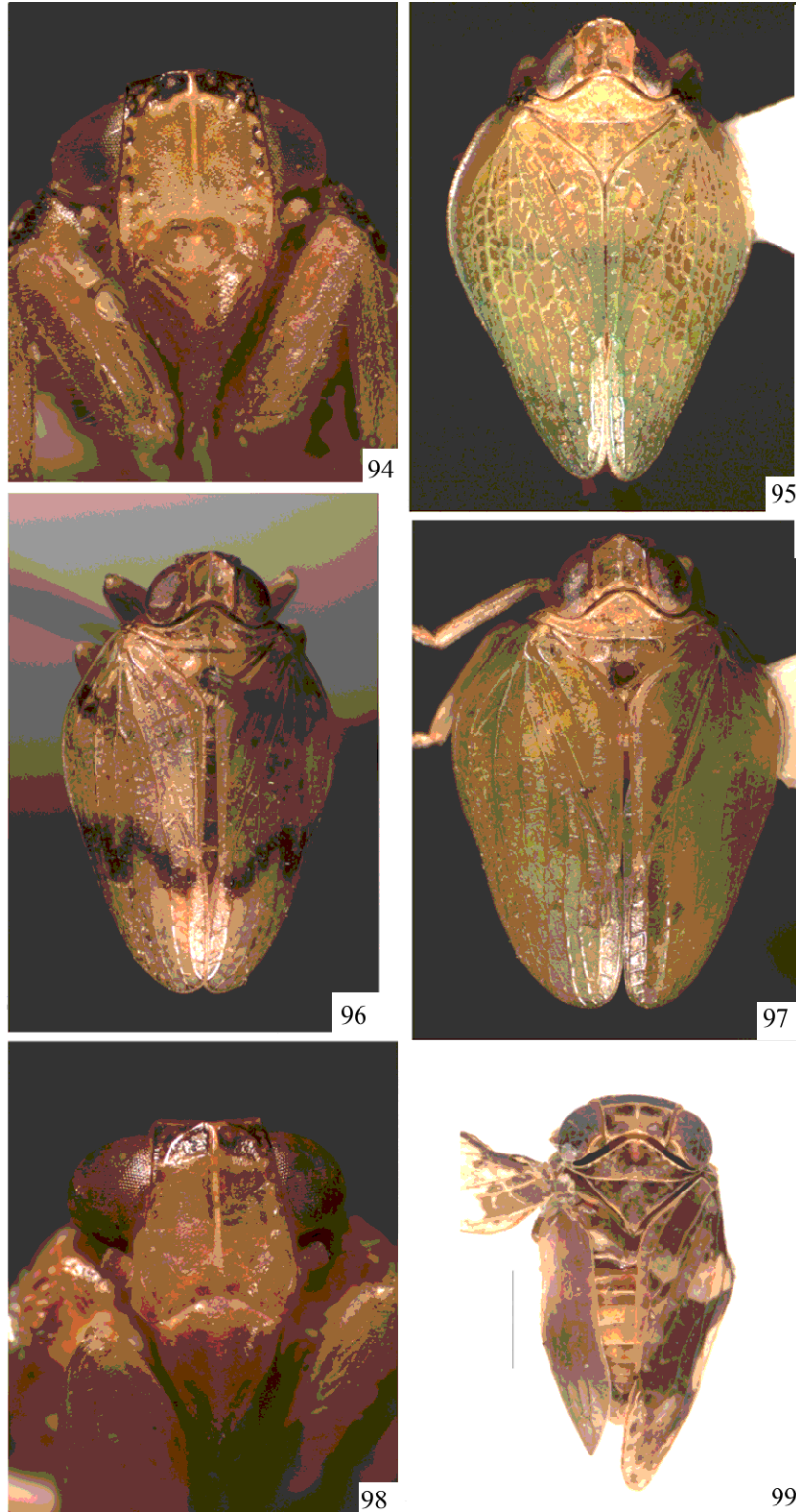
Kovacsiana sp.

Material. Djibouti. 1 ex. (without abdomen): “Interieur de Djibouti, 1900, Nermann leg.” (MNHN).

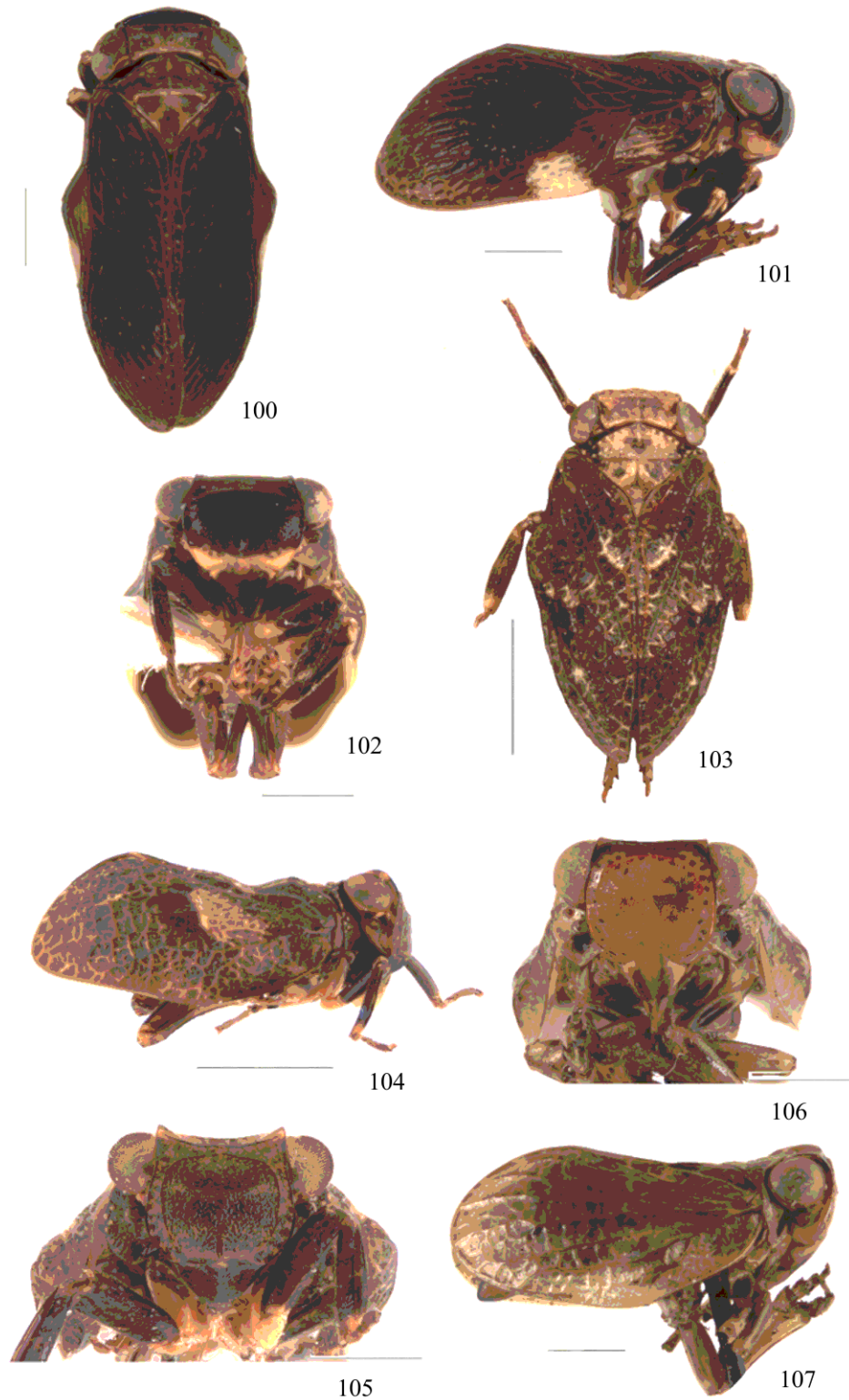
Subtribe *Chimetopina* Gnezdilov, subtrib. n.

Type genus *Chimetopon* Schmidt, 1910

Diagnosis. Fore wing with *R* 3–4 *M* 3–5 *CuA* 1. Clavus open. Hind wing well developed, with two deep emarginations of terminal margin (cubital and vannal) dividing wing into three lobes—anterior remigial lobe (before cubital emargination), remigial-vannal (middle) lobe, and anal lobe. Remigial lobe is widest, remigial-vannal lobe as wide as remigial one or narrower, and anal lobe half as wide as remigial



Figs. 94–99. Issidae, external structure: (94, 95) *Issus tubiflexus* Gnezdilov, sp. n., holotype; (96–98) *Issus vaucheri* Gnezdilov, sp. n., paratypes [(96) female; (97, 98) male]; (99) *Kovacsiana niger* Gnezdilov, sp. n., holotype (scale bar 1 mm) [(94, 98) head, front view (width of metope 0.1 mm); (95–97, 99) dorsal view].



Figs. 100–107. Issidae, external structure: (100–102) *Carydiopterum genimaculatum* Gnezdilov, sp. n., holotype; (103–105) *Cascaruna grumosa* Gnezdilov, sp. n. [(103) paratype; (104, 105) holotype]; (106, 107) *Kovacsiana vibex* (Melichar), holotype [(100, 103) dorsal view; (101, 104, 107) lateral view; (102, 105, 106) head, front view]. Scale: (100–102, 105–107) 1 mm; (103, 104) 2 mm.

lobe or rudimentary. Hind wing venation: $R\ 2\ M\ 1\ CuA\ 2\ CuP\ 1\ Pcu\ 1\ A_1\ 2\ A_2\ 1$. CuA_2 running into apex of CuP near cubital emargination without flattening. Apex of Pcu curved toward cubital emargination. Pcu and $A_{1,1}$ not fused even partly. Hind tibia with 1–2 lateral spines.

Composition. *Chimetopon* Schmidt, 1910, *Ikonza* Hesse, 1925, *Cascaruna* Gnezdilov gen. n. Apparently *Chimetopon* is most primitive in this row of genera as this genus has remigial and remigial-vannal lobes equal in width and *Ikonza* must be derived as this genus has anal lobe reduced.

Genus *Chimetopon* Schmidt, 1910

Chimetopon Schmidt, 1910 : 184.

Type species *Chimetopon camerunensis* Schmidt, 1910.

Chimetopon camerunensis Schmidt, 1910 (Figs. 39–63, 108–110)

Chimetopon camerunensis Schmidt, 1910 : 185.

Chimetopon camerunensis: Gnezdilov, 2016a : 191, figs. 5, 8.

Description. Metope wide, widened above clypeus, with short median carina extending from its upper margin to its middle and intercrossing with transverse carinae at center (Figs. 39, 110). Lateral margins of metope rounded toward metopeclypeal suture. Metopeclypeal suture very gently curved toward metope. Clypeus without carinae. Pedicel subspherical. Upper margin of metope straight. Coryphe transverse, slightly concave, with anterior margin nearly straight, lateral margins weakly diverging toward apex, and posterior margin gently concave (Figs. 40, 108). 3rd segment of proboscis slightly shorter than 2nd, conically narrowed toward apex. Pronotum nearly as long along midline as mesonotum, with weak median carina. Paradiscal fields very narrow. Paranotal lobes wide. Mesonotum without carinae. Tegulae rather flat. Fore wing very gently rounded apically (truncate), without hypocostal plate (Figs. 42, 108, 109). $R\ 4\ M\ 4\text{--}5\ CuA\ 1$. Clavus open, with $Pcu+A_1$ running into its apex. Basal cell narrowly oval. Radius and median vein separately originating from basal cell. Hind wing well developed, three-lobed, with 2 deep emarginations of terminal margin; anterior remigial lobe (before cubital emargination) nearly as wide as remigial-vannal (middle) lobe, and anal lobe half as wide as remigial-vannal lobe; cubital emargination of

wing margin also much deeper than vannal emargination (Fig. 43). Basal cell large, oval. $R\ 2$ (furcating immediately behind coupling lobe) $M\ 1$ m-cu $3\ CuA\ 2$ (furcating apically; CuA_2 running into apex of CuP near cubital emargination) cua-cup $1\ Pcu\ 1$ (apex curved toward cubital emargination) pcu- $a_1\ 5\ A_1\ 2$ (furcating near middle) $a_{1,1}\text{--}a_{1,2}\ 7\ A_2\ 1$. Pcu and $A_{1,1}$ have no anastomosis. At rest, hind wing under fore wing roof-like curved lateral to cubital emargination and peak-like fitting abdomen; anal (posterior) lobe turned underneath remigial-vannal (middle) lobe on vannal fold along A_1 (Fig. 41). Fore femur flattened. Hind tibia with 2 lateral spines in its distal half and with 6 apical spines. 1st and 2nd metatarsomeres subequal in length. 1st metatarsomere with 2 lateroapical and 6 intermedial spines in arcuate continuous row. 2nd metatarsomere only with 2 lateroapical spines.

Male genitalia (Figs. 45–54). Pygophore narrow, with posterior margin almost straight (lateral view) (Fig. 52). Anal tube narrowed toward apex (dorsal view) (Fig. 47), with straight contour of lower margin (lateral view) (Fig. 48). Anal column long (about 1/3 as long as anal tube). Phallobase wide, curved at right angle (lateral view) (Fig. 46). Dorsolateral lobes narrowed toward apex, with narrow lobiform subapical process originating from its ventral margin. Dorsolateral lobes not fused dorsoapically (Fig. 49). Ventral lobe of phallobase wide, long, not narrowed toward apex, distinctly not reaching apices of dorsolateral lobes (Fig. 45). Base of phallobase with short lobe (*bl*). Apical processes of aedeagus long, wide, each with pair of lobes (*lap*) (Fig. 50), widened before apex (lateral view) (Fig. 51). Aedeagus with pair of short, sharply curved ventral hooks with pointed apices. Stylus with wide plate; caudodorsal angle widely rounded (Fig. 53). Capitulum on long neck, narrowed toward apex (dorsal view), with wide lateral tooth (Fig. 54). Connective with small scoop (*sc*) (Fig. 51).

Female genitalia (Figs. 55–63). Posterior margin of sternite VII semicircularly convex (Fig. 63). Anal tube long, narrow, weakly narrowed in middle part, widely rounded or weakly truncate apically (dorsal view) (Fig. 56), convex (lateral view) (Fig. 55). Pygophore with subtubular bridge at base of anal tube (Fig. 59). Ventral surface of anal tube concave. Anal column short (its length less than 1/10 of length of anal tube). Gonoplacs without carinae; lobes (Gp 1 and Gp 2) fused without borders (Fig. 57). Furca without handle, with short base. On whole, gonapophysis IX (PCL) rather long, with proximal part (pPCL) clearly convex



Figs. 108–115. Issidae, external structure: (108–109) *Chimetopon camerunensis* Schmidt, holotype; (111–112) *Hemisobium hammersteini* Schmidt, holotype; (114, 115) *Kovacsiana niger* Gnezdilov, sp. n., holotype [(108, 111 dorsal view; (109, 112, 115) lateral view; (110, 113, 114) head, front view]. Scale: (114) 0.5 mm; (110, 113, 115) 1 mm; (108, 109, 111, 112) 2 mm.

(lateral view), and with distal parts (dPCL) bent toward midline at obtuse angle, widened at place of bend, and bearing no distinct teeth (Figs. 60, 61). Lateral fields (Lf) semicircularly prominent (as those in *Latilica* Emeljanov, 1971 and *Kivupterum* Dlabola, 1985). Median field (Mf) in shape of pair of short convex lobes (as that in *Latilica*). Apical group of anterior connective lamina (ACL) consisting of 3 large rounded teeth; ridge wide, bearing 3 large teeth without carinae in lateral group (Fig. 58). Endogonocoxal process (Gxp) clearly bifurcate (Fig. 62). Posterior margin of gonocoxa VIII (Gx VIII) straight, without lobe.

Material. Cameroon. Holotype, ♀: “Kamerun / Barombi / Conradt” (printed), “*Chimetopon camerunensis* Schmidt / ♀. Edm. Schmidt / determ. 1909” (printed and hand-written), “Type” (printed), “MIZ / 231935” (printed) (MIZ).

Comparative notes. The phallobase curved at the right angle (lateral view) and bearing a basal lobe (*bl*) and also sharply curved ventral hooks of the aedeagus (*vhae*) relate the genus *Chimetopon* to the genus *Ikonza* Hesse, which can be seen, in particular, in *I. angolensis* Gnezdilov, 2016 (Fig. 65).

Genus *Cascaruna* Gnezdilov, gen. n.

Type species *Cascaruna grumosa* sp. n.

Description. Metope wide, subsquare, with arcuately convex lateral margins, with distinct sublateral carinae forming horseshoe and reaching metopeclypeal suture, with median carina originating from transverse carina (formed by horizontal parts of sublateral carinae), crossing metopeclypeal suture, and continuing onto postclypeus (Figs. 32, 105). Sublateral carinae of metope connected in shape of horseshoe, not reaching upper margin of metope. Upper margin of metope emarginate. Metope swollen above metopeclypeal suture which is distinct and straight. Postclypeus large. Coryphe transverse, not less than 3 times as wide as long along midline (Figs. 33, 103). Rudiments of ocelli present. Pedicel subspherical, with rhinaria. 3rd segment of proboscis weakly narrowed apically, 3/4 as long as 2nd segment (Fig. 31). Pronotum with pair of punctiform depressions in median part, without carinae, with traces of sensory pits appearing as pustules (4 rows on disc). Paradiscal fields narrow. Paranotal lobes wide. Anterior margin of pronotum obtuse-angularly projecting; posterior margin nearly straight.

Mesonotum without carinae. Scutellum depressed. Fore wing elongate; caudodorsal angle subequal to 160° (Figs. 35, 104). Clavus at least 3/4 as long as wing. Longitudinal veins prominent. Narrow hypocostal plate present (Fig. 34). Genual projections strong. Tegulae large. Basal cell large, oval. Radius with 3 branches (*R* 3)—furcating near basal cell; median vein with 3 branches (*M* 3)—furcating near middle of wing; cubitus anterior simple (*CuA* 1). Cross-veins abundant, forming net in distal part of wing. Clavus open, with *Pcu* + *A*₁ running into its apex. *A*₁ keel-like projecting in proximal part. Hind wing well developed, three-lobed, with 2 deep emarginations of terminal margin; anterior remigial lobe (before cubital emargination) widest, two posterior lobes [remigial-vannal (middle) and anal (posterior)] half as wide as remigial lobe and subequal in width; cubital emargination of wing margin also much deeper than vannal emargination (Fig. 36). Basal cell large, oval. *R* 2 (furcating immediately behind coupling lobe) r-m 1 *M* 1 m-cu 1 *CuA* 2 (furcating apically; *CuA*₂ running into apex of *CuP* near cubital emargination without flattening) *Pcu* 1 (apex curved toward cubital emargination) *pcu-a*₁ 3 *A*₁ 2 (furcating apically) *A*₂ 1. *Pcu* and *A*_{1,1} have no anastomosis. Fore femur slightly widened (Fig. 37). Hind tibia with 1 lateral spine distally and 8 spines apically. 1st metatarsomere with 2 lateroapical and 4 intermedial spines in continuous row. 2nd metatarsomere only with 2 lateroapical spines.

Posterior margin of sternite VII of female weakly convex (nearly straight). Gonoplasts smooth. Anal tube long, narrow, rounded apically (dorsal view) (Fig. 38). Anal column short, about 1/4 as long as anal tube.

Etymology. The name of the genus formed by a combination of the Greek word “κάσκα” (helmet) and the name “Cameroun” emphasizes similarity of its head capsule to a helmet.

Comparative notes. The new genus is closely related to *Chimetopon* Schmidt but differs in the following characters: the metope is swollen above the metopeclypeal suture; the median carina originates from the transverse carina and continues onto the postclypeus; the fore wing is longer, with a system of prominent veins; a narrow hypocostal plate is present; the clavus of the fore wing is characterized by a keel-like projecting *A*₁ (it is also typical of the Oriental genus *Narayana* Distant, 1906); the hind tibia bears one lateral spine.

Cascaruna grumosa Gnezdilov, sp. n.
(Figs. 31–38, 103–105)

Description. General coloration yellowish brown (Figs. 103–105). Metope brown. Genae above antennae and postclypeus black (Fig. 105). Pronotal disc pale yellow (Fig. 103). Paradiscal fields black. Lower margins of paranotal lobes black. Pustules (traces of sensory pits on paradiscal fields and paranotal lobes) pale yellow. Mesonotum mainly pale yellow, with pair of dark brown round lateral spots above scutellum. Median part of fore wing occasionally with wide pale yellow band crossing genual projection (Fig. 104). Spots in cells of fore wing forming large elongate dark brown to black spot of irregular shape behind pale yellow band. Cross-veins in distal part of wing mainly pale yellow. Hind wing brown to dark brown. Fore and middle coxae and trochanters pale yellow. Fore femur and tibia dark brown to black. Apices of spines black. Sternites III and IV dark brown. Sternites V–VII brown to dark brown medially and yellow laterally. Gonopods dark brown.

Length of body of female 5.8–6.0 mm.

Material. Cameroon. Holotype, ♀: “Umg. Kamerunberg / Missellele, 6–21.9.35,” “Dr. F. Zumpt leg. / Eing. Nr. 7, 1936.” (ZMH). Paratype: ♀, “Mai 57 / Yabassi / Cameroun / J. Cantaloube” (MNHN).

Etymology. The name of the species is derived from the Latin adjective “grumósus” (tuberculate), which emphasizes the tuberculate structure of the fore wings.

ACKNOWLEDGMENTS

The author is grateful to Dr. A. Stroiński (Warsaw, Poland), Dr. J. Dekkert (Berlin, Germany), Prof. H. Hoch (Berlin, Germany), Dr. K. Schütte (Hamburg, Germany), Dr I. Malenovský (Brno, the Czech Republic), Dr. P. Kment (Prague, Czech Republic), Mr. A. Orosz (Budapest, Hungary), Prof. T. Bourgoin (Paris, France), and Mr. M. Webb (London, United Kingdom) for their support and for the material supplied for examination. The work of the author with the collections in Germany and the Czech Republic was supported by Alexander von Humboldt Stiftung (Bonn, Germany), in London, by the Royal Society, and in Paris, by the National Museum of Natural History.

The study was performed within the frame of the Russian state project no. 01201351189 with support of

the Russian Foundation of Basic Research (grant no. 16-04-01143).

REFERENCES

- Ahrens, A., “*Issus lauri* Germar. Fasc. 2,” in *Fauna Insectorum Europae cura E. F. Germar* (Impensis car. Aug. Kummelii, Halae, 1814).
- Bartlett, C.R., O’Brien, L.B., and Wilson, S.W., “A Review of the Planthoppers (Hemiptera: Fulgoroidea) of the United States,” *Memoires of the American Entomological Society* **50**, 1–187 (2014).
- Dlabola, J., “Neue ostmediterrane und iranische Zikadentaxone (Homoptera, Auchenorrhyncha),” *Acta Entomologica Bohemoslovacia* **84** (4), 295–312 (1987).
- Dlabola, J., “Neue Issiden und andere Zikadenarten des Mediterraneums und vom zuliegenden Eremial (Homoptera, Auchenorrhyncha),” *Acta Musei Nationalis Pragae* **45B** (1), 21–59 (1989).
- Fabricius, J.C., *Rhyngota. Systema Rhyngotorum secundum ordines, genera, species, adiectis synonymis, locis, observationibus, descriptionibus* (C. Reichard, Brunsvigae, 1803).
- Fjeldså, J. and Lovett, J.C., “Geographical Patterns of Old and Young Species in African Forest Biota: the Significance of Specific Montane areas as Evolutionary Centres,” *Biodiversity and Conservation* **6**, 325–346 (1997).
- Friis, I., “Forests and Forest Trees of Northeast Tropical Africa,” *Kew Bulletin Add. Ser.* **15**, 1–396 (1992).
- Gnezdilov, V.M., “Morphology of the Ovipositor in the Subfamily Issinae (Homoptera, Cicadina, Issidae),” *Entomologicheskoe Obozrenie* **81** (3), 605–626 (2002) [*Entomological Review* **82** (8), 957–974 (2002)].
- Gnezdilov, V.M., “Review of the Family Issidae (Homoptera, Cicadina) of the European Fauna, with Notes on the Structure of Ovipositor of Planthoppers,” *Chteniya Pamyati N.A. Kholodkovskogo, St. Petersburg* **56** (1), 1–145 (2003).
- Gnezdilov, V.M., “New Records for Some Western Palearctic Issidae (Hemiptera: Fulgoroidea),” *Acta Entomologica Slovenica* **19** (2), 187–192 (2011).
- Gnezdilov, V.M., “Modern Classification and the Distribution of the Family Issidae Spinola (Homoptera, Auchenorrhyncha: Fulgoroidea),” *Entomologicheskoe Obozrenie* **92** (4), 724–738 (2013) [*Entomological Review* **94** (5) 687–697 (2014)].
- Gnezdilov, V.M., “Review of the Genus *Ikonza* Hesse with Notes on Evolution of the Family Issidae (Hemiptera, Auchenorrhyncha: Fulgoroidea),” *Entomologicheskoe Obozrenie* **95** (1), 185–195 (2016a) [*Entomological Review* **96** (2), 225–244 (2016)].
- Gnezdilov, V.M., Extended Abstract of Doctoral Dissertation in Biology (St. Petersburg, 2016b).
- Gnezdilov, V.M., “Notes on the Phylogenetic Relationships of Planthoppers of the Family Issidae (Hemiptera,

- Fulgoroidea) of the Western Palaearctic Fauna, with Description of Two New Genera,” *Entomologicheskoe Obozrenie* **95** (2), 362–382 (2016c) [*Entomological Review* **96** (3), 332–347 (2016)].
15. Gnezdilov, V.M. and Bourgoïn, T., “The Mythic Species *Issus analis* Brullé, 1833 (Hemiptera, Fulgoroidea, Issidae): still an Enigmatic Taxon,” *Zootaxa* **4216** (2), 97–200 (2017).
 16. Gnezdilov, V.M. and Wilson, M.R., “Revision of the Genus *Semissus* Melichar (Hemiptera: Fulgoromorpha: Issidae),” *Annales Zoologici (Warszawa)* **55** (3), 421–428 (2005).
 17. Gnezdilov, V.M., Drosopoulos, S., and Wilson, M.R., “New Data on Taxonomy and Distribution of Some Fulgoroidea (Homoptera, Cicadina),” *Zoosystematica Rossica* **12** (2), 217–223 (2004).
 18. Gnezdilov, V.M., Holzinger, W.E., and Wilson, M.R., “The Western Palaearctic Issidae (Hemiptera, Fulgoroidea): an Illustrated Checklist and Key to Genera and Subgenera,” *Proceedings of the Zoological Institute RAS* **318** (Supplement 1), 1–124 (2014).
 19. Holzinger, W.E., Kammerlander, I., and Nickel, H., *Fulgoromorpha, Cicadomorpha excl. Cicadellidae. Vol. 1. The Auchenorrhyncha of Central Europe* (Leiden, 2003).
 20. Lethierry, L.F., “Homoptères nouveaux d’Europe et des contrées voisines. Pt. 1,” *Annales de la Société Entomologique de Belgique* **19**, lxxvi–lxxxix (1876).
 21. Lethierry, L.F., “Contribution à la faune algérienne. Liste des Hémiptères recueillis par M. Desbrochers des Loges et description des espèces nouvelles,” *Revue d’Entomologie* **8**, 310–318 (1889).
 22. Linnavuori, R., “Studies on the South- and Eastmediterranean Hemipterous Fauna,” *Acta Entomologica Fennica* **21**, 1–69 (1965).
 23. Linnavuori, R., “Hemiptera of the Sudan, with Remarks on Some Species of the Adjacent Countries 2. Homoptera Auchenorrhyncha: Cicadidae, Cercopidae, Machaeroidae, Membracidae and Fulgoroidea,” *Notulae Entomologicae* **53** (3), 65–137 (1973).
 24. Melichar, L., “Monographie der Issiden (Homoptera),” *Abhandlungen der K. K. Zoologisch-botanischen Gesellschaft in Wien* **3** (4), 1–327 (1906).
 25. Metcalf, Z.P., *Fulgoroidea. Issidae. General catalogue of the Homoptera. Fasc.4. Pt. 15* (Waverly Press, Baltimore, 1958).
 26. Remane, R., “Vorläufige Anmerkungen zur Evolution und Speziation der Gattung *Issus* F. auf den Mittelatlantischen Inseln (Kanaren, Madeira) (Homoptera Auchenorrhyncha Fulgoromorpha Issidae),” *Marburger Entomologische Publikationen* **1** (10), 1–168 (1985).
 27. Schmidt, E., “Die Issinen des Stettiner Museums. (Hemiptera–Homoptera),” *Entomologische Zeitung* **71**, 146–221 (1910).
 28. Schmidt, E., “Beitrag zur Kenntnis der Homopteren. (Neue Gattungen und Arten.),” *Entomologische Zeitung* **72**, 238–307 (1911).
 29. Sergel, R., “On the Occurrence of the *Issus* (*Archissus*) *canariensis* Group of Issid Planthoppers on the European Continent,” *Biologische Zeitschrift* **1** (1), 65–72 (1986a).
 30. Sergel, R., “A New *Issus* (*Issus*) *lauri* Ahrens Related Auchenorrhyncha Species from North Africa: *Issus* (*Issus*) *afrolauri* spec. nov. (Homoptera: Fulgoroidea: Issidae),” *Biologische Zeitschrift* **1** (1), 78–83 (1986b).
 31. Stål, S., “Nova methodus familias quasdam Hemipterorum disponendi,” *Öfversigt af Kongliga Vetenskaps-Akademiens Förhandlingar* **18** (4), 195–212 (1861).
 32. Synave, H., “Contribution a l’étude des Issidae africains (Homoptera–Fulgoroidea),” *Bulletin Institut royal des Sciences naturelles de Belgique* **32** (57), 1–22 (1956).
 33. Synave, H., “Fam. Issidae. La faune terrestre de l’île de Sainte-Hélène. Pt. 3. Annales de Musée Royal de Afrique Centrale, Tervuren, Belgique. Ser. IN–8,” *Sciences Zoologiques* **215**, 260–262 (1976).
 34. Walker, F., *List of the Specimens of Homopterous Insects in the Collection of the British Museum, London* (1851), vol. 2, pp. 261–636.