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Author: Ünal, Mustafa

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Genus *Asiotmethis* Uvarov (Orthoptera, Pamphagidae) from Turkey, with a checklist of known taxa

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MUSTAFA ÜNAL

Abant İzzet Baysal Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 14280 Bolu, Turkey. E-mail: unal@ibu.edu.tr

Abstract

Turkish taxa of *Asiotmethis* were studied. *Asiotmethis limbatus limbatus* (Charpentier, 1842), described from Turkey, is compared with *Asiotmethis turritus armeniacus* Ramme, 1951, known only in Armenia. The species described as *Glyphotmethis arasi* Salman, 1978 is proposed as junior synonym of *Asiotmethis turritus armeniacus*, the latter recorded for the first time from Turkey. A neotype is designated for *A. limbatus limbatus* from the European part of Turkey known as this taxon's type locality. Diagnosis, distribution, references to Turkey and doubtful records are given for both taxa, with a key, distributional map, illustrations and measurements. The need for a revision of the complicated genus *Asiotmethis* is explained, with some notes on problems of specific taxa. A checklist of all known species of the genus, their type localities and distributions is tabulated.

Key words

Orthoptera, Pamphagidae, *Asiotmethis*, taxonomy, fauna, key, distribution, Turkey, Bulgaria, Greece, Macedonia, Armenia, checklist

Introduction

The genus *Asiotmethis* was erected by Uvarov (1943), with *Gryllus muricatus* Pallas, 1771 as the type species. The currently known 24 species and subspecies of the genus are widely distributed in central and western Asia and southeastern Europe (Uvarov 1943, Bey-Bienko & Mistshenko 1951, Harz 1975, Presa & Garcia 1984). It is recorded from eastern Siberia, southern Russia, northwest China, Kazakstan, Kyrgyzstan, Uzbekistan, northern Tajikistan, northern Iran, Azerbaijan, Armenia, northern Turkey, southern Ukraine, northern Greece, Macedonia, Romania (Table 1). Most of the species were described from central Asia: 10 taxa in Kazakstan, 4 taxa in Russia, 2 taxa in Uzbekistan, 1 taxon in China. The remaining, two taxa from southern Ukraine and one taxon from each of southeastern Romania, northwestern Turkey, eastern Azerbaijan, Armenia and northern Iran, were described by six researchers (see Table 1).

A recent revisional study of the genus *Glyphotmethis* Bey-Bienko, 1951 (Ünal 2007), one of the genera most closely allied to *Asiotmethis*, has identified some problems and leads here to some comments on these insufficiently known taxa.

Thirteen taxa of *Asiotmethis* have gone unreported, other than in their original descriptions (Table 1).

The type locality of *A. muricatus fasciatus* (Fischer, 1846), described from eastern Siberia, is doubtful. According to Uvarov (1943) no *Asiotmethis* is recorded so far east and this species has not been located again since its original description.

Asiotmethis serricornis (Fischer, 1846) was described insufficiently from the eastern part of Kazakstan. Its exact type locality is unknown and no localities have been forthcoming since its original description. Subsequently eight other species have been described from eastern Kazakstan.

Asiotmethis muricatus lugubris (Herrich-Schaffer, 1838) was discovered from Siberia. Its type locality is uncertain and its characteristics very poorly stated. According to Uvarov (1943) the type locality of this taxon may lie anywhere east of the Ural Mountains. But three more new taxa have been described from that region (Table 1).

Steinmann (1966b) described the subspecies *A. tauritus flavipes* from east of central Kazakstan and compared it with *A. tauritus tauritus* Brunner von Wattenwyl as a nominotypical subspecies. But Brunner v. Wattenwyl did not describe any taxon named *tauritus*. And no such name appears in the family Pamphagidae, or even within Orthoptera. It may be thought that this name is a misspelling of the species *Asiotmethis tauricus* (Tarbinsky, 1930) or *Asiotmethis turritus* (Fischer, 1833). But the different authors and the distribution areas make such confusion unlikely. While the subspecies of *A. tauricus* are known from southern Ukraine and the subspecies of *A. turritus* are known from Transcaucasia, *A. tauritus flavipes* is found from Kazakstan. Therefore, this subspecies is not included in the species *A. tauricus* (Tarbinsky) or *A. turritus* (Fischer) with a correction of the name *tauritus*. It is also possible that *flavipes* may belong to another species found in central Asia (Table 1). The type material should be re-identified to establish its species.

Many species and subspecies, especially those found in central Asia are separated only by small morphological differences and some taxa share the same type locality, *e.g.*, three taxa from Akmolinsk, three subspecies of *heptapotamicus* from Alatau-Almaty (Table 1). A similar situation can be seen in the genus *Glyphotmethis* in central Anatolia and in that instance some taxa have been synonymized (Ünal 2007).

The genus *Asiotmethis* should be revised, using not only museum material, but also new material to be collected from the type localities and the other distributional areas. A current checklist of the taxa of *Asiotmethis* is provided in the present paper with their type localities and distributional areas, in the hope it proves useful to further studies.

In Turkey only the species *A. limbatus* (Charpentier, 1842) has been recorded to date (Ünal 2003). It was described from the European part of Turkey (Thrace: the part west of the Bosporus and Marmara Sea) (Charpentier 1842, Uvarov 1943). Later, this species was recorded from Greece, Macedonia, Bulgaria and Romania (Uvarov 1943, Bey-Bienko & Mistshenko 1951, Harz 1975, Willemse 1984). The population found in Romania was described by Ramme (1951) as a subspecies, *A. limbatus motasi*.

A. limbatus limbatus was mostly recorded from the European part of Turkey (Karabağ 1958, Karabağ *et al*. 1971, Demirsoy 1977); but two doubtful records were given from the Anatolian part. Karabağ *et al*. (1971) recorded one female from Akçakoca (in Düzce Province).

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But this species could not be found again by the author during several detailed field studies that took place in Akçakoca. The other record given from Artova (in Tokat Province) upon one specimen (Önder *et al.* 1999) needs confirmation. In the present study, while many specimens have been collected from the European part of Turkey, no single specimen has been found from the Anatolian part.

Type material of *A. limbatus limbatus* is lost (Harz 1975: 190). Therefore a neotype is designated from the European part of Turkey understood to be the type locality of this taxon.

Salman (1978) described *Glyphotmethis arasi* from Kağızman (in Kars province, E. Turkey). But it has been stated by the author that this species belongs to *Asiotmethis* (Ünal 2007). In the current paper it is determined that this species is synonymous with *Asiotmethis turritus armeniacus* Ramme 1951. Thus *Asiotmethis turritus armeniacus* is reported from Turkey for the first time.

My study is based on specimens newly collected from Turkey including from the type localities of *A. limbatus limbatus* and *G. arasi* and on the material preserved in Museums, including the type specimens of *A. turritus armeniacus* and *G. arasi*. Two taxa, *A. limbatus limbatus* and *A. turritus armeniacus*, respectively, one from the westernmost and the other from the easternmost regions of Turkey, are compared morphologically.

Materials and Methods

In this study, I examined 138 *Asiotmethis* specimens obtained during field studies and from collections. Field trips incorporating the type localities of *A. limbatus* and *G. arasi*, took place in 2001 and 2003 in Kars Province eastern Turkey, and in the european part of Turkey. Specimens were compared with material preserved in museums. Male penis valves and epiphallus are used to separate *A. limbatus* and *A. turritus* for the first time. A key for Turkish species is provided. Measurements are tabulated and were made using a ruler or a micrometer attached to a stereo microscope. The length of the pronotal prozona and metazona were measured along the midline. Illustrations and a distributional map are given. A checklist of current *Asiotmethis* taxa is prepared as a table. The following abbreviations are used in the text: N North; S South; W West; E East; AİBÜEM Abant İzzet Baysal Üniversitesi Entomoloji Müzesi, Bolu; AÜZM Ankara Üniversitesi Zooloji Müzesi, Ankara; NHM Natural History Museum, London; NMW Naturhistorisches Museum Wien; ZMB Zoologischen Museum Berlin.

Results

Asiotmethis Uvarov, 1943

Trans. R. Ent. Soc. Lond. 93: 52. Type species: *Gryllus muricatus* Pallas 1771.
Shumakov 1949; Ramme 1951: 109, 270, 410; Bey-Bienko & Mistshenko 1951: 304 (in translat. 1963: 323); Karabağ 1958: 110; Mirzayans 1959: 15; Dirsh 1961: 376; Shumakov 1963: 69; Weidner 1969: 154; Karabağ *et al*. 1971: 85; Harz 1975: 182; Demirsoy 1977: 36; Presa & Garcia 1984: 6; Otte 1994: 148; Mirzayans 1998: 12; Zhang *et al.* 2003: 219.

Diagnosis.— Body large with distinct tubercles and hairs. Prozona high with three distinct sharp lobes; metazona strongly lowered, with raised longitudinal median carina; hind margin acute angular. Tegmina macropterous in male, brachypterous or longer in female. Hind wing with a distinct large or small dark band, its apical and basal parts transparent, basal part yellowish, bluish or greenish in some species; axillary 1 and 2 veins distinctly curved. Inner side of hind legs various shades of red, blue, violet, orange or black. Dorsal margin of male mesotibia with distinct tubercles, without or less distinct in female. First abdominal tergite with a distinct, small, plate-like process dorsally. Tympanal organ well developed with a small tympanic lobe. Krauss organ large with distinct tubercles. Penis valves paired and divided; epiphallus plate-shaped, lophi with a group of spines, ancorae distinct.

Key to Turkish species of *Asiotmethis*

1. Metazona of pronotum short and narrow (Figs 1, 2; Table 2), less raised (Figs 3, 4); hindwing yellow at base, its dark band short, never attaining basal part (Figs 1, 2); inner side of hind legs orange or yellow; arolium small, reaching only to a half length of claws or less; apical part of penis valves slender, their tips very narrow (Figs 5, 6); posterior margin of epiphallus with a broadly rounded projection (Fig. 7) . . . . . *limbatus* (Charpentier)

– Metazona of pronotum long and broad (Figs 8, 9; Table 2), strongly raised (Figs 10, 11); hind wing light blue at base, its dark band very large, covering half of basal part (Figs 8, 9); inner side of hind legs red; arolium large, reaching beyond half length of claws; apical part of penis valves stout, their tips broad (Figs 12, 13); posterior margin of epiphallus with two rounded projections (Fig. 14) . . . . . *turritus* (Fischer)

Asiotmethis limbatus (Charpentier, 1842)

Eremobia limbata: Charpentier 1842, pl. 24.

Asiotmethis limbatus limbatus (Charpentier, 1842)

Figs 1-7, 15; Tables 1, 2

Eremobia limbata: Charpentier 1842; Saussure 1884: 226, 229.
Asiotmethis limbatus: Uvarov 1943: 55; Bey-Bienko & Mistshenko 1951: 306 (1963: 325); Karabağ 1958: 110; Weidner 1969: 154; Karabağ *et al.* 1971: 85; Demirsoy 1977: 37; Willemse 1984: 104, 220; Önder *et al.* 1999: 164.
Asiotmethis limbatus limbatus: Ramme 1951: 10; Harz 1975: 191; Presa & Garcia 1984: 6; Otte 1994: 148.

Type locality.— European part of Turkey: Kırklareli, Yoğuntaş. *Neotype*.— male (AİBÜEM), here designated.

Material examined.— TURKEY: Çanakkale, Gelibolu [Gallipoli], 10.8.1923, 1♂; Kırklareli, 23.6.1941, 1♂, 1♀, leg. T. Karabağ; Edirne, Keşan area, 1200 m, 6.7.1962, 1♂, 1♀, leg. K.M. Guichard & D.H. Harvey (NHM); Edirne, Süloğlu, Saksağandere ormanları, 24.6.1969, 2♀♀; Kazankaya, 11.7.1961, 1♀(AÜZM); Edirne, Meriç, İpsala yolu, Subaş Köyü, 12.6.2003, 9♂♂, 7♀♀; Edirne, Uzunköprü, Muhacirkadıköy, 12.6.2003, 6♂♂, 6♀♀, leg. M. Ünal & S. Mutun; Kırklareli, Yoğuntaş, Tekke Deresi, 41°45'068" N, 27°07'518" E, 11.6.2003, 27♂♂, 19♀♀, leg. M. Ünal (including neotype) (AİBÜEM); İstanbul, Silivri, Semizkum, 20.7.1966, 1♂, 3♀♀; Silivri, August 1964, 1♀, leg. O. Karabağ; Kırklareli, 23.6.1942, 1♀, leg. T. Karabağ (AÜZM); GREECE: Kavalla, sea level, 1♂(leg. A. Buxton); Kavalla, 7.7.1985, 2♂♂, 1♀ (NHM); Drama, 300 m, 5.7.1982, 1♀ (leg. F. Willemse & J. & W. Faassen; det. F. Willemse) (AİBÜEM); MACEDONIA: Vratnica (N of Tetovo), 700 m, 23.7.1972, 1♂ (leg. et det. F. Willemse) (AİBÜEM); BULGARIA: 6.1929, 3♀♀; 7.1929, 1♂; Borusowgrad, 20.6.1930, 1♂, 1♀ (leg. P. Tchovbadjiev) (NHM).

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Distribution.— (Fig. 15). Southeastern Balkan Peninsula, southern Bulgaria, Macedonia, northern Greece, Thrace, european part of Turkey: Kırklareli, Edirne, Çanakkale, İstanbul, Tekirdağ.

Diagnosis.— Prozona short and high, its lobes distinct, incision between lobes deep (Figs 3, 4); lateral projections of mesozona distinct; metazona long, median carina clear, distinctly raised; lateral margins straight, acute angular at hind margin (Figs 1, 2); male tegmina long, reaching far beyond hind knee (Figs 1, 3); hind wing yellow at base, with a short dark band in anterior margin (Figs 1, 2); inner side of hind femur yellow or orange with a dark-blue macula at base; inner side of hind tibia yellow or orange; female tegmina reaching to end of abdomen or to genicular lobes of hind femur, shorter in some specimens, reaching to 6th to 7th abdominal tergites (Figs 2, 4); arolium short, reaching at most to half extent of claws; penis valves slender, their apices very narrow (Figs 5, 6); epiphallus with a broadly rounded projection in posterior margin (Fig. 7). This subspecies is separated from *A. turritus armeniacus* by the characters given in the key and by distribution (Fig. 15).

Remarks.— The type material of this taxon is lost (Harz 1975: 190). A male neotype is here designated from among a rich sample of material collected from Kırklareli Province: Yoğuntaş in the european part of Turkey.

The specimens given as *Glyphotmethis* sp. from Edirne: Süloğlu (Karabağ *et al*. 1971) and given as *Glyphotmethis escherichi* from the same place (Karabağ *et al*. 1974), belong to this subspecies. No *Glyphotmethis* have been found from that region.

This taxon is found in Thrace. But there are two doubtful records from the Anatolian part of Turkey (Fig. 15). One female collected from Düzce: Akçakoca (Karabağ *et al*. 1971) is lost. No specimen has been discovered in recent field studies in Akçakoca. One specimen recorded from Tokat: Artova (Önder *et al*. 1999) requires confirmation. This latter record may belong to *Glyphotmethis*.

Asiotmethis turritus (Fischer de Waldheim, 1833)

Thrinchus turritus: Fischer de Waldheim 1833, Bull. Soc. Imp. Nat. Moscou 6: 370.

Asiotmethis turritus armeniacus Ramme, 1951
Figs 8-15; Tables 1, 2

Asiotmethis turritus armeniacus: Ramme 1951: 410; Presa & Garcia 1984: 7; Stolyarov 1997: 69.
Glyphotmethis arasi: Salman 1978: 64. *syn. n.*
Glyphotmethis arasi: Demirsoy 1977: 47; Demirsoy 1979: 268. *syn. n.*
Glyphotmethis turritus armeniacus: Otte 1994: 159.
Asiotmethis arasi: Ünal 2007: 3.

Type locality.—Armenia: Yerevan. Holotype.- male (ZMB).

Material examined.— ARMENIA: Eriwan [Yerevan], 14.8.1924, 4 ♂♂, 2♀♀ (holo- and paratypes of *A. turritus armeniacus*) (ZMB); Eriwan, 1♂, leg. W. Ramme (paratype of *A. turritus armeniacus*); Yerevan, 30.6.1934, 2♂♂, 27.7.1934, 1♀; Kotaik, 1♂, 1♀; Ejmiadzin, 8.6.1926, 2♂♂; Armenia, 31.6.1924, 1♂, 1♀, 8.6.1926, 1♂, 17.8.1926, 1♀, leg. A. Schelkovnikov (NHM); TURKEY: Kars, Kağızman, Deller çiftliği, 1250 m, 16.7.1974, 2♂♂, 1♀, leg. S. Salman (holo- and paratypes of *G. arasi*) (NHM); Kars, Kağızman, Aras Vadisi, Deller çiftliği, 1250-1360 m, 26.7.2001, 1♀; Kağızman, Aras Vadisi, Karakurt Köyü, 26-27.6.2003, 12♂♂, 4♀, leg. M. Ünal & S. Mutun (AİBÜEM).

Distribution.— (Fig. 15). Armenia: Yerevan, Ejmiadzin, Kotaik; New for Turkey: Kars.

Diagnosis.— Prozona low, its lobes distinct (Figs 10, 11); lateral projections of mesozona slightly distinct; metazona very long, median carina distinct, strongly raised, almost to level of prozona, lateral margins slightly concave, hind margin slightly rounded (Figs 8, 9); male tegmina long, reaching far beyond hind knees (Figs 8, 10); hind wing light bluish at base with large dark band covering almost half of wing's basal region (Figs 8, 9); inner side of hind femur red with a long, dark-blue macula at base; inner side of hind tibia bright red; female tegmina covering abdominal tergites from above (Figs 9, 11), shorter in some specimens, attaining 5th to 6th abdominal tergites; arolium large, reaching beyond half of claw length; penis valves stout, their apices broad (Figs 12, 13); epiphallus with two rounded projections on posterior margin (Fig. 14). This subspecies is separated from *A. limbatus limbatus* by the characters given in the key and by its distribution (Fig. 15).

Remarks.— *Glyphotmethis arasi* Salman, 1978 was collected from its type locality, Kars, Kağızman, Aras Valley. These specimens were compared with the type materials of both *G. arasi* and *A. turritus armeniacus* in the NHM and ZMB. As a result *G. arasi* is proposed as a junior synonym of *A. turritus armeniacus*, and thus this taxon is added to the Turkish fauna for the first time.

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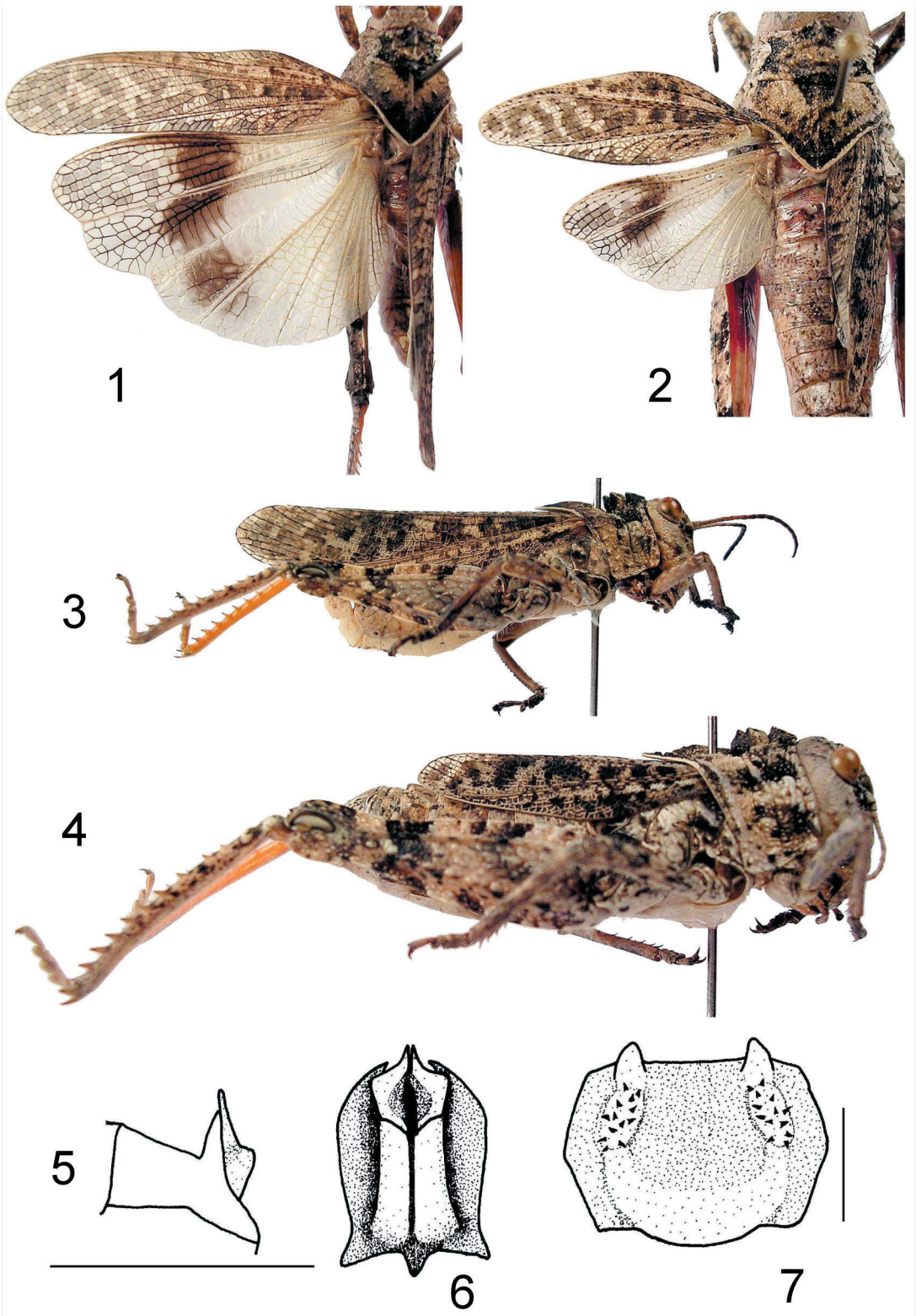
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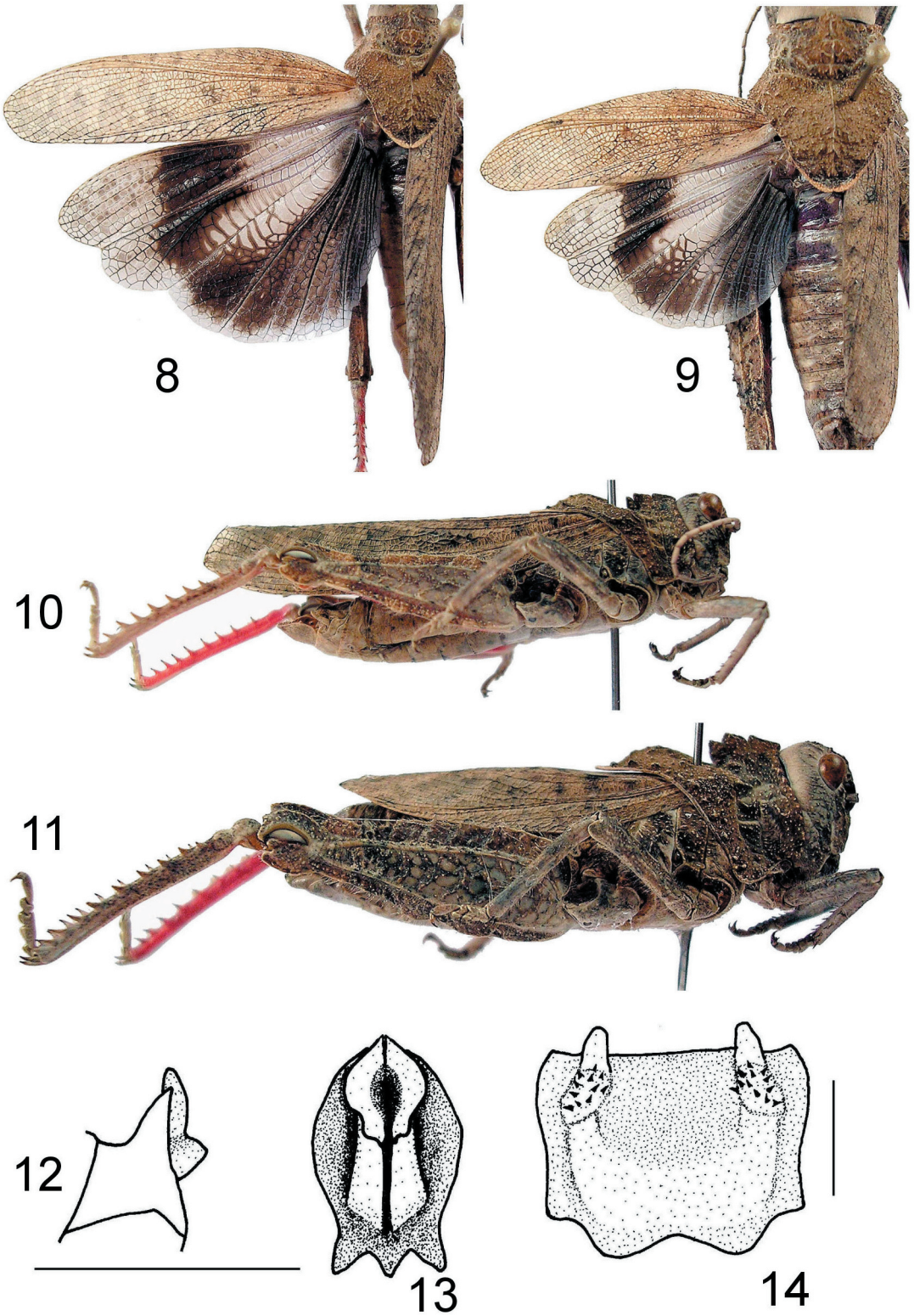
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Figs 1-7. *Asiotmethis limbatus limbatus*. 1. Male pronotum and wings from above. 2. Female pronotum and wings from above. 3. Male lateral view. 4. Female lateral view. 5. Apical valves of penis and cingulum, lateral view. 6. Ditto posterior view. 7. Epiphallus. Scales 1 mm.

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Figs 8-14. *Asiotmethis turritus armeniacus*. 8. Male pronotum and wings from above. 9. Female pronotum and wings from above. 10. Male lateral view. 11. Female lateral view. 12. Apical valves of penis and cingulum, lateral view. 13. Ditto posterior view. 14. Epiphallus. Scales 1 mm.

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Table 1. Checklist of the taxa of *Asiotmethis*, with their type localities and distribution areas (see also references).

Taxa	Type locality	Distribution
A. artemisianus Shumakov, 1949	NE Iran: Khorasan, Nishabur	Iran: Khorasan, Golestan
A. bifurcatus Liu et Bi, 1994	NW China: Xinjiang, Jeminay	Known only from the type locality
A. heptapotamicus (Zubowski, 1898)		
h. heptapotamicus (Zubowski, 1898)	SE Kazakstan: Almaty, Iliysky	SE Kazakstan: SE Balkash, Kefmen Mts. Trans-ili, Alatau; NW Kyrgyzstan: Talas, Dzambul, Chui-ili Mts., Frunze
h. extimus Bey-Bienko, 1951	E Uzbekistan: Fergana, Naiman	Known only from the type locality
h. griseus Shumakov, 1949	SE Kazakstan: Alatau, Terekty River	Known only from the type locality
h. songoricus Shumakov, 1949	SE Kazakstan: Alakul: N Alatau-S Tarbagatau	Known only from the type locality
h. transiens (Uvarov, 1925)	E Uzbekistan: Fergana,Vuadil	E Uzbekistan: Fergana; N Kyrgyzstan: Kyrgyzsian Alatau, Aksu River
A. jubatus (Uvarov, 1926)	Russia: SW Siberia: Omsk, Severnaya	Russia: SW Siberia; NE Kazakstan: Semipalatinsk; NW China: N Dzungaria
A. limbatus (Charpentier, 1842)		
l. limbatus (Charpentier, 1842)	NW Turkey: European Part, Kırklareli	NW Turkey: all Thrace, Asian part of İstanbul; N Greece; S Macedonia; S Bulgaria.
l. motasi Ramme, 1951	SE Romania: Constanta, Dobruja	Known only from the type locality
A. muricatus (Pallas, 1771)		
m. muricatus (Pallas, 1771)	S Russia: Orenburg, Tatischeva	Russia: Orenburg, W Siberia: Transurals; NW Kazakstan: Oral-Akmolinsk.
m. australis (Tarbisky, 1930)	S Kazakstan: Turkestan, Syr Darya, Kazalinsk	S and SW Kazkstan: Caspian lowland Syr Darya; Russia: lower Volga, E Ciscaucasia
m. fasciatus (Fischer, 1846)	SE Russia: Transbaikalia (Duaria), Verkhneudinsk	Known only from the type locality
m. lugubris (Herrich-Schaffer, 1838)	E Russia: Siberia	Known only from the type locality
m. rubripes Shumakov, 1949	E of Central Kazakstan: Karaganda, Akmolinsk	Known only from the type locality
A. nigripedis Steinmann, 1966	E of Central Kazakstan: Akmolinsk, Koksatau	Known only from the type locality
A. serricornis (Fischer, 1846)	E Kazakstan	Known only from the type locality
A. similis Bey-Bienko, 1951	Central Kazakstan: N Bet-Pak Dala	Known only from the type locality
A. tauricus (Tarbinsky, 1930)		
t. tauricus (Tarbinsky, 1930)	S Ukraine: Crimea, Saki	Crimea: Saki, Yevpatoriya, Koktebel
t. steppensis Shumakov, 1949	S Ukraine: Kherson, Askaniya-Nova	Known only from the type locality
A. tauritus flavipes Steinmann, 1966	E of Central Kazakstan: Akmolinsk	Known only from the type locality
A. turritus (Fischer, 1833)		
t. turritus (Fischer, 1833)	E Azerbaijan: Karabagh uplands	E Azerbaijan; Daghestan uplands; E Georgia; NW Iran: E and W Azerbaijan, Golestan
t. armeniacus Ramme, 1951	Armenia: Yerevan	Armenia: Aras Valley, Yerevan; E Turkey: Kars, Aras Valley, Kağızman
A. zacharjini Bey-Bienko, 1926	E Kazakstan: Zaisan Lake Topolev Mts	E Kazakstan: Zaisan depression; NW China: Dzungaria, Emel Valley

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Table 2. Measurements of the Turkish *Asiotmethis* taxa (mm).

Taxa		Length of prozona	Length of metazona	Width of metazona	Length of tegmina	Width of tegmina	Length of hind femur	Body length
A. l. limbatus	♂	3.0-4.0	4.8-6.0	6.0-6.5	23.9-27.6	5.8-7.0	13.8-17.0	26.3-31.2
	♀	4.1-5.0	5.4-7.1	7.8-9.0	17.3-21.3	6.0-6.7	18.0-20.8	31.8-40.0
A. t. armeniacus	♂	3.5-3.9	6.0-6.7	7.0-7.2	23.9-28.0	7.0-7.1	14.8-16.0	29.3-31.8
	♀	4.0-5.2	6.9-8.0	8.4-10.2	16.4-22.2	5.6-6.8	17.8-20.0	36.0-39.8

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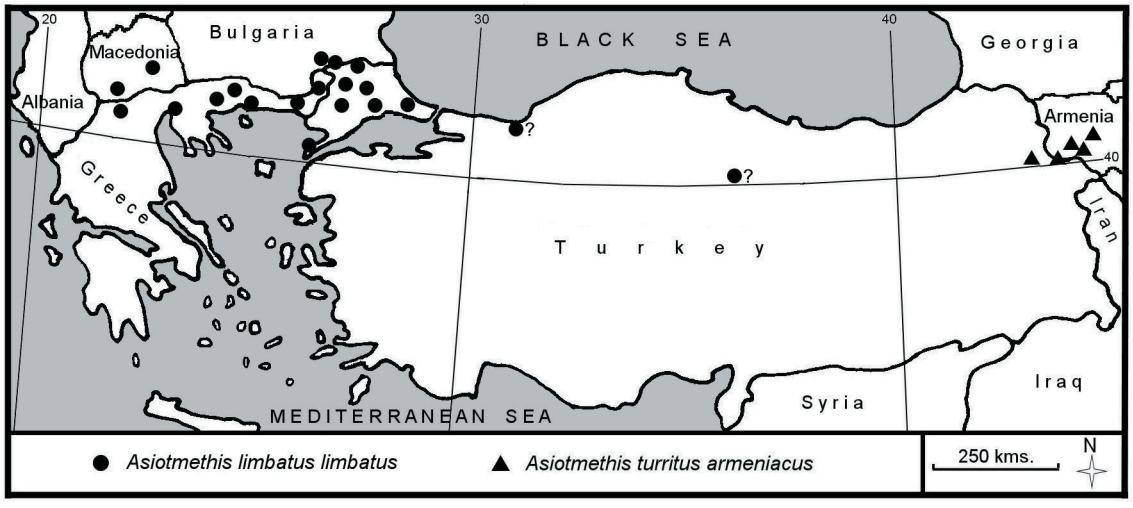


Fig. 15. Distributions of *A. limbatus limbatus* and *A. turritus armeniacus*.

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