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

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Source: Journal of Orthoptera Research, 16(2) : 191-197

Published By: Orthopterists' Society

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Abstract

Turkish taxa of Asiotmethis were studied. Asiotmethis limbatis limbatis (Charpentier, 1842), described from Turkey, is compared with Asiotmethis tauritus armeniacus Ramme, 1951, known only in Armenia. The species described as Glyphotmethis arasi Salman, 1978 is proposed as junior synonym of Asiotmethis tauritus armeniacus, the latter recorded for the first time from Turkey. A neotype is designated for A. limbatis limbatis 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, Harr 1975, Presa & Garcia 1984). It is recorded from eastern Siberia, southern Russia, northwest China, Kazakhstan, 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 Kazakhstan, 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 Kazakhstan. 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 Kazakhstan.

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. tauricus flavipes from east of central Kazakhstan 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 tauritus (Fischer, 1833). But the different authors and the distributional areas make such confusion unlikely. While the subspecies of A. tauricus are known from southern Ukraine and the subspecies of A. tauritus are known from Transcaucasia, A. tauritus flavipes is found from Kazakhstan. Therefore, this subspecies is not included in the species A. tauricus (Tarbinsky) or A. tauritus (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 Akmolinski, three subspecies of heuptapomaticus 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, Harr 1975, Willemse 1984). The population found in Romania was described by Ramme (1951) as a subspecies, A. limbatus motasi.

A. limbatus limbatis 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).
But this species could not be found again by the author during several
detailed field studies that took place in AÇkakoca. 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 Glyphotemis arasi from Kağizman (in
Kars province, E. Turkey). 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
Armrenicus Ramme 1951. Thus Asiotmethis turritus armenicus
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 armenicus and G. arasi. Two taxa, A.
limbatus limbatus and A. turritus armenicus, 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 ab-
notations are used in the text: N North; S South; W West; E East;
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 maricatus
Pallas 1771.

Shumakov 1949; Ramme 1951: 109, 270, 410; Bey-Bienko & Mist-
shenkov 1951: 304 (in transl. 1963: 323); Karabağ 1958: 110;
Mizrayans 1959: 15; Dirsh 1961: 376; Shumakov 1963: 69; Wei-

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. Tymanal 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, ancorea 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 projec-
   tion (Fig. 7) ............................ limbatus (Charpentier)
   – Metazona of pronotum long and broad (Figs. 8, 9; Table 2), strongly
   raised (Figs. 10, 11); hindwing light yellow 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) . . . .

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: Uvarov 1943: 55; Bey-Bienko & Mistshenko
Karabağ et al. 1971: 85; Demirsoy 1977: 37; Willems 1984: 104,
220; Önder et al. 1999: 164.

Asiotmethis limbatus limbatus: Ramme 1951: 10; Harz 1975: 191;

Type locality.— European part of Turkey: Kırklareli, Yoğuntaş. Neo-
type.— male (AÜBEÜM), here designated.

Material examined.— TURKEY: Çanakkale, Gelibolu [Gallipoli],
10.8.1923, 1♂; Kırklareli, 23.6.1941, 1♂, leg. T. Karabağ; Ed-
irne, Keşan area, 1200 m, 6.7.1962, 1♂, 1♀, leg. K.M. Guichard
& D.H. Harvey (NHM); Edirne, Sultolu, Saksagândere ormanlan,
24.6.1969, 2♀; Kazankaya, 11.7.1961, 1♀ (AÜZM); Edirne, Meriç,
İpsala yolcu, Subaş Köyü, 12.6.2003, 9♂, 7♀; Edirne, Üzünköprü,
Muhacirkaddöy, 12.6.2003, 6♂, 6♀, leg. M. Ünal & S. Mutun;
Kırklareli, Yoğuntaş, Tekke Deresi, 41°45’06”N, 27°07’51”E,
11.6.2003, 27♂, 19♀, leg. M. Ünal (including neotype)
(AÜBEÜM); İstanbul, Silivri, Semişkaz, 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. Willems & J. & W. Faassen; det. F. Willems) (AÜBEÜM);
MACEDONIA-Vratnica (of Tetovo), 700 m, 23.7.1972, 1♂ (leg. et
det. F. Willems) (AÜBEÜM); BULGARIA: 6.1929, 3♂, 7.1929, 1♂;
Distribution.—(Fig. 15). Southeastern Balkan Peninsula, southern Bulgaria, Macedonia, northern Greece, Thrace, European part of Turkey: Kırklareli, Edirne, Çanakkale, Istanbul, 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 slightly concave, 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); apodemes short, reaching to most 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: Sülüoğlu (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: Aşkakoca (Karabağ et al. 1971) is lost. No specimen has been discovered in recent field studies in Aşkakoca. 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)


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


Glyphotmethis arasi: Salman 1978: 64. syn. n.


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

Material examined.—ARMENIA: Yerevan [Yerevan], 14.8.1924, 4 ♂♂, 2♀♀ (holo- and paratypes of A. turritus armeniacus) (ZMB); Yerevan, 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, Kağzman, Deller çiftliği, 1250 m, 16.7.1974, 2♀♀, 1♂, leg. S. Salman (holo- and paratypes of G. arasi) (NHM); Kars, Kağzman, Aras Vadisi, Deller çiftliği, 1250-1360 m, 26.7.2001, 1♂; Kağzman, 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, Kağzman, 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.

Acknowledgements

I would like to thank Serap Mutun (Abant Izzet Baysal University, Bolu) for helping me with collecting; appreciation to Erkut Kivanc (AÜZM, Ankara); to George Beccaloni and Judith Marshall (NHM, London); to the late Alfred Kaltenbach and Ulrike Aspöck (NMW, Wien); to Michael Ohl, and Isolde Dorandt (ZMB, Berlin) for their assistance during my studies in the Museums; thanks also to Fer Willemsen (Eygelshoven) for sending me two specimens of A. limbatus collected from Greece and Macedonia; to Dao-Chuan Zhang (Hebei University, China) for data on the current position of A. bifurcatus in China; to Glenn K. Morris (University of Toronto, Mississauga) and anonymous reviewers for corrections and very valuable suggestions on the manuscript. The field studies in Turkey were supported by the Scientific and Technical Research Council of Turkey (TÜBİTAK-TBAG-1981-100T089). My studies in the European Museums were supported by the European Commission’s Research Infrastructure Action via the following SYNTHESYS Projects: GB-TAF-561, AT-TAF-562, DE-TAF-558.

References

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

<table>
<thead>
<tr>
<th>Taxa</th>
<th>Type locality</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. artemisianus</td>
<td>NE Iran: Khorasan, Nishabur</td>
<td>Iran: Khorasan, Golestan</td>
</tr>
<tr>
<td>A. bifurcatus</td>
<td>NW China: Xinjiang, Jeminay</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>A. heptapotamicus (Zubowski, 1898)</td>
<td>SE Kazakhstan: Almaty, Iliisky</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>h. heptapotamicus</td>
<td>SE Kazakhstan: Almaty, Iliisky</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>h. extimus</td>
<td>E Uzbekistan: Fergana, Naiman</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>h. griseus</td>
<td>SE Kazakhstan: Almaty, Terekty River</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>h. songoricus</td>
<td>SE Kazakhstan: Almaty, Terekty River</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>h. transiens</td>
<td>E Uzbekistan: Fergana, Vuadil</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>A. jubatus</td>
<td>Russia: SW Siberia: Omsk, Severnaya</td>
<td>NW Turkey: all Thrace, Asian part of Istanbul; N Greece; S Macedonia; S Bulgaria.</td>
</tr>
<tr>
<td>A. limbatus</td>
<td>NW Turkey: European Part, Kırklareli</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>l. limbatus</td>
<td>SE Romania: Constanta, Dobruja</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>l. motasi Ramme, 1951</td>
<td>SE Romania: Constanta, Dobruja</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>m. muricatus (Pallas, 1771)</td>
<td>SE Russia: Transbaikalia (Duaria), Verkhneudinsk</td>
<td>S and SW Kazakhstan: Caspian lowland S Darya; Russia: lower Volga, E Ciscaucasia</td>
</tr>
<tr>
<td>m. australis (Tarbinsky, 1930)</td>
<td>SE Russia: Transbaikalia (Duaria), Verkhneudinsk</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>m. fasciatus (Fischer, 1846)</td>
<td>E Russia: Siberia</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>m. rubripes Shumakov, 1949</td>
<td>E of Central Kazakhstan: Karaganda, Akmolinsk</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>A. nigripedis Steinnmann, 1966</td>
<td>E of Central Kazakhstan: Akmolinsk, Koksatau</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>A. serricornis (Fischer, 1846)</td>
<td>E Kazakhstan</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>A. similis Bey-Bienko, 1951</td>
<td>Central Kazakhstan: N Bet-Pak Dala</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>A. tauricus (Tarbinsky, 1930)</td>
<td>S Ukraine: Crimea, Saki</td>
<td>Crimea: Saki, Yevpatoriya, Koktebel</td>
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<tr>
<td>t. tauricus</td>
<td>S Ukraine: Crimea, Saki</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>t. steppensis</td>
<td>SE Kazakhstan: Almaty, Terekty River</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>A. taurus flavipes Steinmann, 1966</td>
<td>E of Central Kazakhstan: Akmolinsk</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>A. turritus</td>
<td>E of Central Kazakhstan: Akmolinsk</td>
<td>Known only from the type locality</td>
</tr>
<tr>
<td>t. turritus</td>
<td>E Azerbaijan: Karabagh uplands</td>
<td>E Azerbaijan: Daghestan uplands; E Georgia; NW Iran: E and W Azerbaijan, Golestan</td>
</tr>
<tr>
<td>t. armeniacus Ramme, 1951</td>
<td>Armenia: Yerevan</td>
<td>Armenia: Aras Valley, Yerevan; E Turkey: Kars, Aras Valley, Kağızman</td>
</tr>
<tr>
<td>A. zacharjini Bey-Bienko, 1926</td>
<td>E Kazakhstan: Zaisan Lake Topolev Mts</td>
<td>E Kazakhstan: Zaisan depression; NW China: Dzungaria, Emel Valley</td>
</tr>
</tbody>
</table>


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

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

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