

## Pygmy grasshoppers (Orthoptera: Tetrigidae) from North-eastern Turkey

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### Abstract

Collections of Pygmy grasshoppers (Tetrigidae) were made between mid-May and the beginning of June 2001 in the North-East of Turkey (Black Sea region and Eastern Anatolia). Altogether 6 species (*Paratettix meridionalis*, *Tetrix bolivari*, *T. depressa*, *T. subulata*, *T. tenuicornis*, *T. tuerki*) from 11 localities were recorded. The discussion of these records includes morphological and taxonomic remarks. *T. depressa turcicus* Demirsoy, 1977 nov. syn. represents the macropronotal form and is therefore synonymized with *Tetrix depressa*. The representatives of the genus *Paratettix* from Turkey are discussed.

### Zusammenfassung

Zwischen Mitte Mai und Anfang Juni 2001 wurden Dornschröcken (Tetrigidae) in der Nordost-Türkei (Schwarzmeerregion und östliches Anatolien) gesammelt. Es wurden insgesamt sechs Arten (*Paratettix meridionalis*, *Tetrix bolivari*, *T. depressa*, *T. subulata*, *T. tenuicornis*, *T. tuerki*) an elf Fundorten festgestellt. Die Diskussion dieser Nachweise umfasst morphologische und taxonomische Anmerkungen. *T. depressa turcicus* Demirsoy, 1977 nov. syn. stellt die macropronotale Form dar, und wird hier formal mit *Tetrix depressa* synonymisiert. Die in der Türkei vorkommenden Arten der Gattung *Paratettix* werden ebenfalls diskutiert.

### Introduction

Turkey is quite rich in Orthopteran species and holds a substantial amount of endemic taxa. However, the Northeast is less explored than areas around the big cities along the West (Istanbul, Izmir) or South coast (Antalya), or the central highland area around the capital Ankara. Even so, our knowledge on the Tetrigidae of Turkey is comparatively poor. There are eight Tetrigidae species recorded from Turkey with certainty (ÜNAL 2003), a single recording of *Mishtshenkotetrix brachyptera* is extremely doubtful (Ünal pers. comm.). Given such a small number of species it is still surprising, that many open taxonomic and faunistic questions exist to date.

A journey, which led through the Black Sea region and the northern parts of Eastern Anatolia (Fig. 1), was used to collect new data for the Orthoptera in the North-East of Turkey. This article concentrates on Pygmy grasshoppers (*Tetrigidae*).

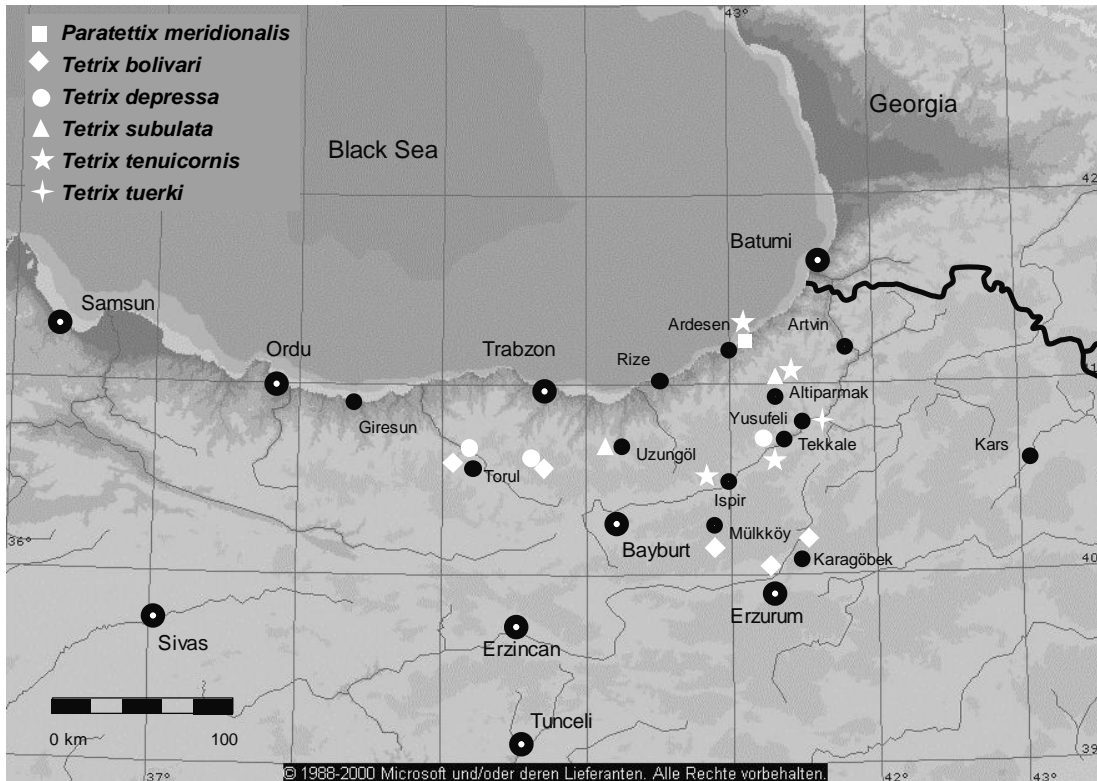


Fig. 1: Map of NO Turkey with localities of the recorded species.

## Investigated area

The Eastern part of Turkey geographically includes the Eastern subregion of the Black Sea region and the highlands of the East Anatolian region (EROL 1982). Both regions differ in their climatic conditions and therefore also in their prevailing vegetation. The whole Black Sea region is coined by the chains of the Pontic mountain ranges running from east to west. This is a high rising, fold mountain range, which forms an effective climatic barrier (BRINKMAN 1976, EROL 1982, HÜTTEROTH 1982). In the eastern subregion its ridges rising up to 4000 m above sea level. The two parallel running main ridges limit internal basins and longitudinal valleys (e.g. Çoruh valley), receiving less rain (600–1000 mm), with a very old cultural landscape (e.g. rice in wet cultivation, apricots). The precipitation-rich, coastal zone is widely covered by evergreen thermophytic wood formations, and relicts of previously widely distributed Mediterranean sclerophyll vegetation (*Pseudomacchia*). The coastal zone is of economic importance (tea, grapes, and fruits) and belongs to the most precipitation-rich regions of Asia Minor, levelling up to 2200 mm (Rize city) precipitation each year. The Northern slopes of this region are covered by deciduous, cold-sensitive, wet lowland forests. This Pontic vegetation is above 560 m replaced by deciduous Pontic beech forests (*Fagus orientalis*) of the montane zone with evergreen understorey (e.g. *Rhododendron ponticum*, *R. luteum*). The oral zone is characterized by Pontic evergreen coniferous forests (hardy wet forests) consisting of *Abies nordmanniana* and *Pinus sylvestris* together with Oriental spruce (*Picea orientalis*). Pine forests formed by *Pinus nigra* ssp. *palasiensis* and *Pinus sylvestris* are typical for the drier inner parts, lying in the rain shadow of the mountains. The inner valleys are widely

covered by little, dense grass, dwarf scrub and other shrub vegetation as well as riverine alder forests (KÜRSCHNER et al. 1995). Thorn-cushion formations (e.g. *Astragalus*, *Astracantha*, *Onobrychis cornuta*) as well as xerophytic grass vegetation are typical for the subalpine and alpine zones.

The Eastern Anatolian highland was formed by repeated mountain rising and folding, resulting in a small-scaled, mosaic landscape. Continental high steppes and steppe forest climate is prevailing, with extremely cold (absolute minima of about -40 °C, temperature under zero degrees at least in 4 months of the year) and snow-rich winters. Precipitation-rich springs, and hot, rain-poor summers are typical, resulting in annual precipitation rates of 400–600 mm and long term mean temperature between 8–12 °C (ALEX 1984, AKMAN & KETENOĞLU 1986). High mountain steppe vegetation, scrub formations and hardwood forest relicts are the typical vegetation. The subalpine and alpine zone again is characterized by thorn-cushion formations. In the upper Euphrate region north of the river Karasu, riverine forests and expanded moorland complexes can be found (KÜRSCHNER et al. 1995).

### **Collecting Sites**

The tetrigid specimens were collected from mid-May until beginning of June 2001 on eleven sites in North-eastern Turkey (Fig. 1). Eight collecting sites are located within the Eastern subregion of the Black Sea Region (sensu EROL 1982) and further three within the Eastern subregion of the East-Anatolian region (Table 1). The journey led from the city Trabzon west along the Black Sea Coast to the mountain range of the Giresun Dağları (mountain ranges are named according to KÜRSCHNER et al. (1995), modified after EROL (1982)), including the collection sites Torul at the river Dogankent, Uzungöl and Zigana Geç. The travel continued into the western part of the mountain range Tatos Dağları with Ispir and the western part of the coast-parallel running Çoruh valley. During the middle section of the journey, the second author left the Black Sea region for the Eastern Anatolia region. Along the upper Euphrate river, Tetrigidae were collected on three sites (Mülkköy, Erzurum, Karagöbek) between 1800 and 2100 m above sea level. The last third of the journey returned to the Tatos Dağları, inspecting the eastern part of valley along the river Çoruh including its side rivers (Yusufeli, Tekkale, Altiparmak, Demirdöven). A last collection site was on to the Black Sea coast (Ardesen).

### **Records including taxonomic remarks**

All tetrigids were collected by Ingmar Landeck, now either in Collectio Landeck (CLa) or Collectio AW Lehmann (CL, specimens individually numbered from 5334 to 5345). Specimens were determined by the first author using BEI-BIENKO & MISHCHENKO (1951–1963), HARZ (1975) and DEVRIESE (1996). The key of HARZ (1975) is by far the most reliable one, nonetheless the collection Lehmann (CL) and the Museum Berlin (ZMHB) were used for comparison.

Table 1: Collecting sites with geographic coordinates and site description

Locality	Geographic coordinates	Altitude (m NN)	Description of collecting site
<b>Black Sea region</b>			
<b>Eastern subregion</b>			
Road 700 m N of Torul, Dogankent-River	N 40°34.4' E 39°18.4'	920 m	Riverine tamarisks vegetation on expanded alluvial sands of river banks with parts of coarse run gravel. Scarce vegetation dominated by grasses of distinct alternate-wet sites
Mountains around the "Holiday village" Uzungöl	N 40°37.1' E 40°17.9'	1550 – 1600 m	Pontic spruce forests ( <i>Picea orientalis</i> ) with dense <i>Rhododendron</i> understorey, wet sands on a forest track
Environment of Ziganana Geç (pass)	N 40°38.2' E 39°23.4'	1940 m	Open steppe forests dominated by <i>Pinus sylvestris</i> on steep, dry mountain slopes with shallow soil. Scarce ground vegetation, especially <i>Anemone blanda</i> and <i>Primula</i> spp., wet places on forest tracks
3 km NO Ispir, valley of river Çoruh	N 40°29.9' E 41°00.1'	1150 m	Roadside, small vegetation-free sites on river banks with alluvial gravel and sands
SW Yusufeli, valley of river Çoruh	N 40°48.1' E 41°32.0'	590 m	River banks, large gravel accumulations with small sandy areas between stones, also under large gravel stones
Village Tekkale, side valley of Çoruh,	N 40°49.9' E 41°27.7'	1325 m	Upper part of valley. Small, vegetation free places of bar and wet soil within a mountain meadow with hay use
5km SW Altiparmak NO Demirdöven	N 40°56.4' E 41°21.9'	1180 m	Scarce vegetation on a river gravel bank
Black Sea coast, river mouth near Ardesen	N 41°10.2' E 40°58.9'	3 m	Tamarisks vegetation on alluvial sediment bank of large run gravel accumulations inside the river south of Ardesen. Smaller wet sandy places near the trash line
<b>East-Anatolian region</b>			
<b>Eastern Subregion</b>			
Mülkköy, high valley	N 40°19.9' E 40°54.9'	1800 m	Steppe slopes, affected by pasture use. Thorn-cashion vegetation with <i>Astracantha</i> and <i>Acantholimon</i> , north exposition, in closely neighbourhood to small-scale rural field use.
N Erzurum, river Karasu/Karaçay	N 39°59.5' E 41°17.2'	1850 m	Karasu/Karaçay moorland (upper Euphrates), valley bog and lime moorland meadows
Erzurum region, N Karagöbek	N 40°10.6' E 41°26.3'	2080 – 2090 m	Calcareous hang mire

## Morphological forms

It is long known that Tetrigidae can occur in distinct morphological forms regarding the length of their wings and the pronotum. Several names are attributed to these forms but from BEI-BIENKO (1936) onwards it becomes more and more common to name these forms using a generalist appendix to the name, instead of species specific names. As DEVRIESE (1996) mentioned, the macropronotal form (forma macroptera by BEI-BIENKO 1936) describes individuals with long hindwings (= Alae) and elongated pronota, both extending beyond the hind knees. In most individuals the hind wings are extending beyond the tip of the pronotum. In the brachypronotal form (forma brachyptera by BEI-BIENKO 1936) the pronotum covers in maximum the abdomen and the hindwings are shorter than the abdomen. In some individuals a rare intermediate form exist, which we name mesopronotal form. In this form the pronotum extends slightly beyond the abdomen, but not as far as in the macropronotal form. This form was to our knowledge first mentioned by WEIDNER (1938) for *T. subulata*, but never (or seldom if we have overlooked records) reported ever since for Palaearctic Tetrigidae. There is one female of *P. meridionalis* with such intermediate pronotum and wing length in the collection.

### ***Paratettix meridionalis* (Rambur, [1838])**

Material studied: 4 individuals from one locality.

3♀ macropronotal, 1♀ mesopronotal, 05.06.2001 Eastern Black Sea region, S Ardesen: alluvial river bank, N 41°10.2' E 40°58.9', Tamarisks vegetation, smaller wet sandy places near the trash line, 3 m NN (CLa 2♀♀, CL 5334-5335).

Taxonomic remarks: There are three *Paratettix* taxa recorded or mentioned from Turkey. The first one is the widespread circum-Mediterranean species *P. meridionalis*. We compared our Turkish material with series of this species from Morocco, Portugal, Sardinia, Corsica, Southern France and Greece. The Turkish material in front of us belongs clearly to *P. meridionalis*, and falls within the variance of this species. However there are two problems related to the second recorded species *P. iranica* UVAROV (in UVAROV & DIRSH 1952), which was described from Iran and recorded from Eastern Turkey (CEJCHAN 1983). Firstly, the name *iranica* is a primary homonym of *P. obliteratus iranicus* BEI-BIENKO (in BEI-BIENKO & MISHCHENKO 1951=1963). Both taxa were described in the same genus and therefore must be treated equally according to Article 57.2 of the "Code" (KRAUSS 2000). Therefore, the name *iranica* sensu UVAROV is not available for the second *Paratettix* species occurring in Turkey. The publication of UVAROV & DIRSH was printed 1952, but the manuscript submitted July 1951. Therefore it overlaps in publication with the book by BEI-BIENKO & MISHCHENKO (1951=1963). This might explain why the primary homonym was established. Secondly, comparing the descriptions, we are relatively convinced that *P. iranica* UVAROV, 1952 is identical with *P. uvarovi* SEMENOV, 1915 (sensu BEI-BIENKO & MISHCHENKO 1951=1963, STEINMANN 1964) described from the Transcaucasus and middle Asia. Both descriptions mentioned the broader fastigium compared to *P. meridionalis*, a clear character separating the species. The first author found 3♂♂, 2♀♀ of *P. uvarovi* SEMENOV, 1915 from Samarkand/Turkmenistan under

the undetermined material of the Zoological Museum Berlin (ZMHB). Further investigation to clear this issue is under way.

Further remarks: The year of publication of the original description by RAMBUR is most likely 1838 (CORAY & LEHMANN 1998). The describer of *P. uvarovi* SEMENOV-TIAN-SHANSKY has based his description on the material collected by UVAROV (1912, compare LANDECK in prep.).

### ***Tetrix bolivari* Saulcy, 1901 in Azam**

Material studied: 6 individuals from 5 localities, all of them were macropronotal.

1♀, 27.05.2001, Eastern Anatolia, N Erzurum: Karasu, N 39°59.5' E 41°17.2', Karasu/Karaçay moorland (upper Euphrates), valley bog and lime moorland meadows, 1850 m NN (CLa) - 1♀, 27.05.2001, Eastern Anatolia, N Karagöbek, N 40°10.6' E 41°26.3', calcareous hang mire, 2080 m NN (CL 5338) - 1♂, 1♀, 26.05.2001, Eastern Anatolia, Mülkköy, N 40°19.9' E 40°54.9', steppe slopes (north exposition), affected by grazing with thorn-cashion vegetation (*Astracantha* and *Acantholimon*), 1800 m NN (CLa, CL ♀ 5337) - 1♀, 22.05.2001, Eastern Black Sea region, 700 m N Torul: Dogankent-River, N 40°34.4' E 39°18.4', riverine Tamarisks vegetation on alluvial sands, 920 m NN (CLa) - 1♀, 22.05.2001, Eastern Black Sea region, Zigana Geç, N 40°38.2' E 39°23.4', open steppe woodland dominated by *Pinus sylvestris*, wet places on forest tracks, 1940 m NN (CLa).

Taxonomic remarks: KARAMAN (1965) has separated three subspecies based on the head profile. However, DEVRIESE (1996) has synonymized these names and we also can not justify a separation, based on the variation found in material from single localities.

Remarks: This species is widespread in Turkey; however, old records under *T. subulata* might be checked for this species. The most confusion however exists in newer data in mixing this species with *T. ceperoi*. To our knowledge the south-eastern most record from *T. ceperoi* is from the European Turkey (NASK-RECHI 1991). The material record from Rhodos (MONNERAT et al. 1999) should be checked carefully, because all material the first author has seen from the Eastern Aegean Islands in the Museum Amsterdam turned out to be either *T. bolivari* or *P. meridionalis*. At present *T. ceperoi* has not been found in Asia minor (Lehmann unpubl. data, Ünal pers. comm.).

### ***Tetrix depressa* Brisout de Barneville, [1848]**

= *Tetrix depressa turcicus* Demirsoy, 1977:24 **nov. syn.** Typus: ♀ lectotypus, ♀ paralectotypus, ♂ paralectotypus. Typus locality: Turkey, Artvin, Yusufeli (designated by Günes 1987).

Material studied: 5 females from 3 localities, 2 were macro- and 3 were brachypronotal.

1♀ macropronotal, 22.05.2001, Eastern Black Sea region, 700 m N Torul: Dogankent-River, N 40°34.4' E 39°18.4', riverine Tamarisks vegetation on alluvial

sands, 920 m NN (CLa) - 1♀ macropronotal, 2♀♀ brachypronotal, 22.05.2001, Eastern Black see region, Zigana Geç, N 40°38.2' E 39°23.4', open steppe woodland dominated by *Pinus sylvestris*, wet places on forest tracks, 1940 m NN (CLa, CL 5339-5340) - 1♀ brachypronotal, 28.-29.05.2001, Eastern Black Sea region, Tekkale, N 40°49.9' E 41°27.7', small, vegetation free places of bar and wet soil within a mountain meadow, 1325 m NN (CLa).

Taxonomic remarks: DEMIRSOY (1977) has described the subspecies *T. depressa turcicus*, which was raised to species rang by GÜNES (1987). Based on the original description *turcicus* represents the macropronotal form of *depressa* and is here for the first time formally synonymized with *Tetrix depressa*.

There is discussion to which genus *depressa* has to be placed. KARAMAN (1960) has separated *depressa* from the genus *Tetrix* and placed this species in the monotypic genus *Depressotettix*. GÜNTHER (1979), revising the African Tetrigidae, mentioned its morphological similarity with *Dasyleurotettix infaustus*. This might be the reason, while *depressa* is frequently cited from Africa or Madagascar, which is obviously wrong. However, the similarities with *D. infaustus* can be seen as superficial (PODGORNAJA 1995). We were able to compare fresh material from South Africa of *D. infaustus* (in CL) with *depressa* and found both taxa to be quite distinct. To further complicate the situation, DEVRIESE (1996) has designed *depressa* to the genus *Uvarovitettix*. However, DNA sequencing found no close affinity of *depressa* with either *D. infaustus* or *transsilvanicus* (Hochkirch, pers. comm. 2006), the type species of *Uvarovitettix*. At the moment we interpret *depressa* as a morphological interesting species within the genus *Tetrix*, but will await the final results of the genetic analysis.

### ***Tetrix subulata* (Linnaeus, 1758)**

Material studied: 9 individuals from 2 localities.

2♂♂ macropronotal, 1♂ brachypronotal, 3♀♀ brachypronotal, 23.05.2001, Eastern Black see region, Mountains around the "Holiday village" Uzungöl, N 40°37.1' E 40°17.9', Pontic spruce forests with dense understorey, wet sands on a forest track, 1550-1600 m NN (CLa, CL 5342-5343) - 1♀ macropronotal, 2♀♀ brachypronotal, 30.05.2001, Eastern Black see region, NO Demirdöven: 5km SW Altiparmak, N 40°56.4' E 41°21.9', scarce vegetation on a river gravel bank, 1180 m NN (CLa, CL 5344-5345).

Remarks: Two individuals showed a undulating middle carina of the pronotum. This is obviously a rare individual aberration, reported also as an aberration from an African *Paratettix* species by GÜNTHER (1979).

### ***Tetrix tenuicornis* (Sahlberg, 1893)**

Material studied: 7 individuals from 4 localities. All of them were brachypronotal.

2♀♀, 05.06.2001, Eastern Black Sea region, S Ardesen: alluvial river bank, N 41°10.2' E 40°58.9', Tamarisks vegetation, smaller wet sandy places near the trash line, 3 m NN (CLa) - 1♂, 2♀♀, 25.05.2001, Eastern Black Sea region, Çoruh-Valley, 3 km NO Ispir, N 40°29.9' E 41°00.1', roadside with small vegeta-

tion-free sites on river banks, 1150 m NN (CLa, CL♀5341) - 1♀, 28.-29.05.2001, Eastern Black Sea region, Tekkale, N 40°49.9' E 41°27.7', small, vegetation free places of bar and wet soil within a mountain meadow, 1325 m NN (CLa) - 1♀, 30.05.2001, Eastern Black Sea region, NO Demirdöven: 5km SW Altiparmak, N 40°56.4' E 41°21.9', scarce vegetation on a river gravel bank, 1180 m NN (CLa).

### ***Tetrix tuerki* (Krauss, 1876)**

Material studied: 2 individuals from 1 locality, macropronotal.

1♂ f. macropronotal, 1♀ f. macropronotal, 28. + 31.05.2001, Eastern Black Sea region, River Çoruh: SW Yusufeli, N 40°48.1' E 41°32.0', river banks, large gravel accumulations with small sandy areas, 590 m NN (CLa, CL♂ 5336).

Remarks: *T. tuerki* is considered to be a relict species, inhabiting gravel habitats along mountainous rivers in the Alps, the Tatra in Slovakia and the Balcanian mountains. Two males from Tadzhikistan were described as a separate subspecies (HARZ 1979), which was later synonymized with the nominate taxa by DEVRIESE (1996). Starting this study, we were not aware of the occurrence of *T. tuerki* in Turkey. With one largely overlooked published record (ÜNAL 1997), and a second unpublished one (Ünal pers. comm.) our locality demarks the third record of this species from Turkey. The records from Turkey link the European distribution to the Middle Asian record by HARZ (1979). We would not be astonished to see Middle Asian localities to be reported in the future. However, the habitat fits well into the descriptions given for European localities, with gravel banks along large rivers on middle altitudes (HARZ 1975).

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