



## Taxonomic review of the subfamily *Bradyporinae* (Orthoptera: Tettigoniidae; Bradyporini; Ephippigerini) of Turkey, with description of new species and the relationship of the taxa

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## Abstract

The members of the subfamily *Bradyporinae* including *Bradyporini* and *Ephippigerini* found in Turkey are studied. Two phylogenetic relationships based on morphology for the subgenera, species groups and for the all species of *Bradyporus s.l.* are proposed. A new diagram shows together the relationships and the schematized distributions of the taxa, Geographical Network Relationship, is proposed. A synonymic checklist of the known species of *Bradyporus s.l.* is given. Taxonomical changes, the doubtful and uncertain taxa names are discussed. *Callimenus* Fischer von Waldheim, 1830 is proposed as a subgenus of *Bradyporus* Charpentier, 1825. Four species groups, *B. oniscus* sp. group, *B. macrogaster* sp. group, *B. dilatatus* sp. group and *B. latipes* sp. group, are separated. *Callimenus macrogaster pancici* Brunner, 1882 is synonymized with *Bradyporus (Callimenus) macrogaster longicollis* (Fieber, 1853). Neotypes for *B. (s.str.) dasypus* (Illiger, 1800) and *B. (Callimenus) macrogaster macrogaster* (Lefebvre, 1831) are designated. Five new species, *Bradyporus (Callimenus) avanos sp. n.*, *B. (Callimenus) sureyai sp. n.*, *B. (Callimenus) conophallus sp. n.*, *B. (Callimenus) toros sp. n.* and *B. (Callimenus) karabagi sp. n.* are described. *Bradyporus (Callimenus) latipes* (Stål, 1875) is recorded from Turkey for the first time. The species *Schulmeisteri schulmeisteri* Harz, 1992 is excluded from the subfamily *Bradyporinae*. All previous records of *Bradyporinae* species in Turkey with full synonymic list of each species are given. The previous misidentifications are determined and then the distribution of each species is adjusted. The characters used the separation of the taxa are briefly discussed. The titillator for Turkish species and the basal projecting of ventral valve of ovipositor are used for the first time. Descriptions and redescriptions of the studied *Bradyporus* species are given. Keys to tribes, subgenera, species groups and Turkish species of *Bradyporus* are provided. In addition 157 original figures including a distributional map are provided.

**Key words:** Orthoptera, *Bradyporinae*, *Bradyporus*, *Callimenus*, taxonomy, systematic, phylogeny, Geographical Network Relationship, distribution, Europe, Turkey, Caucasia, Iran

## Introduction

The classification of *Bradyporinae (-idae)* and *Ephippigerini (-idae, -inae)* is changeable according to the authors. If the last several decades are considered the following studies on the classification of this group come into prominence. According to Rentz (1979) *Bradyporinae* and *Ephippigerinae* as well as *Hetrodinae*, *Pycnogastrinae*, *Derachantinae*, *Acridoxeninae* and *Apteropedetinae* are separate subfamilies in *Tettigoniidae*. Kevan (1982) used the family name *Bradyporidae (=Ephippigeridae)*. He gave *Bradyporinae*, *Ephippigerinae*, *Pycnogastrinae*, *Zichyinae (=Deracanthinae)*, *Hetrodinae* and with a doubt *Apteropedeticinae* under this family. Gorochov (1988, 1995) classifying the suborder Ensifera gave *Hetrodinae* and *Bradyporinae* in the family *Tettigoniidae*. He used the tribes *Bradyporini (=Callimenidae; =Pycnogastrinae)*, *Ephippigerini* and *Zichyini (=Deracanthidae)* in the subfamily *Bradyporinae*. Nickle & Naskrecki (1997) mainly followed Rentz (1979) except the subfamily *Apteropedetinae*. They gave the subfamilies *Bradyporinae*, *Ephippigerinae*, *Hetrodinae*, *Pycnogastrinae*, *Derachantinae* and *Acridoxeninae* in *Tettigoniidae*. According to Otte (1997) the subfamilies *Bradyporinae*, *Hetrodinae* and *Apteropedetinae* are in the family *Tettigoniidae*. He gave the tribes *Bradyporini*, *Ephippigerini* and *Zichyini* in the subfamily *Bradyporinae*. Gwynne (2001) followed Gorochov (1988) and he listed *Bradyporinae* and *Hetrodinae* under the family *Tettigoniidae*, but he did not give the tribes of *Bradyporinae*. Eades *et al.* (OSF–2011) followed Otte (1997). Regarding the classification of these groups I follow Gorochov (1988, 1995), Otte (1997) and Eades *et al.* (OSF–2011) in the present paper.

Five species of *Bradyporinae* are known from Turkey (Ünal, TOS–2011). The first species, *Ephippiger macrogaster* Lefebvre, 1831 was recorded from İzmir Province in Turkey in 1831. It is at the same time the first described Orthoptera species from Turkey (Lefebvre, 1831). *Callimenus dilatatus* Stål, 1875 was described from Amasya Province. It is the second *Bradyporinae* species described and recorded from Turkey (Stål, 1875). The following two species *Ephippiger ephippiger* (Fiebig, 1784) and *Bradyporus dasypus* (Illiger, 1800) were recorded from the European Turkey for the first time by Karabağ (1964) and Karabağ *et al.* (1971) respectively. A well known species of *Ephippigerini* and three well known historical species of *Bradyporini* are known from Turkey. In addition Harz (1992) described *Schulmeisteri schulmeisteri* Harz, 1992 from S.E. Turkey which is excluded from *Bradyporinae* in the present paper. Almost all the later collected species of *Bradyporinae* were considered previously recorded these species (see synonymy part of each species). Especially all records in Central Anatolia have been deemed to be *Callimenus dilatatus* and the records of Eastern Anatolian species have been identified as *Callimenus macrogaster* or *C. dilatatus*. The reason of these misidentifications is based on the used external characters