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On the Zoogeographical Distribution of the Genus *Agathis* Latreille, 1804 (Hymenoptera: Braconidae: Agathidinae) in Turkey

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ABSTRACT

The distribution of *Agathis* Latreille (Hymenoptera: Braconidae: Agathidinae) species within the main chorotypes of the Holarctic Region in Turkey is presented on the basis of field-work in the period 1985-2005, collection studies and miscellaneous data from previous literature. Twenty one species belonging to *Agathis* are recorded. Turkish species constitute approximately 50% of the West Palearctic species of this genus. The majority of the species are associated with the Asiatic - European and Sibero - European chorotypes. Central Asiatic-Europeo-Mediterranean and Southwest Asiatic species are poorly represented in the Turkish fauna. Distributional data indicate that *Agathis fischeri* Zettel and Beyarslan, 2002*, A. rubens* Tobias, 1963*, A. taurica* Telenga, 1955 and *A. zaisanica* Tobias, 1963 are not a part of the main European fauna, but rather have an Asiatic distribution. *A. gracilipes* Helen, 1956 and *A. zaisanica* Tobias, 1963 are new records for the Turkish fauna.

Key words: Hymenoptera, Braconidae, Agathidinae, *Agathis,* zoogeography, Turkey, chorotype.

INTRODUCTION

Turkey is a land bridge for the distribution of faunal elements from eastern to western and from northern to southern parts of the Palearctic region. Both Anatolia (= Asian Turkey) and Thrace (= European Turkey) are within the Palearctic region in terms of zoogeographical composition and structure. However, the southeastern and eastern parts are influenced by Oriental (southern Asia) and Afrotropical (or Ethiopian) elements but towards the north it is vanishing. These faunal elements become more widespread towards eastern (Iran and partially Iraq) and southern countries (i.e. Syria and Palestine: Demirsoy, 2002; Çıplak, 2004).

Hymenoptera are poorly studied in Turkey and more investigations are needed to establish knowledge of this order. Within the Hymenoptera, Agathidinae is a moderately

large subfamily of Braconidae. Although the Agathidinae has a worldwide distribution, it is poorly represented in the West Palearctic region. It is mainly represented by two genera: *Agathis* Latreille, 1804, sensu stricto and *Bassus* Fabricius, 1804. Both genera belong to the tribe Agathidini Nees, 1814, and are characterized by the claws lacking a subapical tooth (Simbolotti & van Achterberg, 1999).

Members of *Agathis* are solitary koinobiont endoparasitoids of moderately concealed lepidopteran larvae, evidently using their long ovipositors to probe for hosts in their feeding tunnels, mines or retreats (Shaw & Huddleston, 1991). The genus is represented by 41 species in the West Palearctic region and 181 species worldwide.

MATERIAL AND METHODS

Adult specimens of *Agathis* were collected from as wide a range of habitats as possible at different altitudes in different parts of Turkey between the years 1985 and 2005 (Figs 1-9). A sweeping-net was used for diurnal collecting specimens while a light trap was used to target nocturnal species. They were then transferred into a hand-made aspirator and immediately killed with 70% alcohol.

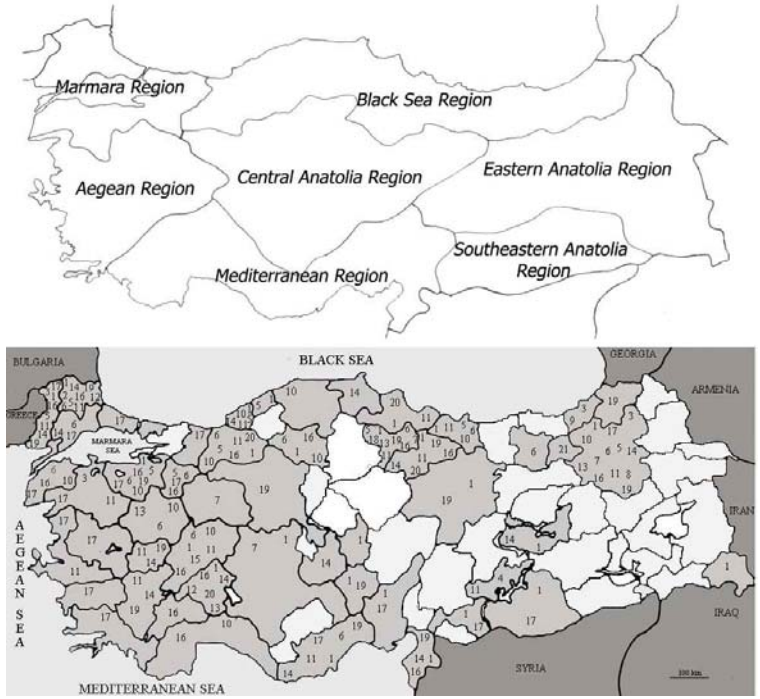

Fig. 1. Distribution of the genus *Agathis* throughout Turkey (See table 1 for location numbering).

Figs. 2-9. Examples of chorotypes in Turkey. 2, Mediterranean Region: Adana, Yumurtalık; 3, West Black Sea Region: Zonguldak-Yayla; 4, id., Bartın-Kurucaşile; 5, East Black Sea Region: Rize-Çamlıhemşin-Ayder yaylası; 6, id., Artvin-Şavşat; 7, Central Anatolia Region: Kayseri-Bünyan-Ekrek; 8, id., Kayseri-Yeşilhisar-Araplı; 9, East Anatolia Region: Malatya-Doğanşehir-Takaz.

The taxonomy and distribution of *Agathis* in Turkey is documented from new data in addition to the literature, as follows. The first detailed faunistic study of Agathidinae (including *Agathis*) in Turkey was carried out by Zettel & Beyarslan (1992) in various regions of Turkey. Until now, 19 species belonging to *Agathis* have been reported (Shenefelt, 1970; Nixon, 1986; Zettel & Beyarslan, 1992; Simbolotti & Achterberg, 1999; Çetin & Beyarslan, 2001; Beyarslan *et al*., 2002a, b; Çetin Erdoğan & Beyarslan, 2004).

Although the above studies have significantly contributed to the knowledge of *Agathis* in Turkey, we still do not have adequate knowledge of the faunal composition. The distribution of *Agathis* species is classified according to the main chorotypes of the Holarctic Region in Turkey, following the terminology developed by Taglienti *et al.* (1999). This terminology has been used and discussed by several zoologists researching other groups (Poggi, 1996; Mifsud & Scupola, 1998).

The following chorotypes were used for *Agathis* distribution: Holarctic, Palearctic, Asiatic–European, Sibero–European, Central Asiatic-Europeo-Mediterranean, Central Asiatic-European and Southwest Asiatic. The chorotypes and their borders within the world are briefly described.

RESULTS AND DISCUSSION

Among the 21 species of the genus *Agathis* collected during 1985-2005 from different parts of Turkey, two species are new to the fauna of Turkey: *Agathis gracilipes* Hellen, 1956 and *Agathis zaisanica* Tobias, 1963.

Several species recorded from Turkey have especially Marmara, Black Sea and East Anatolia region distribution. *A. anglica* Marshall, 1885, *A. fuscipennis* (Zetterstedt, 1838), *A. malvacearum* Latreille, 1805, *A. nigra* Nees, 1814, *A. syngenesiae* Nees, 1814 and *A. umbellatarum* Nees, 1814 are widespread (Table 1).

Seven large chorotypes of the Holarctic are reflected in the Turkish fauna of *Agathis*. Each of the chorotypes has a different *Agathis* faunal composition. The majority of the species of *Agathis* in Turkey are associated with the Asiatic- European, Sibero-European, Palearctic chorotypes, whereas Central Asiatic-European, Holarctic, Central Asiatic-Europeo-Mediterranean and Southwest-Asiatic chorotypes are represented by only a few species (Table 2). However, each of the chorotypes has its own specific features that need to be considered separately.

Table 1. *Agathis* of Turkey and their distribution according to geographical regions.

Species	MR	AR	BR	CR	ER	SR	MER
1. *Agathis anglica*	*	*	*	*	*	*	*
2. *A. assimilis*	*						
3. *A. breviseta*	*		*		*		
4. *A. fischeri*						*	
5. *A. fulmeki*	*		*		*		
6. *A. fuscipennis*	*	*	*	*	*		*
7. *A. glaucoptera*			*	*	*		
8. *A. gracilipes*					*		
9. *A. griseifrons*			*				
10. *A. lugubris*	*	*	*		*		*
11. *A. malvacearum*	*	*	*		*	*	*
12. *A. melpomene*	*						*
13. *A. montana*		*	*		*		*
14. *A. nigra*	*	*	*	*	*		*
15. *A. rubens*		*					
16. *A. rufipalpis*	*	*	*		*		*
17. *A. syngenesiae*	*	*	*		*	*	*
18. *A. taurica*			*				
19. *A. umbellatarum*	*	*	*	*	*		*
20. *A. varipes*		*	*				*
21. *A. zaisanica*			*				

MR: Marmara Region; AR: Aegean Region; BR: Black Sea Region; CR: Central Anatolia Region; ER: Eastern Anatolia Region; SR: Southeastern Anatolia Region; MER: Mediterranean Region.

Table 2. *Agathis* species of Turkey and their distributions within chorotypes.

Zoogeographic region	**Species**
Holoarctic	*A. malvacearum*
Palearctic	*A. anglica , A. fuscipennis* *A. nigra, A. umbellatarum*
Asiatic-European	*A. breviseta, A. gracilipes* *A. melpomene,A. montana* *A. syngenesiae, A. varipes*
Sibero-European	*A. assimilis, A. glaucoptera* *A. griseifrons, A. lugubris* *A. rufipalpis*
Central Asiatic-Europeo-Mediterranean	*A. fulmeki*
Central Asiatic-European	*A. rubens, A. taurica* *A. zaisanica*
Southwest Asiatic	*A. fischeri*

Holarctic

This is the chorotype of species widespread either in Palearctic or Nearctic regions. Only one *Agathis* species in Turkey conforms to this: *Agathis malvacearum*, which has an extensive colour variability and is widely distributed in Turkey. This species has a wide range of habitats, which are suitable for its existence since it is found from European Turkey up to high mountain meadows in eastern Anatolia.

Palearctic

This chorotype includes Eurasia, south to the Himalayan chain, Africa north of the Sahara and Macaronesia. *Agathis* is represented by four species in this chorotype in Turkey. These are the most widely distributed species of *Agathis* in Turkey and their distribution range extends from Turkish Thrace region to the borders of northern Iraq and West Iran. Nixon (1986) noted that *A. umbellatarum* was found in Mediterranean countries. The Mediterranean region includes the Mediterranean Taurus, Antitaurus and Aegean Anatolia up to Bursa province in the north of Turkey (Çıplak 2003). *A. umbellatarum* was recorded from the Anatolian Mediterranean and also from other parts of Anatolia.

Asiatic-European

This is the chorotype of species widespread throughout the Eurasian continent, south to the Himalayan chain. More *Agathis* species have this chorotype than any other in Turkey. Six species belonging to the genus were recorded from the Turkish part of the Asiatic-European chorotype and most of them have poor distributions in Turkey. *A. syngenesiae* is the most widely distributed species of *Agathis* in Turkey. *A. breviseta*, *A. gracilipes , A. melpomene*, *A. montana* and *A. varipes* are rarely encountered. In eastern Anatolia a female of *A. gracilipes* was collected at 1750 m altitude by the first author. Up to now, it was only known from Finland and Tadzhikistan and is new for Turkey.

Sibero-European

This is the chorotype of species widespread in Siberia that extend westwards to Europe, sometimes occurring in mountainous areas of western Asia. There are five recorded species of *Agathis* in this chorotype in Turkey. *A. assimilis* is one of these five common Sibero-European species, but it is only known from a locality in Turkish Thrace. It has not found in any part of Anatolia. *A. griseifrons* was reported to occur in East Black Sea region (Rize: Fig. 5) (Simbolotti & Achterberg, 1999). It was recorded

throughout the west from Europe to Russia. We have not observed this species in our research areas, but it is most likely to be distributed in other localities in Turkey. *A. rufipalpis* and *A. lugubris* are the most commonly represented species in this chorotype and are widely distributed. They were also found widely in Turkey. *A. glaucoptera* was found in four localities in Anatolian Turkey (Figs 7-9).

Central Asiatic-Europeo-Mediterranean

This is the chorotype of species widespread from the Gobi desert to the Aralo-Caspian Depression, Middle East, Caucasus, Anatolia, Europe (mainly in southern and central countries) and N. Africa. *A. fulmeki* is the only known species of this chorotype in Turkey. It is found from the warm parts of European Turkey to the mountains of northern Anatolia.

Central Asiatic-European

This chorotype is the same as Central Asiatic-Europeo-Mediterranean chorotype but North Africa is excluded. Three species of the genus were recorded from this chorotype in Turkey. Two of them (*A. rubens* and *A. zaisanica*) have a limited range outside Turkey since they are in addition known from the Caucasus.

A. zaisanica is recorded here for the first time from Turkey (1 female from 1500 m at Bayburt-Aydintepe). The area where the *A. zaisanica* specimen was collected is on a transition region between Anatolia and the Caucasus and is isolated by surrounding mountains of 2500-3000 m. altitude at the eastern Black Sea Region. Considering the distribution of the species, we tentatively suspect that *A. zaisanica* entered Turkey through the Caucasus.

Up to present, *A. taurica* has been recorded by Nixon (1986) from a single locality in Turkey. It was also recorded from Bulgaria and the Caucasus. The presence of more localities in Turkey is expected. According to Nixon (1986), this species is not part of the main European fauna and has an eastern Mediterranean distribution. Regarding its distribution the species is considered to be included in the Central Asiatic-European chorotype.

Southwest Asiatic

The area of this chorotype ranges from eastern Mediterranean coastal regions (from Anatolia to Sinai) east to the Sind (Indo River basin), through the Arabian Peninsula, Mesopotamia and Iran, and to the Caucasus and SW Turkmenistan in the north (both included). This region is named as Mesopotamian province in Turkey. It is

limited by the Amanus mountain range in the west (Çıplak, 2003). According to Demirsoy (2002), this area is equivalent to the eremial elements. *A. fischeri* has been reported by Zettel & Beyarslan (1992) from this area and was not recorded from other countries. Probably it occurs in Syria and Iraq but there are no records yet. Its habitat may be restricted to the (semi-) desert areas.

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