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A review of the tribe Phanerotomini (Hymenoptera, Braconidae, Cheloninae) in Turkey, with a new host record for *Phanerotoma* (*Bracotritoma*) *permixtellae*

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Abstract: In this study, the Phanerotomini of Turkey collected between July 1959 and July 2004, are listed. A total of thirteen Phanerotomini species were determined, and six of these are reported for the first time from Turkey. *Phanerotoma* (*Bracotritoma*) *permixtellae* Fischer, 1968 was reared from a new natural host *Recurvaria pistaciicola* (Danilevskii, 1955) (Lepidoptera: Gelechiidae). With this present study an illustrated identification key for the Phanerotomini of Turkey is given. The distribution of the Phanerotomini species is discussed according to the phytogeographical provinces of Turkey.

Key words: Phanerotomini; new natural host; *Phanerotoma* (*Bracotritoma*) *permixtellae;* phytogeographical provinces; Turkey

Introduction

Anatolia (Asian Turkey, also known as Asia Minor) is a biologically diverse region mainly due to the variable topography and climate which provide many different macro- or micro-habitats, being a bridge between Asia and Europe in the south and also linking to the Ethiopian region via the Arabian peninsula, thus providing a natural pathway for the spread of species both north-south and east-west. Its tectonic evolution has continuously changed through Tertiary and Quaternary ice ages, receiving populations via the Balkans and/or the Caucasus. Later, climatic change during the ice ages pushed many northern populations, especially those found in the Balkans, the Caucasus and/ or northern Anatolia, to the south and led to their isolation and speciation at higher altitudes in southern regions. For all of these reasons, there have been many speciation events in Anatolia and therefore a rich biodiversity (Çıplak 2003).

The Braconidae is the second largest family of parasitic Hymenoptera with least 40,000 species worldwide (Wahl & Sharkey 1993). They are well disturbed and highly diverse in almost all terrestrial habitats (La Salle & Gauld 1993), and play important role as the regulatory agents for phytophagous insect populations dynamic, particularly the economically important insects pests (La Salle 1993). The Pahanerotomini contains solitary endoparasitic koinobionts of Pyralidae and a lesser extent of Olethreutidae, Carposinidae, Gelechiidae, Oecophoridae and Coleophoridae (Lepidoptera), and are ovo-larval parasites. The females begin to search for hosts immediately after emergence from their thin (semi-) transparent silvery cocoon and oviposit as soon as suitable hosts are located (van Achterberg 1990).

The west Palaearctic species of the Phanerotomini were revised and keyed by van Achterberg (1990). The author reported a total of 47 species, nine of which were described as new to science. To date, a total of 288 species of Phanerotomini have been reported in the world and approximately 50 species are found in the Palaearctic region (Yu et al. 2005).

Few researches studied Phanerotomini fauna of Turkey and therefore the Turkish fauna of this tribe is not well-known. Up to now, seven species have been recorded from Turkey (Zettel 1989; van Achterberg 1990; Beyarslan & Inanç 1990; Öncüer 1991; Papp 1994; Beyarslan et al. 2002). The aim of this study was to survey the Lepidoptera parasitoids from a wide range of habitats at different altitudes in Turkey.

Recurvaria pistaciicola (Danilevskii, 1955) from Lepidoptera (Gelechiidae) was determined as an important pest in orchards. This species feeds in the fruits, entering inside just before the shell hardening. Therefore, this is an economically important pest in Turkey. *Recurvaria pistaciicola* causes serious damage in old pistachio trees providing safe shelter for the overwintering larvae under the trunk and large branches bark. This insect hibernates as fully developed larvae, and the adults emerge during the pistachio flowering period in the early spring. The moth lays its eggs on the very young pistachio flower cluster and on the tiny fruits. The larvae usually feed on the fruits soft skin (mesocarp). It causes black and brown wide spots on the shell surface due to feaces produced by the larvae. In the

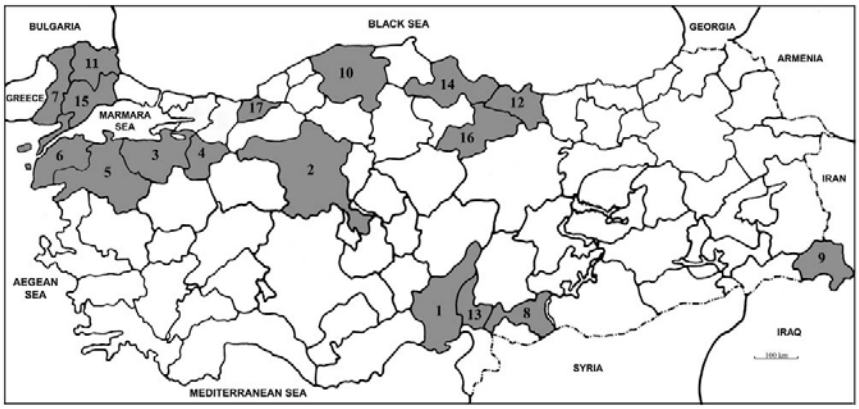


Fig. 1. Collecting places of Phanerotomini species in Turkey: 1 – Adana;, 2 – Ankara; 3 – Balıkesir; 4 – Bilecik; 5 – Bursa; 6 – Çanakkale; 7 – Edirne; 8 – Gaziantep; 9 – Hakkari; 10 – Kastamonu; 11 – Kırklareli; 12 – Ordu; 13 – Osmaniye; 14 – Samsun; 15 – Tekirdağ; 16 – Tokat; 17 – Zonguldak.

Table 1. Phanerotomini of Turkey and their distribution according to phytogeographical provinces.

Species	MD	EU	SE	KE	IS	AS	CS	MS
Phanerotoma (P.) acuminata	*							
Phanerotoma (B.) atra	*	*						
Phanerotoma (B.) bilinea		*	*					
Phanerotoma (B.) capeki				*				
Phanerotoma (P.) dentata		*						
Phanerotoma (B.) gracilisoma			*					
Phanerotoma (B.) intermedia					*			
Phanerotoma (P.) leucobasis	*	*	*					
Phanerotoma (B.) parva		*						
Phanerotoma (B.) permixtellae								*
Phanerotoma (P.) planifrons	*							
Phanerotomella bisulcata		*						
Phanerotomella rufa	*	*	*					

Explanations: MD – Mediterranean; EU – Euxin; SE – Subeuxin; KE – Kseroeuxin; IS – Iran steppe; AS – Anatolian steppe; CS – Central Anatolian steppe; MS – Mesopotamian steppe.

split nuts, the larvae feed on pistachio kernels as well, and the damaged fruits generally become susceptible the fungal and mould infection (Samet 1984; Yanık & Yücel 2001).

Material and methods

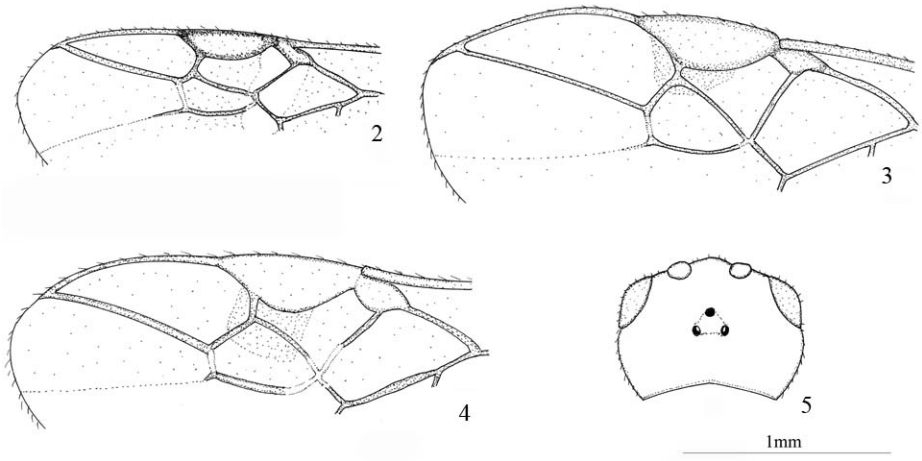
Phanerotomini species were collected from pastures, crop fields, orchards, hazelnut garden, pasture, pine forests and mixed forests at different altitudes in Turkey between 1987 and 2004. The specimens were collected by using a sweep nets, light traps and Malaise traps. The specimens were then pinned and labeled according to taxonomic rules and regulations. Pertinent literature was used for the identification of species (Tobias et al. 1986; van Achterberg 1990, 1993). Some species were identified by Dr. Kees van Achterberg (Entomology Department, National Museum of Natural History, Leiden Netherlands).

References are used for known distributions and hosts of the species in the world (Shenefelt 1973; Tobias et al. 1986; Beyarslan & Inanç 1990; Beyarslan et al. 2002; Yu et al. 2005). An illustrated key is provided for the species of Phanerotomini in Turkey. Although *Phanerotoma (B.) capeki* and *Phanerotoma (B.) intermedia* have already been known from Turkey, we have not found these species in our study, but we include them in this paper. The collecting places (provinces) of species are shown on the map (Fig. 1).

The larvae of *R. pistaciicola* were collected from *Pistacia vera* L. trees in Gaziantep, southeastern part of Turkey. These larvae kept under laboratory conditions at 25 ± 1℃, 16 : 8 (L : D) and 70% relative humidity. The larvae of *R. pistaciicola* were reared with *P. vera* leaves. From the observations, an adult hymenopteran parasitoid was identified as an endoparasitoid *P.* (*B.*) *permixtellae*.

The distribution of Anatolian Phanerotomini species is classified according to the phytogeographical provinces of Turkey (Table 1) following the terminology devoloped by Zohary (1973). This teminology was also used by Hesselbarth et al. (1995) for Turkish butterflies, by Çıplak (2003) for Turkey Tettigoniinae and by Beyarslan et al. (2008) for Turkish species of the *Vipio* genus (Hymenoptera: Braconidae: Braconinae). Recognised provinces and their borders within Anatolia (and European Turkey) are also briefly described.

The Mediterranean province belongs to the Mediterranean and includes the Mediterranean Taurus, Antitaurus and Aegean Anatolia up to the Çanakkale province in the north, and roughly to 30° longitude in the east. The Euxin province belongs to the Euro-Siberian and in Turkey this territory extends along North Anatolia, southeastern and eastern European Turkey. The Subeuxin province belongs to the Euro-Siberian region and covers the Black Sea Region and southern Marmara region below West Black Sea Region mountains and East Black Sea Region mountains.



Figs 2–5. *Phanerotoma* (*B.*) *gracilisoma,* ♀: 2 – apical part of fore wing; 5 – head, dorsal aspect. *Phanerotoma* (*B.*) *bilinea,* ♀: 3 – apical part of fore wing. *Phanerotoma* (*P.*) *dentata,* ♀: 4 – apical part of fore wing.

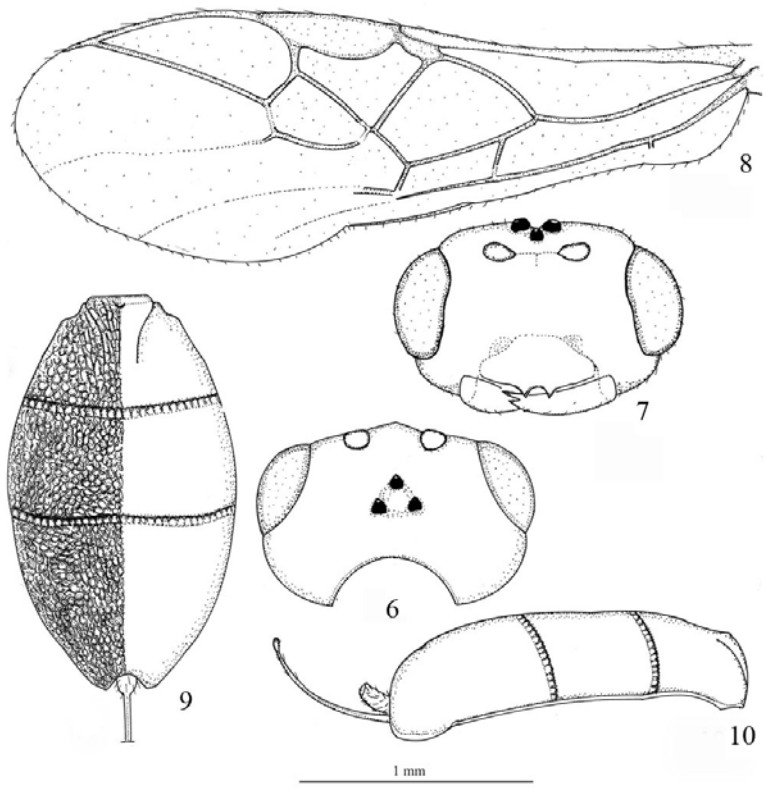
The Kseroeuxin province belongs to the Irano-Turanian and covers Central Anatolian, except Iran step province within its middle. The Iran steppe province belongs to Irano-Turanian region and includes southeastern Anatolia. The Anatolian steppe province belongs to the Irano-Turanian and includes east of eastern Anatolia. The Central Anatolian steppe province belongs to Irano-Turanian region and includes Ankara and Konya province in the middle of Kseroeuxin province. The Mesopotamian steppe province covers the Mesopotamia below southeastern Taurus.

The materials are deposited in the Collection of Biological Department of Trakya University, Edirne, Turkey (T.U.). New records are indicated by asterisks (*). Figures were drawn and measurements taken using a camera lucida attached to a stereomicroscope. The following example denotes the information given for the material examined: Edirne [1] – İskenderköy [2], pasture [3], 41°37′46 N, 26°40′17 E [4], 41 m [5], 08.07.1990 [6], 1 ♀ [7].

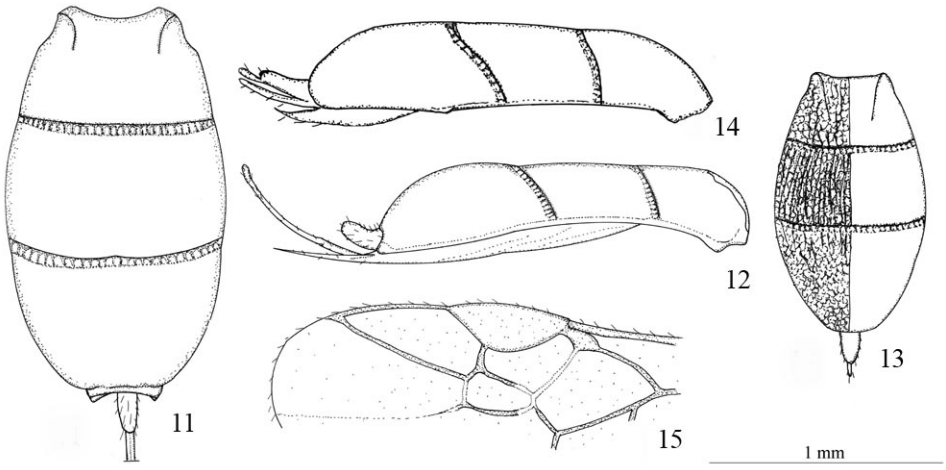
[1] Administrative district (province); [2] Town or Village; [3] Habitat; [4] Coordinates; [5] Altitude; [6] Collecting data (day/month/year); [7] Number of specimens.

Key to Turkish species of the genus *Phanerotoma* Wesmael, 1838

1 Maximum width of pterostigma 1.5–4.2 times length of vein 3-SR of fore wing, vein 1-SR of fore wing as long as pterostigma or distinctly shorter (Fig. 2), but distinctly longer in *atra* and *bilinea* (Fig. 3); veins 2-SR and SR1 of fore wing (nearly) straight (Fig. 2); (subgenus *Bracotritoma* Csiki, 1909) 2
– Maximum width of pterostigma 0.8–0.9 times length of vein 3–SR of fore wing, vein 1-SR of fore wing somewhat longer than pterostigma, veins 2-SR and SR1 of fore wing variable (Fig. 4); (subgenus *Phanerotoma* Wesmael, 1838) 8
2 Eyes small, length of eye in dorsal view 0.8 times length of temple (Fig. 5) ..... ***P. gracilisoma*** van Achterberg, 1990
– Eyes medium sized to large, length of eye in dorsal view (about) equal to temple or longer (Fig. 6) 3
3 Malar space long, its length 1.7–1.8 times basal width of mandible; length of eye in dorsal view equal to length of temple; vein r of fore wing 1.0–1.5 times vein 3-SR; tegulae dark brown; mesoscutum densely rugose ..... ***P. intermedia*** van Achterberg, 1990
– Malar space short, about equal to basal width of mandible or less (Fig. 7); length of eye in dorsal view 1.3 times temple or more (Fig. 6); if about equal then vein r of fore wing much shorter vein 3-SR (Fig. 8); or tegulae yellowish and mesoscutum rugulose-coriaceous 4
4 Body completely black; third metasomal tergite of female deeply semicirculary emarginate, distinctly convex and ovipositor sheath protruding (Figs 9, 10); clypeus with two distinct teeth ventrally (Fig. 7) ... . ***P. atra*** Šnoflák, 1951
– Body (partly) yellowish; third metasomal tergite of female not emarginate and ovipositor sheath not or slightly protruding (except in *bilinea*, but emargination wider) (Figs 11, 12); clypeus with minute teeth or virtually without teeth 5
5 Vein 1-M of fore wing pale yellowish; vein r of fore wing 1.5 times vein 3-SR ..... ***P. permixtellae*** Fischer, 1968
– Vein 1-M of fore wing (dark) brown; if pale yellowish (*bilinea*) then vein r of fore wing 0.3–0.4 times vein 3-SR 6
6 Vein 1-R1 (somewhat) longer than pterostigma (Fig. 3); humeral plate dark brown; ovipositor sheath distincly protruding and hypopygium with long spine (Fig. 12) ..... ***P. bilinea*** Lyle, 1924
– Vein 1-R1 of fore wing about as long as pterostigma or shorter; humeral plate and tegula equally yellowish; ovipositor sheath not or slightly protruding and hypopygium at most with short spine (Figs 13, 14) 7
7 Subapical antennal segments small and robust; 1-R1 about as long as pterostigma ..... ***P. capeki*** van Achterberg, 1990
– Subapical antennal segments submoniliform; 1-R1 shorter than pterostigma (Fig. 15) ..... ***P. parva*** Kokujev, 1903
8 Third metasomal tergite of female slender, subtriangular, and its lateral sides nearly straight; but somewhat less slender in male; metasoama strongly flattened ..... ***P. acuminata*** Szépligeti, 1908

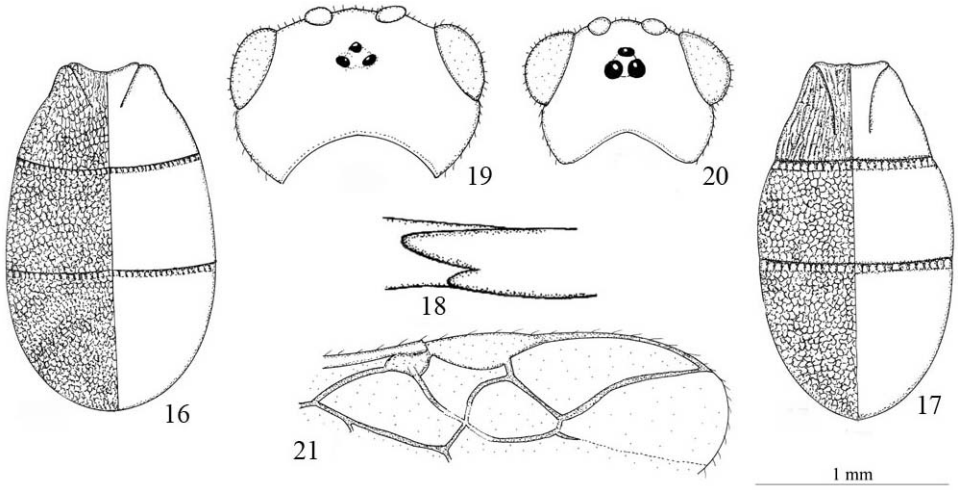


Figs 6–10. *Phanerotoma* (*B.*)*atra,* ♀: 6 – head, dorsal aspect; 7 – head, frontal aspect; 8 – fore wing; 9 – metasoma, dorsal aspect; 10 – metasoma, lateral aspect.

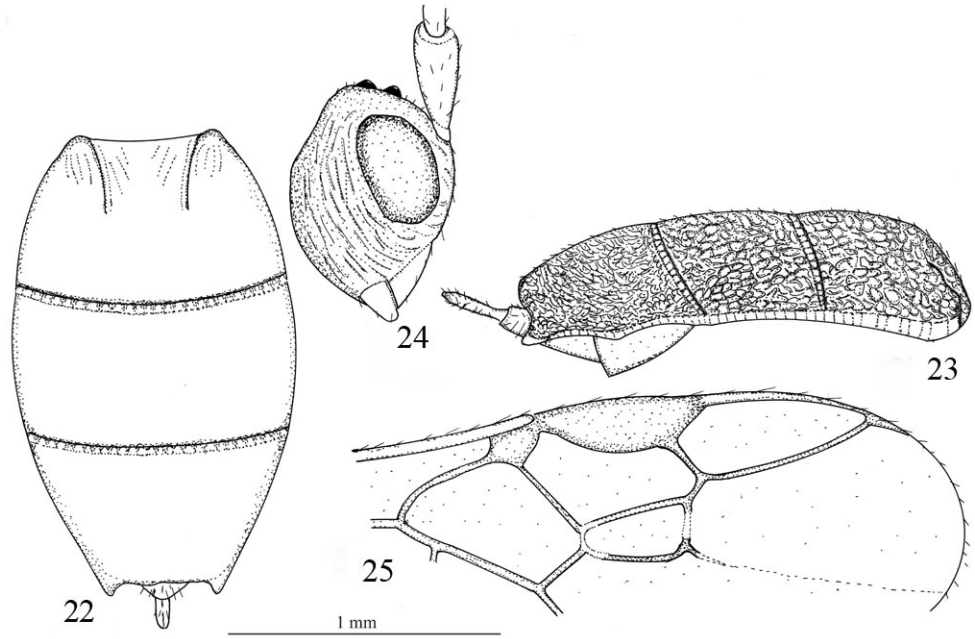


Figs 11–15. *Phanerotoma* (*B.*) *bilinea,* ♀: 11 – metasoma, dorsal aspect; 12 – metasoma, lateral aspect. *Phanerotoma* (*B.*) *parva,* ♀: 13 – metasoma, dorsal aspect; 14 – metasoma, lateral aspect; 15 – apical part of fore wing. 11, 12, 14, 15: scale 1×; 13: scale 0.75×.

– Third tergite more robust, semi-oval or subrectangular its sides more or less curved (Figs 16, 17); convexity metasoma variable, usually less flattened 9
9 Base of mandible, complete antenna, all femora, tegulae, head and mesosternum dark brown or blackish; head and mesoscutum reddish-brown; inner tooth of mandible distinctly devoloped (Fig. 18); mesosternum largely smooth, except for faint microsculpture . . . . . ***P. planifrons*** (Nees, 1816)
– Mandible basally, antenna largely, femora, tegulae, mesosternum (partly) yellowish; head and mesosternum yellowish or blackish inner tooth of mandible small 10
10 Length of eye in dorsal view 0.9–1.0 times temple (Fig. 19); fore wing: r 0.3–0.4 times vein 3-SR, 2-SR distinctly and SR1 weakly curved or sraight (Fig. 4); shape of metasoma slender oval (Fig. 16) . . . . . ***P. dentata*** (Panzer, 1805)
– Length of eye in dorsal view 1.6 times temple (Fig. 20); fore wing: r 0.2–0.3 times vein 3-SR, 2-SR bent, SR1 strongly curved to nearly straight (Fig. 21); shape of metasoma elliptical . . . . . ***P. leucobasis*** Kriechbaumer, 1894



Figs 16–21. *Phanerotoma* (*P.*) *dentata,* ♀: 16 – metasoma, dorsal aspect; 19 – head, dorsal aspect. *Phanerotoma* (*P.*) *leucobasis,* ♀: 17 – metasoma, dorsal aspect; 20 – head, dorsal aspect; 21 – apical part of fore wing. *Phanerotoma* (*P.*) *planifrons,* ♀: 18 – mandible, ventral aspect. 16, 17, 19, 20, 21: scale 1×; 18: scale 2.5×.



Figs 22–25. *Phanerotomella rufa,* ♀: 22 – metasoma, dorsal aspect; 23 – metasoma, lateral aspect; 24 – head, lateral aspect; 25 – apical part of fore wing.

Key to Turkish species of the genus *Phanerotomella* Szépligeti, 1900

1 Apex of third metasomal tergite of male with lateral pair of lamelliform lobes (Figs 22, 23); eyes comparatively large (Fig. 24); second submarginal cell of fore wing usually distinctly petiolate (Fig. 25); body yellowish brown; hind femur and tibia yellowish; antennal segments 32–35 ..... ***P. rufa*** (Marshall, 1898)
– Apex of third metasomal tergite of male without lobes (Figs 26, 27); eyes comparatively small (Fig. 28); second submarginal cell of fore wing subsessile (Fig. 29); body blackish brown; hind femur and tibia dark brown; antennal segments 30–32..... ..... ***P. bisulcata*** (Herrich-Schäffer, 1838)

Tribe *Phanerotomini* Baker, 1926

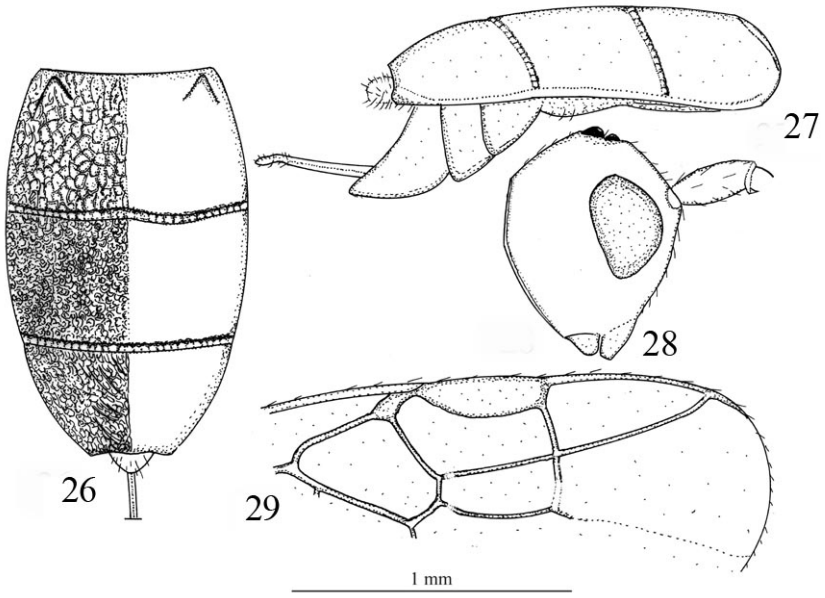
***Phanerotoma* Wesmael, 1838**

***Phanerotoma* (*Phanerotoma*) *acuminata* Szépligeti, 1908**

Phanerotoma acuminata
Szépligeti, 1908. Ann. Hist. Nat. Mus. Nat. Hung. 6: 410, ♀.

Material examined: Çanakkale – Gökçeada – Kale, pasture, 40°06′00 N, 25°48′00 E, 55 m a.s.l, 06.07.1997, 1 ♀ (Beyarslan et al. 2002), Turkey (Papp 1994).
Distribution: Holarctic.

***Phanerotoma* (*Bracotritoma*) *atra* Šnoflák, 1951**



Figs 26–29. *Phanerotomella bisulcata,* ♀: 26 – metasoma, dorsal aspect; 27 – metasoma, lateral aspect; 28 – head, lateral aspect; 29 – apical part of fore wing.

Phanerotoma atra Snoflák, 1951. Entomol. Listy 13: 18, ♀ ♂.

Material examined: Çanakkale-Bozcaada – Ayazma, pasture, 39°50′06 N, 26°04′11 E, 54 m a.s.l., 08.07.1996, 1 ♀ (Beyarslan et al. 2002); Kazdağı – Hacıfakılı, mixed forests, 39°25′02 N, 26°24′14 E, 700 m a.s.l., 16.09.1992, 2 ♂♂; Kastamonu – Araç – Toprakcuma, crop field, 41°14′32 N, 33°19′42 E, 350 m a.s.l., 13.06.2002, 2 ♂♂; Küre – İpsinler, pasture, 41°47′60 N, 33°40′00 E, 1900 m a.s.l., 12.06.2002, 1 ♀; Kırklareli – Dereköy, mixed forests, 41°55′58 N, 27°22′00 E, 500 m a.s.l., 28.06.2002, 1 ♀, 1 ♂; Yeniceköy, pasture, 41°43′58 N, 27°38′07 E, 600 m a.s.l., 19.07.1994, 1 ♀, 1 ♂; 06.07.1997, 1 ♂; Samsun – Havza – Mismiliağaç, pasture, 40°58′14 N, 35°39′44 E, 610 m a.s.l., 02.07.2003, 2 ♀♀, 2 ♂♂; Tokat – Çamağzı, orchard, 40°24′44 N, 36°41′08 E, 692 m a.s.l., 01.07.2004, 1 ♂.
Distribution: Eastern Palaearctic, Western Palaearctic.

**Phanerotoma* (*Bracotritoma*) *bilinea* Lyle, 1924

Phanerotoma bilinea Lyle, 1924. Entomologist 57: 99–103, ♀ ♂.

Material examined: Edirne – İskenderköy, pasture, 41°37′46 N, 26°40′17 E, 41 m a.s.l., 08.07.1990, 1 ♀; Lalapaşa – Hacıdanışment, pasture, 41°54′33 N, 26°49′24 E, 210 m a.s.l., 05.07.1997, 1 ♂; Samsun – Salıpazarı – Soyuk, hazelnut garden, 41°28′16 N, 36°25′10 E, 650 m a.s.l., 03.07.2003, 1 ♀.
Distribution: Eastern Palaearctic, Europe, Western Palaearctic.

Phanerotoma (*Bracotritoma*) *capeki* van Achterberg, 1990

Phanerotoma (*Bracotritoma*) *capeki* Achterberg, 1990. Zool. Verh. Leiden. 255: 26, ♀ ♂.

Material examined: Ankara – Dikmen, 39°55′38 N, 32°51′52 E, 910 m a.s.l., 05.07.1959, 1 ♀ (Achterberg, 1990).
Distribution: Western Palaearctic.

**Phanerotoma* (*Phanerotoma*) *dentata* (Panzer, 1805)

Chelonus dentatus Panzer, 1805. Faunae Insekt. German.: 88, Fig 2: 100.

Phanerotoma dentata: Wesmael, 1835. Nouv. Mem. Acad. Brux. 11: 166.
Material examined: Edirne – Enez – Sultaniçe, pine forests, 40°37′35 N, 26°09′12 E, 20 m a.s.l., 04.08.2001, 1 ♂; Keşan – Koru dağı Orman işletme, pine forests, 40°28′32 N, 26°33′51 E, 350 m a.s.l., 09.09.1999, 3 ♀♀, 6 ♂♂; 09.09.1999 (light trap), 1 ♀.
Distribution: Eastern Palaearctic, Ethiopian, Western Palaearctic.

**Phanerotoma* (*Bracotritoma*) *gracilisoma* van Achterberg, 1990

Phanerotoma (*Bracotritoma*) *gracilisoma* van Achterberg, 1990. Zool. Verh. Leiden. 255: 35, ♀.

Material examined: Edirne – Hacıumur, pasture, 41° 43′00 N, 26°48′00 E, 55 m a.s.l., 13.06.1987, 1 ♀.
Distribution: Western Palaearctic.

Phanerotoma (*Bracotritoma*) *intermedia* van Achterberg, 1990

Phanerotoma (*Bracotritoma*) *intermedia* van Achterberg, 1990. Zool. Verh. Leiden. 255: 38, ♀ ♂.

Material examined: Hakkari – Süvari Halil pas., 37°34′0 N, 43°43′60 E, 2900 m a.s.l., 11.08.1983, 1 ♂ (van Achterberg 1990).

Distribution: Western Palaearctic.

Phanerotoma (*Phanerotoma*) *leucobasis* Kriechbaumer, 1894

Phanerotoma leucobasis Kriechbaumer, 1894. Berl. Entomol. Z. 39: 62, ♀.

Material examined: Adana – Çukurova, citrus-plantage, 37°01′0 N, 35°19′44 E, 7 m a.s.l., 1 ♀ (van Achterberg 1990); Aydın (Öncüer 1991); Edirne – Enez – Sultaniçe, pine forests, 40°37′35 N, 26°09′12 E, 20 m a.s.l., 04.08.2001, 1 ♂; Balıkesir – Kepsut – Karaçaltı, orchard, 39°39′28 N, 28°10′28 E, 110 m a.s.l., 11.09.2002, 1 ♀; Bursa – Karacabey – Yenikaraağaç, pasture, 40°13′11 N, 28°37′12 E, 30 m a.s.l., 23.07.2001, 1 ♀; Yenişehir – Çayırlı, orchard, 40°12′57 N, 28°55′11 E, 120 m a.s.l., 24.07.2001, 2 ♀♀; Tekirdağ – Şarköy – Güzelköy, orchard, 40°44′44 N, 27°20′03 E, 150 m a.s.l., 26.06.2003, 1 ♀.
Distribution: Ethiopian, Holoarctic, Oceanic.

**Phanerotoma* (*Bracotritoma*) *parva* Kokujev, 1903

Phanerotoma parva Kokujev, 1903. Russk. Entomol. Obozr. 3: 285, ♀ ♂.

Material examined: Balıkesir – Kepsut – Karaçaltı, orchard, 39°39′28 N, 28°10′28 E, 110 m a.s.l., 11.09.2002, 1 ♀; Edirne – Keşan – Koru dağı Orman İşletme, pine forests, 40°28′32 N, 26°33′51 E, 350 m a.s.l., 09.09.1999, 1 ♀; 09.09.1999 (light trap), 2 ♀♀, 1 ♂.
Distribution: Eastern Palaearctic, Western Palaearctic.

**Phanerotoma* (*Bracotritoma*) *permixtellae* Fischer, 1968

Phanerotoma (Bracotritoma) permixtellae Fischer, 1968. Pflanzensch. Ber. 37: 107–109.

Material examined: Gaziantep – Yavuzeli – Karadağ, *Pistacia vera,* 37°19′60 N, 37°32′60 E, 620 m a.s.l., 13.04.1999, 2 ♀♀.
Distribution: Western Palaearctic.

Phanerotoma (*Phanerotoma*) *planifrons* (Nees, 1816)

Sigalphus planifrons Nees, 1816. Mag. Ges. Naturforsch. 7: 259, ♀ ♂.
Phanerotoma planifrons Marshall, 1889 in Andre: Spec. Hym. Eur. Alg. 4: 381, ♀ ♂.

Material examined: Çanakkale – Bozcaada, pasture, 39°50′06 N, 26°04′11 E, 10 m a.s.l., 06.06.1996, 8 ♀♀, 17 ♂♂; – Ayazma, pasture, 39°55′16 N, 26°14′15 E, 54 m a.s.l., 08.07.1996, 1 ♀; Gökçeada – Aydıncık, pasture, 40°16′20 N, 25°38′10 E, 29 m a.s.l., 07.07.1996, 10 ♀♀, 12 ♂♂; – Kale, pasture, 40°06′00 N, 25°48′00 E, 55 m a.s.l., 06.07.1997, 4 ♀♀, 22 ♂♂; – Tigem, orchard, 40°26′10 N, 25°28′14 E, 57 m a.s.l., 06.07.1996, 1 ♀; – Uğurlu, crop field, 40°06′20 N, 25°14′10 E, 45 m a.s.l., 06.07.1996, 5 ♀♀, 3 ♂♂ (Beyarslan et al. 2002).
Distribution: Holoarctic, Oriental.

Phanerotomella Szépligeti, 1900

**Phanerotomella bisulcata* (Herrich-Schäffer, 1838)

Chelonus bisulcatus Herrich-Schäffer, 1838. Faunae Ins. German.: 154, Fig. Ent. 2: 98.
Phanerotomella bisulcata: Fahringer, 1934. Opusc. Bracon. 3 (5–8): 583.

Material examined: Bursa – İnegöl – Cerrah, pasture, 40°04′16 N, 29°26′57 E, 400 m a.s.l., 10.07.1993, 1 ♂; Zonguldak-Devrek, mixed forests, 41°13′09 N, 31°57′21 E, 800 m a.s.l., 29.06.2001 (Malaise traps), 1 ♀.
Distribution: Eastern Palaearctic, Western Palaearctic.

Phanerotomella rufa (Marshall, 1898)

Phanerotoma rufa Marshall, 1898. in Andre Spec. Hym. Eur. Alg. 5: 172, ♀.
Phanerotomella rufa: Masi, 1932. Annali Mus. Civ. Stor. Nat. Giacomo Doria 56: 11.

Material examined: Bilecik – Okluca, mixed forests, 40°13′60 N, 29°51′00 E, 420 m a.s.l., 24.7.2001, 1 ♂; Bursa – Karacabey – Cambazköy, pasture, 40°15′00 N, 28°30′00 E, 200 m a.s.l., 12.07.1993, 1 ♂; Çanakkale – Gökçeada – Tigem, orchard, 40°26′10 N, 25°28′14 E, 57 m a.s.l., 06.07.1996, 1 ♀ (Beyarslan et al. 2002); Kırklareli – Demirköy – Boztaş, mixed forests, 41°55′00 N, 27°37′60 E, 50 m a.s.l., 27.07.1986, 1 ♂; İğneada, mixed forests, 41°52′28 N, 27°59′02 E, 350 m a.s.l., 06.07.1997, 7 ♀♀, 1 ♂; Osmaniye, pasture, 37°20′34 N, 35°58′22 E, 39 m a.s.l., 7 ♀♀, 3 ♂♂ (Beyarslan & Inanç 1990); Ordu – Gürgentepe, hazelnut garden, 40°47′18 N, 37°36′06 E, 1100 m a.s.l., 04.07.2003, 1 ♀; Samsun – Salıpazarı – Kayaköprü, pasture, 41°10′18 N, 36°28′16 E, 100 m a.s.l., 03.07.2003, 6 ♂♂; Tekirdağ – Ganos, pasture, 40°45′00 N, 27°19′00 E, 400 m a.s.l., 5 ♀♀, 14.07.1986 (Beyarslan & Inanç 1990); Turkey (van Achterberg 1990; Zettel 1989).
Distribution: Europe, Oriental, Western Palaearctic.

Discussion

In the present survey 13 taxa of lepidopteran parasitoids were found in Turkey. Among these species, *Phanerotoma* (*Bracotritoma*)*bilinea, P.* (*Phanerotoma*) *dentata, P.* (*B.*) *gracilisoma, P.* (*B.*) *parva, P.* (*B.*) *permixtellae* and *Phanerotomella bisulcata* are new records for the Turkish fauna. Accordingly, the number of Phanerotomini species in Turkey has increased from 7 to 13.

The species and their habitats, Lepidoptera hosts and altitudes are given in the Table 2. As a result of this study, *Phanerotoma* (*Phanerotoma*) *acuminata, Phanerotoma* (*Bracotritoma*) *atra, P.* (*B.*) *bilinea, P.* (*B.*) *gracilisoma, P. (P.) leucobasis, P. (P.) planifrons, Phanerotomella bisulcata* and *Phanerotomella rufa* were obtained from pasture. It was determined that Phanerotomini species usually more populous in arid regions or during dry seasons.

Table 2. The relationships among the species and their habitats, Lepidoptera hosts and altitudes.

Species	Habitats	Hosts	Altitude (m)
Phanerotoma (*P.*) *acuminata*	pasture	Pyralidae	55
Phanerotoma (*B.*) *atra*	mixed forests, orchard, pasture	Unknown	54–700
Phanerotoma (*B.*) *bilinea*	hazelnut garden, pasture	Tortricidae, Yponomeutidae	41–650
Phanerotoma (*B.*) *capeki*	unknown	Gelechiidae	910
Phanerotoma (*P.*) *dentata*	pine forest	Gelechiidae, Oecophoridae, Sesiidae, Tortricidae	20–350
Phanerotoma (*B.*) *gracilisoma*	pasture	Unknown	55
Phanerotoma (*B.*) *intermedia*	unknown	Unknown	2900
Phanerotoma (*P.*) *leucobasis*	citrus-plantage, orchard, pasture, pine forest	Gelechiidae, Noctuidae, Nolidae, Yponomeutidae	7–150
Phanerotoma (*B.*) *parva*	orchard, pine forest	Unknown	110–350
Phanerotoma (*B.*) *permixtellae*	*Pistacia vera*	Gelechiidae, Oecophoridae	620
Phanerotoma (*P.*) *planifrons*	crop field, orchard, pasture	Lasiocampidae, Pyralidae, Tortricidae	10–57
Phanerotomella bisulcata	pasture, mixed forest	Unknown	400–800
Phanerotomella rufa	hazelnut garden, orchard, pasture, mixed forest	Unknown	39–1100

Lepidoptera caterpillars, which occur commonly in orchards, vegetable area, crop fields and forests, are frequently accompanied by a considerable number of natural enemies. The greatest importance in the nature is attached to the endoparasitoid insects belonging to the tribe of Phanerotomini. Even infrequent treatments of insecticides on plantations have limited the population of parasitoids and reduced their species richness. *Phanerotoma* (*B.*) *atra, P.* (*B.*) *bilinea, P. (P.) leucobasis, P.* (*B.*) *parva, P.* (*B.*) *permixtellae, P. (P.) planifrons* and *Phanerotomella rufa* were obtained from orchards, and these species can be used as biological control agents of the Lepidoptera hosts.

Many species of Braconidae use insects as hosts which are economically important pests of crops. The need for programmed "biological" control is already becoming more urgent if the effectiveness of chemical methods of pest control declines. The use of parasitoid insects in the control of pest species has met variable success. To be effective in biological control an intimate knowledge of the biology of the insects involved is essential, and this depeds upon an accurate knowledge of their taxonomy.

Significant knowledge about biology of *P.* (*B.*) *permixtellae* is still lacking. Little is known about its taxonomy and distribution and it has never been recorded from anywhere over the world, except from Syria and Greece (van Achterberg 1990; Yu et al. 2005). As a result of the present study, *R. pistaciicola* has been determined as a new natural host of *P.* (*B.*) *permixtellae* in the world. This study is very important to be a base to integrated pest management studies which will be made in the future. However, Phanerotomini species can be candidates for future research as biological control agents against some important lepidopteran pests. Aditional research is required on the parasitoids of Lepidoptera in Turkey. Research on native species as potential biocontrol agents for exploration also merits serious attention.

When all the species were evaluated according to their altitudinal distribution in the study area, it appeared that the species numbers decreased with increasing altitude. *Phanerotoma (P.) dentata* and *P. (B.) parva* were collected by using light traps, i.e. some of Phanerotomini species have been determined as nocturnal species.

Eleven of the species have a wide range outside Turkey and are Holoarctic, Afrotropical, Oceanic or Oriental in distribution, thus they are considered to be widespread. *Phanerotoma* (*P.*) *acuminata*, *P.* (*B.*) *capeki*, *P.* (*B.*) *gracilisoma*, *P.* (*B.*) *intermedia* and *P.* (*B.*) *permixtellae* have been recorded from a single locality in Turkey and are considered to be rare in Turkey.

Each of the eight provinces has different Phanerotomini faunal composition (Table 1). Considering the total number of species the provinces can be ordered as Euxin > Mediterranean > Subeuxin > Kseroeuxin = Iran steppe = Mesopotamian steppe > Central Anatolian steppe = Anatolian steppe. Euxin is the most species-rich province, with seven species (53.8% of the total Turkey Phanerotomini species) and Mediterranean is the second most diverse province with five species (38.5% of the total). This tribe is represented by four species in Subeuxin provinces (30.8% of the total). Kseroeuxin, Iran steppe and Mesopotamian steppe are poor compared to the other three provinces. The highest simililarity has been detected for *Phanerotoma (P.) leucobasis* and *Phanerotomella rufa* that are common for the Mediterranean, Euxin and Subeuxin provinces, secondly, *Phanerotoma* (*B.*) *atra* in common for the Mediterranean and Euxin provinces, thirdly, *Phanerotoma* (*B.*) *bilinea* in common for the Euxin and Subeuxin provinces. Phanerotomini species have not been found in Central Anatolian steppe or Anatolian steppe. However, the present knowledge of the Phanerotomini fauna is far from accounting for the actual number of species occurring in Turkey. Further studies will certainly add a significant number of taxa, because biotypes are highly diverse and ecological niches are numerous in this country.

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