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On the Bumblebee Fauna of Turkey: III. The Subgenus *Thoracobombus* D.T. (Hymenoptera, Apidae, Bombinae)

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ABSTRACT

Thirteen species and subspecies of the subgenus *Thoracobombus* D.T. of the genus *Megabombus* D.T. are recorded in Turkey. *Megabombus humilis erzincanensis* ssp.n. is described from Erzincan and Tunceli provinces. Horizontal and altitudinal distribution, habitat and flowers visited of each taxon are given. With 2134 specimens collected *Megabombus sylvarum* (L.) with its two subspecies was the most widespread and abundant species. It was followed by *M. zonatus* (Smith) with 1700 specimens and *M. humilis* (Illiger) with 713 specimens. *M. velox* (Skorikov) was found at only three provinces in 2000-2800 m with 13 specimens. It can be classified as "endangered" species.

Key words: Bumblebees, *Thoracobombus*, *Megabombus*, Bombinae, Apidae, distribution, Turkey

INTRODUCTION

This part of the serial studies on the bumblebee fauna of Turkey comprises the subgenus *Thoracobombus* Dalla Torre in the genus *Megabombus* D.T. for which the material was collected in almost all parts of the country. In the first part (Özbek, 1979) the genera *Alpigenobombus* Skorikov, *Bombias* Robertson and *Bombus* Latreille (s. st.) and in the second part (Özbek, 1998) the genus *Pyrobombus* T.D. (s. st) had been treated.

The information relevant to material, methods and other particulars were given in Part I and II. However, it should be taken into account that collecting efforts are not the same for all parts of the country, but with the focus on eastern and northeastern Anatolia. The symbols on the distribution maps show the sampling locations, but not

the number of specimens taken, which varied from 1 to about 50.

Genus: *Megabombus* Dalla Torre, 1880

Subgenus: *Thoracobombus* Dalla Torre, 1880 (=Agrobombus Vogt, 1911)

Megabombus humilis (Illiger, 1806)

= *M. fulvescens* (Schrank, 1802), =*M. helferanus* (Seidl, 1837), =*M. variabilis* (Schmiedeknecht, 1878)

M. humilis is a widespread species almost through the country from about sea level up to ca. 3000 m (Fig.1). 713 specimens were collected. It has geographic variations within the range of its distribution. Therefore, there are several subspecies occurring in various locations.

M. humilis insipidus (Radoszkowski, 1884)

This subspecies occurs in eastern Anatolia and some parts of central Anatolia. It prefers open areas in meadows, pastures and road sides. *Anchusa azurea* and *A. leptophylla* are the most abundantly visited plant species.

Material examined: Aðrý: Tahir Mt. 2000-2200 m, Eleskirt 2000-2300 m, Hamur 1900-2100 m, Tutak 1800 m, Patnos 1700 m. Aksaray: Hanobasi 1100 m. Ankara: Çubuk 1000 m, Polatli 1000 m., Elmadag 1250 m, Hotali and Musular (Þereflikoçhisar) 800 m. Ardahan: Ilgar Mt. 2000-2600 m, Yurtbekler 1400 m, Türkgözü (Posof), Ardahan yaylasi 2000-2400 m, Göle 2000 m, Çildir 1900 m. Artvin: Kinaliçam 800 m, Ishan 700 m, Kiliçkaya 1400 m, Karagöl (Savsat) 1600-1800 m. Bayburt: Kop Mt. 2000-2400 m, Demirözü 1600 m. Bingöl: Karliova 1800-2200 m. Bitlis: Beekeeping Institute 1400 m. Elazig: Karakoçan 1600 m, Keban 1300 m. Erzincan: Along the roadside Tercan and Askale 1600-1900 m. Erzurum: Erzurum plateau ca. 1900 m, Palandöken Mt. 2000-2800 m, Kargapazari Mts. 2000-2900 m, Dumlu Mts. 1900-2700 m, Pasinler plain 1700-1900 m, Rabat 2000-2600 m, Köprüköy 1600 m, Hinis 1700-2000 m, Karayazi 2000 m, Horasan 1600 m, Dikyar (Uzundere) 1400 m, Kaledibi (Tortum) 1600 m, Bagbasi 1200 m, Kireçli Mt.(Narman) 2000-2700 m, Baþaklý(Oltu) 1700 m, Turnalý(Þenkaya) 1400-1900 m, Süngübayýr (Olur) 1800-2200 m, Çat 2000 m, Serçeme (Ilýca) 1900 m, Pazaryolu 1500-1700 m, Ispir 1100 m. Kars: Susuz 1800 m, Kümbetli (Selim) 2000 m, Saryýkamýþ 2000-2200 m, Karakurt 1600 m, Digor 1700 m. Muþ. Muþ Plain 1300-1500 m, Varto 1400 m. Nevþehir: Ürgüp 1100 m. Niðde: Kavlaktepe (Çamardý) 2000 m. Sivas: Along the roadsides Sivas and Yozgat provinces. Tunceli: Hozat 1700 m, Çemiþgezek 1600 m.

Distribution data from literature: Kop Mt., Çakmak Mt. (Reinig, 1971); Gölebert, Yalnýzçam, Ardahan (Reinig, 1973). Erzurum (Özbek, 1979, 1983, 1990; Özbek & Yýldýrým, 1996); Ardahan (Özbek, 1980).

Megabombus humilis aurantiacus Dalla Torre, 1882

This subspecies occurs in northern Anatolia from Rize to Istanbul in forest, woodland and adjacent to forested areas.

Material examined: Bolu: Gerede 1000 m, Abant 1300 m, Kaynaþlý1500 m. Çankýrý: Kesecik (Ilgaz) 1200 m, Ilgaz Mt. 1800 m. Giresun: Pýnarlar (Dereli) 1800 m. Gümüþhane: Zigana Mt. 1800 m. Isatanbul: Rumeli Kavaðý100 m, Orman Fakültesi Campus 50 m, Polonez 150 m. Kastamonu: Çetni 1200 m, Oyrak pass 1300 m.Kýrýkkale: Merkez 1000m. Ordu . Kölköy 800 m. Samsun: Gürgen Mt. 900 m, Ayvacýk (Çarþamba) 1400 m, field of Tarýmsal Araþtýrma Enstitüsü 50 m, vicinity of University Campus 100 m, Malgölü (Yakakent) 100 m. Sinop: Kerim (Gerze) 50 m, Dikmen 150 m, Dranoz pass 1300 m, Erfelek 200 m, Saryýkum 20 m, Aliköy (Ayancýk) 50 m, Yenikonak 250 m. Rize: Çamlýhemþin 1500 m. Trabzon: Sumela 700 m, Hamsiköy 1600 m.

Distribution data from literature: Ilgaz Mt., Isfendiyar Mts., Bolu (Reinig, 1968, 1971).

Megabombus humilis tristis (Seidl, 1837)

This subspecies is less abundant when compared to other subspecies.

Material examined: Bolu: Bolu Mt. vicinity of Varan tesisleri. Bursa: Uludað National Park 1200 m, Kuþaklýkaya 2000 m. Kastamonu: Ilgaz Mt. 1700 m. Samsun: Alaçam 200 m.

Distribution data from literature: Uludað, Isfendiyar Mt., Ilgaz Mt, Bolu (Reinig, 1968, 1971).

Megabombus humilis erzincanensis **ssp.n.**

Holotype: Queen, Türkiye, Erzincan, Cevizli 1400 m, 4.VI.1990, *Arctium lappa* Leg. H. Özbek: In the collection of Entomology Museum, Erzurum, Turkey (EMET).

Paratypes: 3 queens, the same as holotype ; 1 queen Erzincan, Cevizli, 1400 m, 10.VI.1982, *Trifolium pratense* (Leg. H. Özbek); 1 queen, Tunceli, Ovacýk, Karaoðlan Karakolu, 1800 m, 14.VII.1984 *Trifolium repens* (Leg. H. Özbek); 2 males, Erzincan, Kemah, Dedek 1600 m, 30.VII.1980 (Leg. H. Özyþýk); 2 males, Erzincan, Cevizli 1400 m, 14.VIII.1983, *Salvia* sp. (Leg. H. Özbek); 2 males, Erzincan, Cevizli, 1400 m, 1.VIII.1991 (Leg. E. Yýldýrým); 1 male, Erzincan, Cevizli, 1400 m, 10.VIII.1990 *Arctium lappa* (Leg. E. Yýldýrým).

Holotype: Hairs on head pale yellow, piles of face and vertex long and entirely yellow; dorsum of thorax and propodeum with dense orange hairs, as also adjacent edge of episternum, episternum otherwise with entirely yellow hairs; venter, trochanters and femurs with long pale yellow hairs, fore-and mid-tibiae with short black hairs, corbicular fringes pale yellow; piles on T_1 and T_2 dull yellow, T_3-T_5 yellow, tip of T_6 pale yellow, otherwise admixed with sparse pale yellow and short black hairs; the fringes of sternits pale yellow. Length:13.5-15.6 (14.7) mm.

Males have the same colour pattern as holotype, but some of the workers have some differences on the hairs of legs, yellow hairs admixed with black hairs. Length: 11.1-12.0 (11.5) mm.

Megabombus humilis erzincanensis ssp. n. resembles *M. h. aurantiacus*, but is distinguished from this subspecies by orange colour of dorsum and entirely yellow hairs on head and legs.

Megabombus muscorum (Linnaeus, 1758)

This species was found in some localities of Black Sea Region and eastern Anatolia (Fig.2) in relatively small numbers (48 specimens) particularly in neighboring woodland, forest, wild heath areas and uncultivated land between arable fields.

Material examined: Ankara: Kýzýlcahamam 1300 m. Artvin: Iþhan (Yusufeli) 900 m. Bayburt: Demirözü 1500 m. Bitlis: Tatvan 1500 m. Bolu: Abant 1400 m. Bursa: Uludað 1200 m. Erzincan: Cevizli 1300 m, Bayýrbað 1300 m, Kemah 1100 m. Erzurum . Baðbaþý(Uzundere)1200 m, Oltu 1300 m. Kastamonu: Daday 1300 m. Kocaeli: Çayýrova 10 m. Samsun: Tarýmsal Araþtýrma Enstitüsü 100 m, Þeker Fabrikasý(Çarþamba) 150 m, Gürgen Mt. 800 m, University Campus, Malgölü (Yakakent) 20 m. Sinop: Gerze 50 m, Ayancýk 200 m. Sivas: Atatürk Çeþmesi 1500 m. Tokat: Kozova Tarým Ýþletmeleri 1100 m.

Distribution data from literature: Sultan Mt. (Reinig, 1967).

Megabombus mlokosievitzii (Radoszkowski, 1877)

This species occurs in the northern and north eastern part of the country (Fig. 2). In woodland, mountain, meadows and adjacent to wooded areas above ca. 1000 m. 217 specimens were collected.

Material examined: Amasya: Akdað, Tepeyayla 1900 m. Ardahan: Yurtbekler 1400 m, Ilgaz Mt. 2200-2600 m, Gölebert 2100 m, Hanak 2200 m, Karýnca (Göle) 2000-2200 m. Artvin: Genye Mt. 1600-1800 m, Karagöl (Þavþat) 1600-1700 m, Barhal Mt. (Sarýgöl) 1900-2000 m, Kýlýçkaya yaylasý(Yusufeli) 1900 m. Bayburt: Kop Mt. 2200-2600 m. Bolu: Abant Lake 1600 m, Gerede 1200 m. Bursa: Soðukpýnar 1400 m, Kuþaklýkaya (Uludað) 2000 m. Çankýrý: Kesecik (Ilgaz) 1300 m, Ilgaz Mt. 1800 m. Erzincan: Kýzýldað 2000-2400 m, Sakaltutan 2000 m, Çatalçam (Refahiye) 1700 m. Erzurum: Palandöken Mt. 2000-2800 m, KargapazarýMts. 2000-2900 m, Dumlu Mts. 2000-2600 m, Karagöbek Mt. 2000-2700m, YukarýMeydanlar (Tortum) 2200 m, Rabat (Pasinler) 2000-2600 m, Kireçli Mt. (Narman) 2000-2600 m, Turnalý(Þenkaya) 2000 m, Deðirmenli (Þenkaya) 1700 m, Baþaklý(Oltu) 1800-2200 m, Tutmaç 2000 m, Uzunoluk (Oltu) 1900 m, Çamlýyamaç (Uzundere) 2000 m, Çat 2000 m, Gölyurt (Pazaryolu) 2000-2400 m, Ovit pass (Ispir) 2000 m. Gümüþhane: Zigana Mt. 1700-2200 m. Kars: Sarýkamýþ 2000-2400 m. Samsun: Akdað (Ladik) 1500 m. Sinop: Erfelek 1200 m. Tokat: 900 m. Trabzon: Esiroðlu, Derecik, 200m.

Distribution data from literature: Uludað (Vogt, 1911; Reinig, 1968); Semen Mt.,

Ilgaz Mt., Isfendiyar Mt., Bolu (Reinig, 1968); Ardahan (Reinig, 1973); Erzurum (Özbek, 1983; Özbek & Yıldırım, 1996).

Megabombus ruderarius ruderarius (Müller, 1776)

It exhibits a sporadic occurrence in woodland and mountain meadows and neighbouring wooded areas in the Black Sea Region. It is a rare taxon. 15 specimens were collected.

Material examined: Bolu: Abant Lake 1200 m. Gümüşhane: Zigana Mt.1800-2000 m. Kastamonu: Oyrak 1200 m. Sinop: Ayancık 300 m. Trabzon: Hamsiköy 900 m.

Distribution data from literature: Kastamonu (Reinig, 1968).

Megabombus ruderarius simulatilis (Radoszkowski, 1888)

This taxon has a widespread occurrence, particularly in eastern Anatolia (Fig. 3) in meadows, mountain meadows, pastures, Leguminosae fields and uncultivated areas between cultivated land in open areas. 185 specimens were collected. It is pollinator of *Onobrychis viciaefolia, Medicago sativa, Trifolium pratense, T. repens, Helianthus annuus* and some fruit trees (apple, pear etc.).

Material examined: Adana: Pozantı1000-1400 m, Saimbeyli 1400 m. Adıyaman: Gölbaşı900 m. Afyon: Sultan Mts. 1200-1500 m. Ankara: Elmadağ 1200 m, Atderesi (Ayaş) 1100 m. Antalya . Saklıkent 1800 m, Akseki 1200-1500 m. Ardahan: Ilgar Mt. (Posof) 2000-2400 m, Yurtbekler (Posof) 1500 m, Şehitveren (Hanak) 2000 m, Göle 2000 m. Artvin: Kılıçkaya 1000 m, Ardanuç 1000-1200 m. Bayburt: Kop Mt. 2000-2600 m, Aydıntepe 1600 m, Akşar 1600 m. Bingöl: Along the side of Karlıova- Bingöl road 1400-1800 m. Bitlis: Kuzgunkıran 2000 m. Burdur: Ağlasun 1100 m. Denizli: Kazıkbeli pass 1200 m. Erzincan: Kızıldağ 2000 m, Sakaltutan 2100-2200 m, Çatalçam (Refahiye) 1700 m, Tercan 1700 m. Erzurum: University field 1850 m, Palandöken Mt. 2000-2800 m, KargapazarıMts. 2000-2800 m, Umudum Yaylası2000-2400 m, Atlıkonak (Ilıca) 1800-2200 m, Serçeme Valley 1800-2000 m, Ovacık 2000-2400 m, Gölyurt (Pazaryolu) 2000-2600 m, Madenköprübaşı1600 m, Ispir 1300 m, Pasinler plain ca. 1700 m, Rabat 2000 m, Karaçuha (Horasan) 1600 m, Tortum 1500 m, Kireçli Mt. (Narman) 2000-2600 m, Başaklı1700-2000 m, Çamlıbel 1700 m, Turnalı(Şenkaya) 1700-2000 m, Gaziler (Şenkaya) 1600-1900 m, Süngübayır (Olur) 1900-2200 m. Hatay: Teknapınar 1000 m. Isparta: Along the sides of Isparta-Eğirdir road, Şarkikaraağaç 1500 m. Iğdır: Taşburun 900 m. Içel: Sertavul pass 1400-1600 m. Karaman: Karadağ (Madenşehri) 1700-1900 m. Kars: Akkurt 1500 m, Karakurt (Sarıkamış) 1600 m, Issisu (Sarıkamış) 2000-2200 m, Susuz 1900 m, Digor 1700 m. Konya: Sultan Mt. (Akşehir) 1500-1600 m, Doğanhisar 1000 m. Muş: Muğlan pass 1700m. Niğde: Kavaltepe (Çamardı) 2000 m. Rize: Ovit pass 2300 m. Samsun: Ladik 900 m. Sivas. Çamlıbel pass 1600-1700 m, Imranlı2000 m, Hafik 1600 m. Tokat: Aybastı800 m. Tunceli: Pülümür Mt. 1800-2200 m, Hozat 1700 m, Çemişgezek 1600 m. Van: Çaldıran plain 1900-2100 m, Muradiye 1800 m. Yozgat: Akdağmadeni 1600 m.

Distribution data from literature: Sultan Mt. (Reinig, 1967); Bayburt, Ağrı,

MandarlýMts. (Reinig, 1971); Kayseri (Reinig, 1973); Erzurum (Özbek, 1983, 1990; Özbek & Yýldýrým, 1996; Çalmaþur & Özbek, 1997); Adana, Ýçel (Aslan & Þekeroðlu, 1996).

Megabombus sylvarum (Linnaeus, 1761)

This taxon was the most abundant and widespread bumblebee species of the genus *Megabombus* after *M. argillaceus* occurring in Turkey. 2134 specimens were collected. It exhibits geographical variations. There are two subspecies in the country.

Megabombus sylvarum citrinofasciatus (Vogt, 1909)

This subspecies occurs in the central and western Black Sea Region, Marmara Region and western Anatolia and Trace (Fig. 4) in wooded areas, meadows adjacent to woodland areas, orchards and roadsides from sea level up to ca. 2000 m.

Material examined: Afyon: Emirdað 1200 m, Sultan Mt. 1500-1800 m. Balýkesir . Manyas Lake 300 m. Bolu: Abant Lake 1200-1300 m. Bursa: Inegöl 500 m. Çankýrý: Ilgaz 1200 m, Eskipazar 900 m. Denizli: Kazýkbeli 1300 m. Eskiþehir: Sivrihisar 900 m. Isparta: Keçiborlu 1200 m, along the road Isparta-Eðirdir. Istanbul: Rumeli Kavaðý100 m, Campu of Forestry Faculty. Izmir: Bornova 50 m. Kastamonu: Çetni 1200m. Konya: Akþehir 1000 m. Ordu: Ünye 10 m. Samsun: Akdað (Ladik) 1500 m, Gürgen Mt. 800 m, Tarýmsal Araþtýrma Enstitüsü 50 m, Alaçam 50 m. Sinop: Gerze 100 m, Ayancýk 150 m.

Distribution data from literature: Çankýrý(Reinig, 1968); Bolu (Reinig, 1871); Sultan Mts. (Reinig, 1973).

Megabombus sylvarum daghestanicus (Radoszkowski, 1877)

This subspecies occurs abundantly in eastern part of Turkey (Fig. 4) from about 500 m up to 3500m in meadows, pastures, Leguminosae fields and uncultivated areas between cultivated land and occasionally orchards.

It is a good pollinator of *Onobrychis viciaefolia, Medicago sativa, Trifolium pratense, T. repens, Helianthus annuus* and *Brassica napus* (Özbek, 1976, 1979, 1980;.Özbek & Yýldýrým, 1996; Çalmaþur & Özbek, 1997).

Material examined: Adana: Pozantý1000 m, Pýnarlar 1100 m. Aðrý: Tahir Mt. 2000-2200 m, Eleþkirt 2000 m, Cumaçay 1900-2000 m, Doðubeyazýt 2000 m, Hamur 1900-2100 m. Ankara: Elmadað 1200-1300 m, Çubuk 1000 m, Polatlý1100 m. Antalya: Saklýkent 1900-2100 m. Ardahan: Yurtbekler 1400 m, Türkgözü 1600 m, Ilgar Mt. (Posof) 2000-2600 m, Ardahan Yaylasý2000-2300 m. Artvin: Kýlýçkaya 1400 m, Þavþat 1500 m. Bayburt: Kop Mt. 2000-2600 m, Aydýntepe 1700 m, Akþar 1600 m. Bingöl: Karlýova 1800 m. Bitlis: Tatvan 1700-1800 m, Kuzgunkýran pass

2000-2400 m. Erzincan: Kýzýldað 1800-2000 m, Sakaltutan 2000 m, Çaðlayan 1400-1600 m, Çatalarmut 1700 m. Erzurum: Erzurum and Pasinler plains 1700-1900 m, Palandöken Mt., KargapazarýMts., Dumlu Mts. 1900-3000 m, Çat 2000-2400 m, Hýnýs 1700-2400 m, Karayazý 2000-2800 m, Aþkale 1700-2800 m, Pazaryolu 1400-2800 m, Ýspir 800-2500 m, Tortum 1500-2800 m, Oltu 1000-3000 m, Olur 800-2800 m, Þenkaya 1500-3000 m, Horasan 1600-2000 m. Gümüþhane: Kale 1500-1700 m, Zigana Mt. 1700-2200 m, Kelkit 1500-2000 m. Iðdýr: Karaçomaklý2800 m. Ýçel: Kýrobasý1500 m, Þehitlik (Silifke) 500 m. Kars: Susuz 1800 m, Selim 1800-2200 m, Anýharabeleri 1800 m, Digor 1600 m, Sarýkamýþ 2000-2200 m, Kaðýzman 1400-1800 m, Karakurt 1600 m. Kayseri: Develi 1600 m, Incesu 1100 m. Kýrþehir: Kargasekmez Mt. 1600 m. Malatya: Yeþilyurt 1000 m. Muþ: Muþ plain 1300-1500 m, Varto 1500 m. Niðde: Kavlaktepe 2000 m, Bademdere (Çamardý) 2000-2200 m. Rize: Arýlý(Ýkizdere) 1800-2200 m. Sivas: Beðendik 1900 m, Karacaören (Imranlý) 2100 m, Hafik 1400 m, Suþehri 1100 m. Tokat: Çamlýbel 1700 m. Tunceli: Pülümür Mt. 1800-2200 m, Hozat 1700 m. Van: Çaldýran plain 1900-2200 m. Yozgat: Akdaðmadeni 1700 m.

Distribution data from literature: Kop Mt., Çakmak Mt., Aðrý; Van (Reinig, 1971); Kayseri (Reinig, 1973); Erzurum (Özbek 1983, 1990; Özbek & Yýldýrým, 1996; Çalmaþur & Özbek, 1997); Ardahan (Özbek, 1980).

Megabombus velox (Skorikov, 1914)

The distribution area of this species is confined to the Northeast Anatolia (Fig. 4). It prefers mountain meadows and mountain pastures. It had a very low abundance 13 specimens were collected. *M. velox* can be accepted as an endangered species in this country.

Material examined: Ardahan: Ilgar Mt. (Posof) 2000-2600 m. Bayburt: Kop Mt. 2200-2600 m. Erzurum: KargapazarýMts. 2700-2800 m, Palandöken Mt. 2000-2800 m, Dumlu Mts. 2000-2700 m, Ahýrcýk (Ilýca) 2800 m, Kireçli Mt. (Narman) 2200-2400 m, Allahuekber Mts. (Þenkaya) 2000-2700 m.

Distribution data from literature: Eastern Anatolia (no location) (Rasmont 1983); Erzurum Özbek & Yýldýrým, 1996).

Megabombus zonatus (Smith, 1854)

This species is widespread through almost the entire country (Fig. 5), from about 500 m up to ca. 2500 m in open areas of roadsides, meadows, and uncultivated land between fields. In central Anatolia, it is the most abundant species. Apparently prefers rather arid areas. A total of about 1700 specimens were collected. *Centaurea solstitialis* is the most often visited plant particularly in roadsides.

Material examined: Adana: Pozantý900-1200 m. Adýyaman: Gölbaþý1300-1500 m. Aðrý: Hamur 1700-1800 m, Cumaçay 1800-2100 m, Doðubeyazýt 2000 m. Aksaray: Taþpýnar 1000 m, Sultanhaný1000 m. Amasya: Turhal 600 m. Ankara: Çubuk Barajý1000 m, Atatürk Orman

Çiftliði 800-900 m, Beytepe 900 m, Haymana 1200 m, Elmadað 1200 m, Polatlý 1000 m, Þereflikoçhisar 850 m, Hotalý(Þereflikoçhisar) 1000 m, Musalar 900 m. Antalya: Termossos 700-800 m, Akseki 1200 m. Ardahan: Yurtbekler (Posof) 1400. Artvin: Iþhan (Yusufeli) 900 m, Borçka 800 m. Bayburt: Along the roadsides Bayburt-Akþar 1600-1700 m. Bilecik: Merkez 800 m. Bitlis: Sarýkonak 1200 m, Tatvan 1600 m, ahlat 1500 m, Yassýca 1600 m. Burdur: Aðlasun 1200 m. Bursa: Uludað 1200 m. Çankýrý: Along the road sides Çankýrý-Ankara. Çorum: Alaca 900 m, along the roadsides Çorum-Sungurlu 900-1000 m. Denizli: Kazýkbeli 1300 m, Kýzýlhisar 1050 m, Pamukkale 1000 m. Elazýð: Harput 1100 m, Kovancýlar 1200 m. Erzincan: Merkez 1250 m, Baþpýnar 1400 m, along the roadsides Ilýç-Kemah ca. 1200 m, Altunkent 1400 m. Erzurum: University field 1850 m, along the roadsides Pasinler-Horasan-Karakurt, Köprüköy 1600 m, along roadsides Horasan-Yeniköy 1600-1700 m, Hýnýs 1700-1800 m, Aþkale 1700 m, Serçeme valley 1900-2200 m, along the roadsides Oltu-Akþar and Oltu-Olur ca. 1100-1300 m, Tortum 1500 m, Narman 1600 m, Pazaryolu 1600 m, Madenköprübaþý (Ispir) 1400 m. Eskiþehir: Sivrihisar 900 m. Gümüþhane: Kale 1600 m, Vavukdaðýpass 1800 m. Iðdýr: Along the roadsides Tuzluca-Iðdýr 900-1000 m. Hakkari: Þemdinli 1300 m. Hatay: Belen 800 m. Isparta: Along the roadsides Isparta-Eðirdir ca. 1000 m, Keçiborlu 1200 m, Gelendost 1000 m. Içel: Along the roadsides Gülnar-Sütlüce ca. 700 m, Kýrobasý1500 m. Karaman: along the roadsides Karaman-Konya and Karaman-Sertavul pass. Kars: Along the roadsides Karakurt-Sarýkamýþ 1700-2000 m, Susuz 1900 m, Demiröz (Digor) 1700 m, Yerköy (Sarýkamýþ)1700 m, Kötek (Kaðýzman) 1800 m. Kayseri: Incesu 1100 m, Lalelibeli pass 1400 m, Develi 1200 m, Araplý(Yenihisar) 1300 m. Kýrýkkale: Along the roadsides Yozgat-Kýrýkkale. Konya: Sultan Mt. (Akþehir) 1100-1500 m, Ilgýn 1300 m, University Campus 1100 m, Güraðaç (Güneysýnýr) 1200 m. Malatya: Yeþilyurt 1000 m. Muþ: Along the roadsides Varto-Muþ ca. 1500 m, Salhan 1600 m. Nevþehir: Zelve 1200 m, ürgüp 1200 m. Niðde: Çamardý1300 m. Sivas: Zara 1500 m, Hafik 1400 m, Suþehri 1100 m. Tokat: Reþadiye 1100 m, Çamlýbel 1600 m. Tunceli: Pertek 1100 m, Çemiþgezek 1200 m. Van: University Campus, along the roadsides Van-Gevaþ, Erciþ 1600 m. Yozgat: Along the roadsides Yozgat-Kýrýkkale ca. 1000 m.

Distribution data from literature: Niðde (Vogt, 1909); Uludað, Sultan Mt. Baba Mt. (Reinig, 1967); Kastamonu, Çankýrý(Reinig, 1968; Çorum, Aðrý, Van (Reinig, 1971); Kayseri, Nevþehir (Reinig, 1973); Denizli, Isparta, Konya (Reinig, 1974); Erzurum (Özbek, 1983); Adana, Içel (Aslan & Þekeroðlu, 1996).

Megabombus pascuorum (Scopoli, 1763)

=*Megabombus agrorum* Fabricius, 1787

This forest bumblebee species occurs along the northern part of the country from the eastern most point to the western most point (Fig. 5) and from sea level up to about 3000 m in forest areas and orchards. It is good pollinator of fruit trees (apple, pear etc.) in some orchards located along the valleys particularly in north eastern Anatolia (*M. pascuorum rebhinderi*). It prefers rather humid areas. Its abundance was quite high, 1615 specimens were collected, and many specimens were observed in different locations.

A great variability in the colour pattern of *M. pascuorum* throughout its range has been observed. Reinig and Rasmont (1983) studied distribution and geographical variation of *M. pascuorum* in Anatolia. According to these authors, the subspecies *Megabombus pascuorum olympicus* (Vogt, 1909) occurred in the mountains of West-Anatolia, the subspecies *M. pascuorum paphlagonicus* Reinig 1983 occurred in the western part of the Black Sea Region and the subspecies *M. pascuorum rebhinderi* (Vogt, 1909) in East-Black Sea Region and North-East Anatolia. The same authors also pointed out that the form *subdrenowskianus* (Vogt, 1909) is considered as infrasubspecific of *olympicus*. The forms *flavotrapezoides* (Vogt, 1909) and *taeniatus* (Vogt, 1909) are hybrids between *olympicus* and *paphlagonicus* ; they occur in variable proportions from the Uludað, in the west to the Ilgaz Mts. and Köroðlu Mts., in the east. The hybridization zone between *paphlagonicus* and *rebhinderi* extends over 500 kilometers from the Isfendiyar Mts. to the Zigana Mt. However, it should be emphasized that *M. pascuorum* is an extremely variable species, a vast number of colour variants can be named and several more subspecies can be recognized. For instance, in some localities of North-Eastern Anatolia it is possible to see populations very similar to that of either *olympicus* or *paphlagonicus*. Among the subspecies mentioned occurring in Anatolia, *M. p. rebhinderi* is the only one that can be considered as identical subspecies. Thus the subspecies status of this taxon should be studied more in detail.

Material examined: Amasya: Destek boðazý(Taþova) 1500 m, Akdað (Aktaþ) 2000 m. Ankara: Kýzýlcahamam, National Park 1000-1200 m. Ardahan . Posof 1400 m. Artvin: Cankurtaran (Hopa) 700 m, Altýparmak 1800-2100 m, Barhal Mt. (Sarýgöl) 1900 m, Karagöl (Þavþat) 1600 m, Karagöl (Borçka) 1600 m, Genye Mt. 1600-2000 m. Balýkesir: Manyas Lake 300 m, Erdek 300 m. Bolu: Abant Lake 1200-1500 m, Varan Tesisleri 1400 m. Bursa: Uludað, oteller 1800-2100 m, Millipark 1600 m. Çankýrý. Ilgaz Pass 1800 m, Yapraklý800 m, Kesecik (Ilgaz) 1400 m. Erzincan: Sakaltutan Pass 1700-1800 m, Çaðlayan 1300-1600 m, Sansa Boðazý1500 m, Yurtbaþý(Refahiye) 1700 m. Erzurum . Turnalý(Þenkaya) 1700-2000 m, Uzunoluk (Oltu) 1600-2000 m, Uzundere Yaylasý(Uzundere) 1800-2000 m, Baðbaþý(Tortum) 1300 m, Serdarlý(tortum) 1600 m, Rabat (Pasinler) 2000-2200 m. Giresun: Bulancýk 200 m. Gümüþhane: Zigana Pass 1600-1800 m. Istanbul: Rumeli Kavaðý200 m, Campus (Orman Fakültesi) 150 m, Polenezköy 300 m. Kars: Sarýkamýþ 2000-2400 m, Issisu (Sarýkamýþ) 2000 m. Kastamonu: Gökçeaðaç 1200 m, Taþköprü 1200 m. Ordu: Umurbey, Gürgentepe 1300-1500 m, Harçbeli 1900 m. Rize: Kalkandere 600 m, Çamlýhemþin 1200 m, Çataltepe (Ikizdere) 1800 m. Samsun: Þeker Fabrikasý(Çarþamba) 150 m, Gürgen Mt. 800 m, University Campus, Malgölü (Yakakent) 100 m, Soðanlý(Ladik) 600 m, Hacýlar Pass 800 m. Sinop: Erfelek 800-1000 m, Gerze 200 m. Tokat: Merkez 700 m. Trabzon: Maçka 1400 m, Sumela Manastýrý800 m, Hamsiköy 1600 m.

Distribution data from literature: Uludað, Genye (Vogt, 1909; Reinig, 1967; Reinig & Rasmont, 1983); Doðançay, Karaçam (Kruger, 1931); Bolkar Mts. (Fahringer, 1922); Sultan Mt. (Reinig, 1967); Bolu Mts., Semen Mt., Ilgaz Mt., Isfendiyar Mt., Inebolu, Küre (Reinig, 1968; Reinig & Rasmont, 1983); Bolu, Canik Mt., Rize, Trabzon (Reinig, 1971); Kazdaðý, Balýkesir (Reinig, 1973; Reinig & Rasmont, 1983); Kýrkpýnar, Maden (Reinig, 1974); Istanbul, Çanakkale, Balýkesir, Manisa, Bursa, Adapazarý, Bolu, Ankara, Kastamonu, Tokat, Ordu, Giresun, Trabzon, Rize, Artvin, Bolkar Mts. (Reinig & Rasmont, 1983); Erzurum (Özbek, 1983).

Plant species	Bumblebee species										
	Mhi	Mha	Mm	Mml	Mr	Mrs	Msc	Msd	Mv	Mz	Mp
Boraginaceae											
Alkanna orientalis	+									+	+
Anchusa arvensis	+							+		+	
A. azurea	+										
A. leptophylla	+		+					+			
Cerinthe minor		+	+		+		+	+			+
Echium italicum	+	+	+	+			+				+
E. vulgare	+	+					+	+			+
Myosotis lithospermifolia		+	+		+		+				+
M. alpestris											+
M. sylvatica		+		+			+				+
Caryophylaceae											
Cerastium dichotomum		+				+		+			+
Minuartia erythrocephala						+					+
M. recurva						+				+	+
Silene compacta								+		+	+
Compositae											
Arctium tomentosum var. glabrum	+					+		+		+	+
A. platylepis	+		+		+						+
Anhtemis tinctoria	+					+		+			+
Carduus acanthoides	+									+	
C. defloratus	+					+		+		+	
C.nutans	+										+
C.olimpicus	+							+			
Centaurea carduiformis	+					+				+	
C. depressa	+							+		+	+
C. glastifolia	+			+							+
C. jacea				+				+		+	
C. iberica	+	+				+	+			+	+

Centaurea pulcherrima				+				+			
C. scabiosa	+	+	+	+	+		+	+			+
C. sessilis				+						+	
C. solstitialis	+		+					+		+	+
C. virgata								+		+	
Cichorium intybus	+		+	+		+		+		+	
Cirsium acaule				+				+			+
C. arvense	+			+		+		+		+	
C. palustre			+	+	+			+			
Notabili syriaca	+					+					+
C.vulgare	+							+		+	
Echinops viscosus	+	+				+	+				+
E. caucasicus						+		+		+	
Helianthus annuus	+										+
Inula oculus-christi				+	+			+			
Jurinella moschus		+	+				+				+
Onopordum illyricum	+			+							
Serratula tinctoria	+							+			
Taraxacum androssovii	+			+				+		+	
T. officinalis	+	+	+	+	+	+		+	+	+	+
T. serotinum	+			+				+			
Tragopogon aureus	+			+		+		+	+	+	+
T. latifolium	+							+	+		
Dipsacaceae											
Cephalaria procera	+		+	+				+			
C.sparsipilosa	+										
Dipsacus fullonum		+		+	+		+	+			+
Scabiosa caucasica	+									+	
Morina persica	+			+				+			
Ericaceae											
Arbutus unedo	+										
Calluna vulgaris			+					+			+
Vaccinium sp.		+					+				+
V. myrtillus		+		+	+		+				+
Euphorbiaceae											
Euphorbia virgata	+					+		+		+	
Gentianaceae											
Gentiana angulosa	+		+	+				+			
G. gelida	+			+		+		+		+	+
G. verna			+					+			+

Geraniaceae											
Geranium sylvaticum				+							
Hypericaceae											
Hypericum linarioides		+			+		+			+	
Hypericum maculatum			+								+
Labiatae											
Ajuga chamaepitys	+					+		+		+	
A. orientalis	+	+		+			+	+	+	+	
A. reptans	+					+		+		+	+
Ballota nigra	+					+		+		+	
Galeopsis speciosa	+	+				+		+		+	
Glechoma hederaceum						+		+		+	+
Hyssopus officinalis		+			+		+	+		+	+
Lamium album	+		+								+
L. amplexicaule	+			+		+		+			
L. maculatum	+			+		+		+			+
Mentha longifolia	+		+					+	+	+	
Nepeta nepetella	+			+						+	
N. nuda	+							+			
Prunella grandiflora				+						+	
P. vulgaris	+			+		+					
Salvia angustifolia	+							+		+	+
S. azurea	+							+			
S. candidissima	+	+			+		+	+		+	
S. nemorosa	+		+			+		+		+	
S. officinalis	+							+		+	
S. poculata	+							+		+	
S. pratensis	+					+		+			+
S. triloba	+							+		+	
S. verticillata	+			+				+			
Scutellaria orientalis			+	+		+				+	+
Stachys annua	+					+		+			
S. atherocalyx	+			+							
S. balansae	+							+		+	
S. iberica	+					+					+
S. italica	+	+		+			+				
S. lanata	+							+		+	
S. officinalis	+										
T. orientale										+	
Thymra spicata								+			+

Thymus fallax	+					+		+	+		
T. praecox	+	+			+		+	+			
T. pubescens						+		+		+	
T. longicaulis var. longicaulis	+					+		+			
T. vulgaris								+			+
Ziziphora clinopodioides						+					
Leguminosae											
Anthyllis vulneraria	+	+				+	+	+			+
A. aduncus			+			+					
Astragalus alepecuroides	+					+					
A. barba-jovis				+		+		+			
A. aureus			+			+					+
A. christianus	+					+		+			
A. lagurus								+			
A. lineatus				+		+					
A. microcephalus	+		+					+			+
A. odoratus						+		+			
A. pinetorum		+				+	+	+			
Cicer anatolicum	+			+				+			+
C. orientalis			+								
Lathyrus digitatus	+										
L. montanus	+										
L. pratensis						+					
L. sylvestris	+	+					+				+
Lotus corniculatus	+			+		+		+			
Medicago lupilina						+		+			
M. papillosa						+		+			
M. sativa						+		+			
M. varia						+		+			
Melilotus alba	+			+		+		+			+
M. officinalis	+			+		+		+			
Onobrychis comuta	+					+		+			
O. montana						+		+			
O. viciifolia						+		+			
Ononis spinosa						+		+			
Pisum stivum var. arvense	+							+			
Robinia pseucl-acacia	+							+			
Trifolium ambiguum				+		+		+			
T. aureum			+					+			
T.campestre						+		+			
T. medium			+	+				+			

Trifolium montanum	+					+		+			+
T. pratense		+		+	+		+	+	+		+
T. purpureum						+		+			
T. repens	+	+		+		+		+	+		+
T. tricocephalum						+		+			
Vicia canescens								+			
V. cracca		+		+	+	+	+	+			
V. sepium				+				+			
V. silvatica			+	+		+		+			+
Liliaceae											
Asphodeline taurica				+				+			+
Onagraceae											
Epilobium angustifolium		+		+							+
E. hirsutum	+										
E. ponticum		+			+		+				
Ranunculaceae											
Consolida orientalis			+								
Delphinium coelestinum				+							
Rosaceae											
Alchemilla caucasica	+			+		+		+			
Cotoneaster nummularia								+			
Dryas octopetala				+							+
Fragaria vesca	+			+	+						+
Geum montanum			+								+
G. reptans										+	
G. urbanum										+	
Malus communis								+			+
Potentilla bifurca	+										
P.fruticosa				+							+
Prunus armeniacus								+			+
P. spinosa				+							+
Rosa canina								+			
Rubus canescens		+			+		+				
R. idaeus		+									
Scrophulariaceae											
Digitalis grandiflora	+			+							
D. ferruginea		+		+			+				+
Linaria genistifolia	+			+							
Pedicularis comosa											+
Veronica gentianoides	+			+		+		+			
V. montana	+			+							
V. orientalis								+			

Umbelliferae											
Eryngium alpinum	+					+		+			
E. billardieri	+					+		+			
E. campestre	+		+	+	+	+		+			
E. giganteum	+					+		+			
Verbenaceae											
Vitex agnus-castus										+	

Table 1. Plant species visited by bumblebees in Turkey. *Megabombus humilis insipidus* (Mhi), *M. humilis aurantiacus* (Mha), *M. muscorum* (Mm), *M. mlokosievitzii* (Mml), *M. ruderarius ruderarius* (Mr), *M. ruderarius simulatilis* (Mrs), *M. sylvarum citrinofasciatus* (Msc), *M. sylvarum daghestanicus* (Msd), *M. velox* (Mv), *M. zonatus* (Mz), *M. pascuorum* (Mp).

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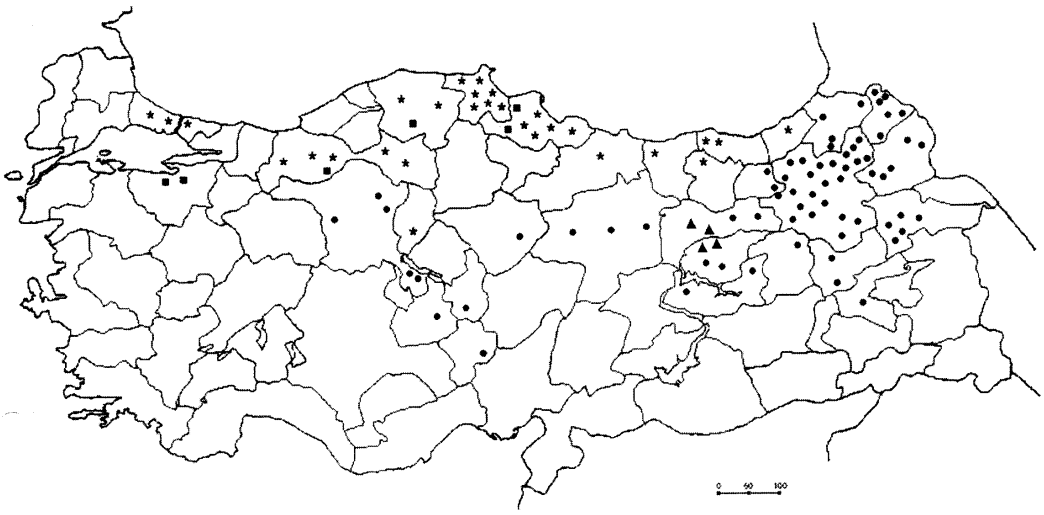

Fig. 1. *Megabombus humilis insipidus* (●) *Megabombus humilis tristis* (■)
Megabombus humilis aurantiacus (★) *Megabombus humilis erzincanensis* (▲)

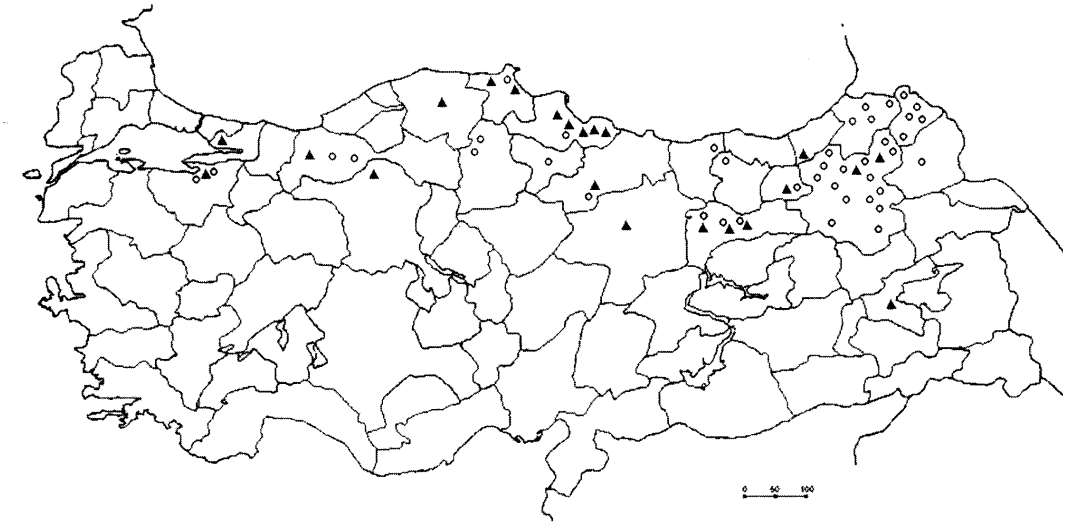

Fig. 2. *Megabombus muscorum* (▲) *Megabombus mlokosievitzii* (○)

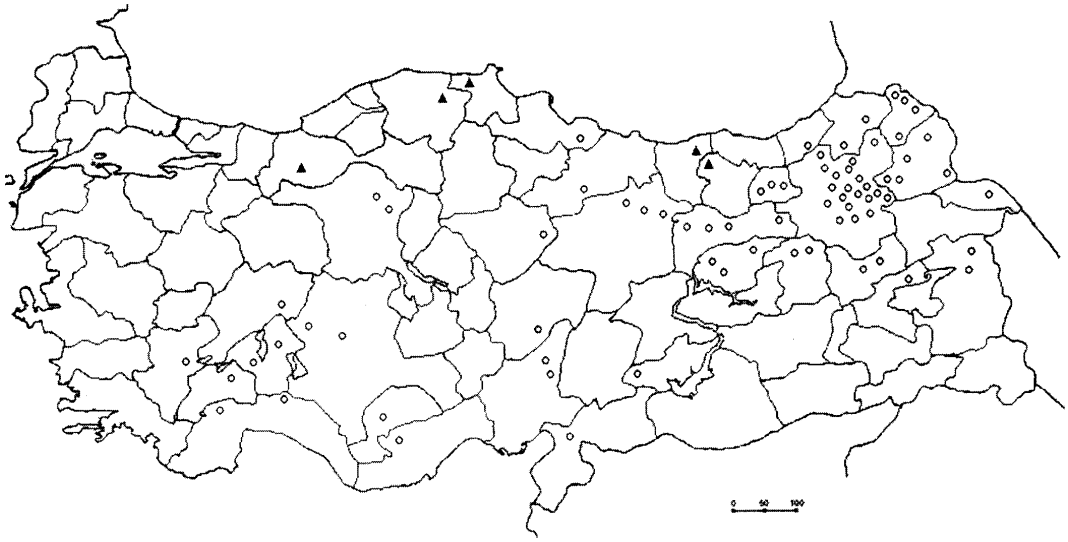

Fig. 3. *Megabombus ruderarius ruderarius* (▲) *Megabombus ruderarius simulatilis* (O)

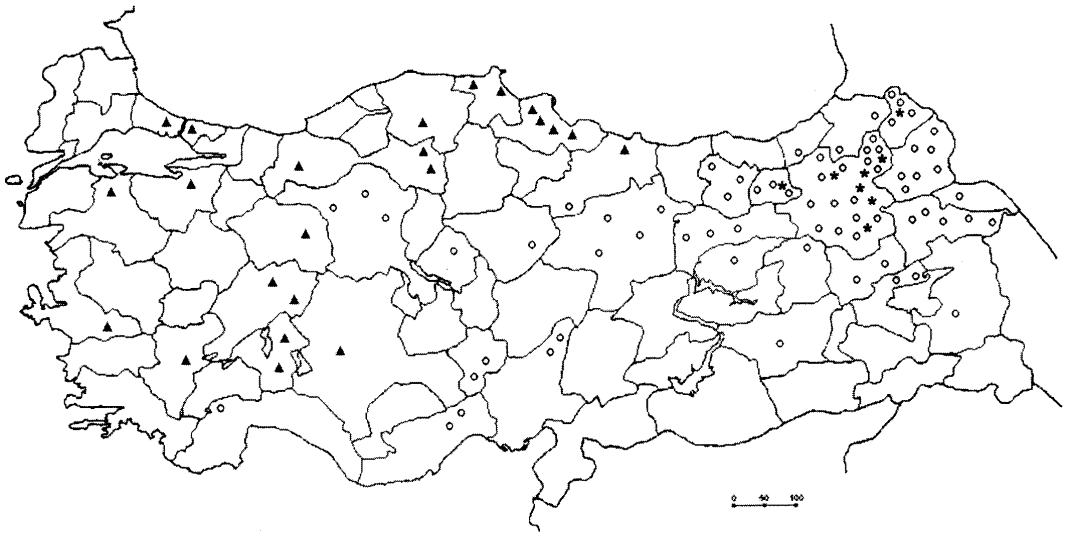

Fig. 4. *Megabombus sylvarum citrinofasciatus* (▲) *Megabombus velox* (✱)
Megabombus sylvarum daghestanicus (O)

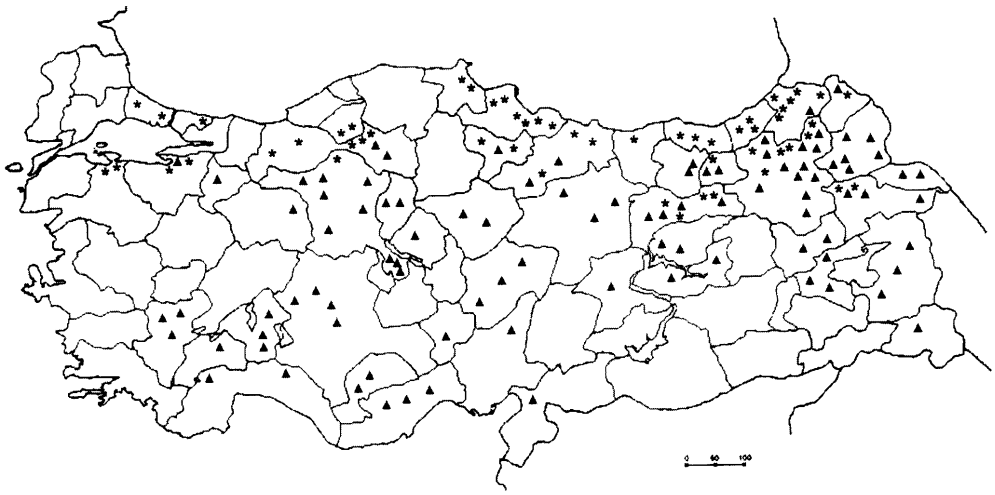

Fig. 5. *Megabombus zonatus* (▲) *Megabombus pascuorum* (★)

Figs. 1-5. Distribution of the species of the subgenus *Megabombus* (*Thoracobombus* D.T.).

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