

A CONTRIBUTION TO THE KNOWLEDGE OF THE EMPUSIDAE, TARACHODIDAE AND MANTIDAE (DICTYOPTERA: MANTODEA) FAUNA OF ASPAT (STROBILOS), BODRUM, MUĞLA, WESTERN TURKEY

Nilay Gülperçin^{1*}, Abbas Mol², Serdar Tezcan³

¹Natural History Application and Research Center, Ege University, Bornova, Izmir, Turkey

²Health Academy, Department of Emergency Aid and Disaster Management, Aksaray University, Aksaray, Turkey

³Department of Plant Protection, Faculty of Agriculture, Ege University, Bornova Izmir, Turkey

Abstract

This paper maintains data about the Mantodea (Dictyoptera) fauna from Aspat (Strobilos) province of Bodrum, Muğla, Western Turkey. Species were collected using different methods namely, handpicking on vegetation, handpicking on the ground, handpicking under stone, light trap, bait trap and sweep net sampling. Sampling took place at two weeks' intervals during the years of 2008 and 2009. At the end of this research, three species belonging to three families of Mantodea were specified. Those are *Empusa fasciata* Brullé, 1832 (Empusidae), *Iris oratoria* (Linnaeus, 1758) (Tarachodidae) and *Mantis religiosa* (Linnaeus, 1758) (Mantidae). Sweeping net is the effective method (40.48%) in sampling and light trap (35.71%) method followed it. All three species were sampled in both years. *E. fasciata* was sampled in March-May, while *I. oratoria* was sampled in March-December and *M. religiosa* was sampled in June-November. Among those species *Iris oratoria* was the most abundant one. All these species have been recorded for the first time from Muğla province of Turkey.

Keywords: Empusidae, Tarachodidae, Mantidae, Mantodea, Dictyoptera, fauna, Turkey

1. Introduction

With the works carried out in Anatolia which is a very rich open air museum, numerous civilizations reaching from past to present are being unearthed and these areas open up to cultural tourism.

Recently, in Turkey as in the world, with cultural tourism supporting nature and agricultural tourism together has begun to stand out. In this context, an interdisciplinary project was conducted in the ancient city and its surroundings known for its history going back to the B. C. 7th Century and formerly called Strobilos, today called Aspat, and the subject was discussed in different aspects (Diler, 2010).

In this paper, aiming to reflect the results of the first interdisciplinary research in an ancient city in Turkey, during the studies conducted in Aspat region, the species belonging to the Empusidae, Tarachodidae and Mantidae (Dictyoptera: Mantodea) were considered faunistic aspect and, evaluated in terms of the method of collection and their seasonal presence.

Mantodea fauna of Turkey is quite rich and a total of 25 species belong to four families occurring in Turkey. Those are Amorphoscelididae (one species), Empusidae (four species), Eremiaphilidae (four species) and Mantidae (16 species) (Caesar et al., 2015; Tezcan, 2020).

2. Material and Methods

In this study, Empusidae, Tarachodidae and Mantidae (Insecta: Mantodea) samples collected from Aspat (Strobilos) (27°26'E and 37°02'N), Bodrum, Muğla, western Turkey have been evaluated. Material have been sampled in 500 hectares of area. Species were collected using four methods: handpicking, light trap, bait trap and sweep net sampling. Sampling took place at two weeks' intervals between the years of 2008 and 2009. For each species, after collection date and method, number of specimens and their gender were given. If the material

***Sorumlu Yazar (Corresponding Author):**

Nilay GÜLPERÇİN; Ege University, Natural History Application and Research Center, Ege University, Bornova, Izmir, Turkey

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damaged, gender was been given as following format: “male/female?”. All the specimens studied were kept in the collection of Lodos Entomological Museum, Turkey (LEMT) of Ege University, Izmir and Aksaray University, Entomology Museum (A. Mol Coll.), Aksaray, Turkey. In the identification of material, Karabağ et al. (1974), Demirsoy (1975, 1977) and Salman (1978) have been followed.

3. Results

In this study, two specimens in one species belong to family of Empusidae; 31 specimens in one species belong to family of Tarachodidae; nine specimens in one species belong to family of Mantidae have been given. As a result of this research, a total of 42 specimens from three species were recorded for the first time in this province.

3.1. Family: Empusidae

3.1.1. *Empusa fasciata* Brullé, 1832

Distribution in Turkey: Recorded from Amasya, Ankara, Antalya, Bursa, Edirne, Erzurum, Eskişehir, Hatay (Antakya), İstanbul, İzmir, Kahramanmaraş, Konya, Malatya, Manisa, Niğde (Uvarov, 1930; Karabağ, 1958; Karabağ et al., 1974; Demirsoy, 1977; Çıplak & Demirsoy, 1997), Amasya, Ankara, Antalya, Artvin, Bursa, Diyarbakır, Elazığ, Erzincan, Erzurum, Hakkari, Hatay, İstanbul, İzmir, Konya, Manisa, Niğde, Siirt, Sinop, Şırnak, Van (Kemal & Koçak, 2014, 2015). This is the first locality record from Muğla province (Figure 1).

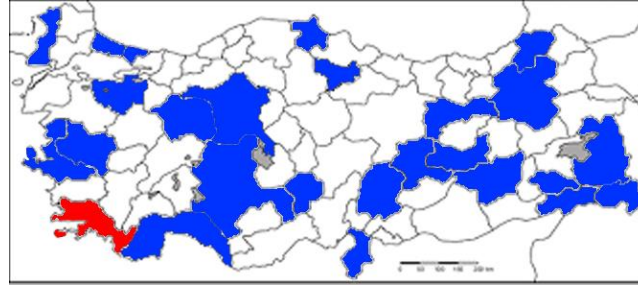


Figure 1. Distribution of *Empusa fasciata* Brullé, 1832 in Turkey.

Material examined: Muğla, Bodrum, Aspat, 29.III.2008, by handpicking, 1 male; 01.V.2009, by handpicking, 1 male. Totally 2 specimens.

3.2. Family: Tarachodidae

3.2.1. *Iris oratoria* (Linnaeus, 1758)

Distribution in Turkey: Recorded from Ankara, Balıkesir, Bursa, Elazığ, Erzurum, Hakkari, Hatay, İstanbul, İzmir, Mersin (Demirsoy, 1977; Çıplak & Demirsoy, 1997), Isparta (Avcı et al., 2005), Ankara, Bursa, İzmir, Mersin, Van (Koçak & Kemal, 2010), Balıkesir (Sevgili et al., 2011), Adana, Gaziantep, Mersin (Kment, 2012). This is the first locality record from Muğla province (Figure 2).

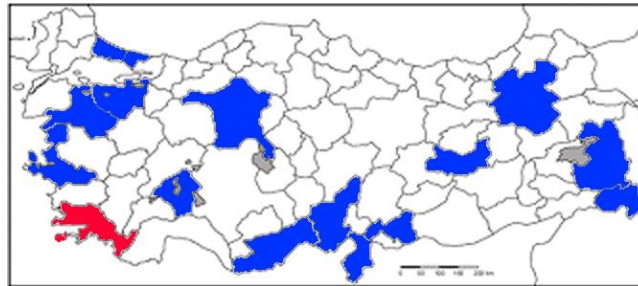


Figure 2. Distribution of *Iris oratoria* (Linnaeus, 1758) in Turkey.

Material examined: Muğla, Bodrum, Aspat, 29.III.2008, by handpicking, 1 female; 10.05.2008, by hand, 1 male; 01.V.2009, by handpicking, 1 male; 29.VI.2009, by sweep net, 1 male/female?; by sweep net, 1 male; 19.VII.2009, by sweep net, 1 male/female?; by sweep net, 3 females; light trap, 1 male; 09.VIII.2009, by light trap, 3 males; 24.VIII.2009, by sweep net, 1 male; 17.IX.2009, by light trap, 3 males; 16.X.2009, by sweep net, 1 female; by bait trap, 1 male/female?; by light trap, 5 males; 1 female; by handpicking under stone, 1 male; 13.XI.2009, by sweep net, 1 male; by sweep net, 2 females; 26.XII.2009, by handpicking on the ground, 1 male; by handpicking under stone, 1 female. Totally 31 specimens.

3.3. Family: Mantidae

3.3.1. *Mantis religiosa* (Linnaeus, 1758)

Distribution in Turkey: Recorded from Ağrı, Ankara, Artvin, Bursa, Erzurum, Hakkari, Hatay, İstanbul, İzmir, Kars, Manisa, Mersin, Samsun, Zonguldak (Karabağ, 1958; Karabağ et al., 1974; Salman, 1978), Ankara (Memişoğlu et al., 1986), Antalya (Yayla, 1983; Yayla et al., 1995), Malatya (Çıplak & Demirsoy, 1997), Isparta (Avcı et al., 2005), Mersin (Çetin & Alaoğlu, 2005), Burdur (Aydın & Avcı, 2010), Balıkesir (Sevgili et al., 2011), Artvin (Sert et al., 2013), Bartın (Sert & Kabalak, 2013), Hatay (Kemal & Koçak, 2015). This is the first locality record from Muğla province (Figure 3).

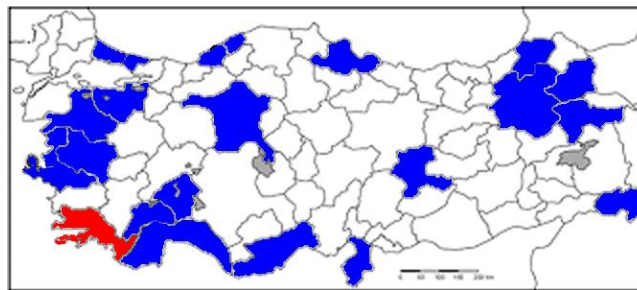


Figure 3. Distribution of *Mantis religiosa* (Linnaeus, 1758) in Turkey.

Material examined: Muğla, Bodrum, Aspat, 01.VIII.2008, by sweep net, 1 female; 29.VI.2009, by sweep net, 1 male; 1 male/female?; by handpicking on the ground, 1 male; 19.VII.2009, by sweep net, 1 male; 1 female; by light trap, 1 male; 16.X.2009, by light trap, 1 male; 13.XI.2009, by sweep net, 1 male. Totally 9 specimens.

4. Discussion

As a result of this study, three species were determined. Amongst those species *I. oratoria* were the most abundant one. All species in this study, have been recorded for the first time from Muğla province of Turkey in 2008 and 2009. The number of specimens collected only in 2008 was four (9.52 %) and in 2009 was 38 (90.48 %).

During the study, sampling was made with six different methods and according to these methods, the distribution of the species can be seen in Table 1. When the number of the species captured by these methods was examined, two taxa were collected by handpicking on vegetation, handpicking on the ground, sweep net, light trap, one by handpicking understone and bait trap.

The distribution of the samples collected during this study by sampling months and years is given in Table 2. *E. fasciata* was sampled in March-May, while *I. oratoria* was sampled in March-December and *M. religiosa* was sampled in June-November.

Those three species occurring almost all regions of Turkey except high and cold areas (Demirsoy, 1977). Their distribution in Turkey were given in Figures 1-3 in the light of recent researches.

Table 1. Status of the studied species according to sampling methods

| Species | Sampling methods | | | | | | Total (Number) |
|--|---------------------------|---------------------------|-------------------------|--------------|------------|-----------|----------------|
| | Handpicking on vegetation | Handpicking on the ground | Handpicking under stone | Sweeping net | Light trap | Bait trap | |
| <i>Empusa fasciata</i> Brullé, 1832 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| <i>Iris oratoria</i> (Linnaeus, 1758) | 3 | 1 | 2 | 11 | 13 | 1 | 31 |
| <i>Mantis religiosa</i> (Linnaeus, 1758) | 0 | 1 | 0 | 6 | 2 | 0 | 9 |
| Total number of individuals | 5 | 2 | 2 | 17 | 15 | 1 | 42 |
| Rate (%) | 11.91 | 4.76 | 4.76 | 40.48 | 35.71 | 2.38 | 100 |
| Total number of taxa | 2 | 2 | 1 | 2 | 2 | 1 | 3 |

Table 2. Status of the studied species according to sampling periods

| Species / subspecies | Months | | | | | | | | | | | | Years | |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 2008 | 2009 |
| <i>Empusa fasciata</i> Brullé, 1832 | | | + | | + | | | | | | | | + | + |
| <i>Iris oratoria</i> (Linnaeus, 1758) | | | + | | + | + | + | + | + | + | + | + | + | + |
| <i>Mantis religiosa</i> (Linnaeus, 1758) | | | | | | + | + | + | | + | + | | + | + |
| Total number of taxa | 0 | 0 | 2 | 0 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 3 | 3 |

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References

1. Avcı M., Oğurlu I. & Sarıkaya O. (2005). Kasnak meşesi tabiatı koruma alanı faunası üzerine araştırmalar. Korunan Doğal Alanlar Sempozyumu, 8-10 Eylül 2005, SDÜ, Isparta, 599-606.
2. Aydın G. & Avcı A.B. (2010). Burdur İli anason (*Pimpinella anisum* L.), kişniş (*Coriandrum sativum* L.) ve rezene (*Foeniculum vulgare* Mill.) agro-ekosistemlerinde böcek biyolojik çeşitliliklerinin belirlenmesi. Süleyman Demirel Üniversitesi, Fen Bilimleri Enstitüsü Dergisi, 14 (1): 38-45.
3. Caesar M., Roy R., Legendre F., Grandcolas P. & Pellens R. (2015). Catalogue of Dictyoptera from Syria and neighbouring countries (Lebanon, Turkey, Iraq and Jordan). Zootaxa 3948 (1): 071–092.
4. Çetin H. & Alaoğlu Ö. (2005). Mut (Mersin) İlçesinde zeytin ağaçlarında bulunan yararlı böcek türlerinin tespiti ve önemli türlerin populasyon değişimi. S.Ü. Ziraat Fakültesi Dergisi, 19 (36): 59-65.
5. Çıplak B. & Demirsoy A. (1997). Mantodea (Insecta) fauna of Malatya vicinity (Turkey) and some remarks on the Mantises of Anatolia. Journal of Orthoptera Research, 6, 105–111.
6. Demirsoy A. (1975). Erzurum Bölgesi Orthoptera (Insecta) faunasının tespiti ve taksonomik incelenmesi. Atatürk Üniversitesi Yayınları, Erzurum, 122 s.
7. Demirsoy A. (1977). Türkiye Faunası, Mantodea. Atatürk Üniversitesi Yayınları, Fen Fakültesi Yayınları, Araştırma Seri No: 55, Seri 8, Bölüm 4, Sayı 10, 53 s.
8. Diler A. (2010). Aspat (Strobilos) ve territoriumunda arkeolojik park yönetimi ve antik tarım alanlarına agro-turizm planlaması. 107K234 No'lu Tübitak Projesi Sonuç Raporu.
9. Karabağ T. (1958). Türkiye'nin Orthoptera Faunası (The Orthoptera Fauna of Turkey). Ankara Üniversitesi Fen Fakültesi Yayın. No: 81, 198 s., Şirketi Murettebiye Basımevi, İstanbul.
10. Karabağ T., Gümüştuyu İ., Balamir S. & Tutkun E. (1974). Türkiye Orthoptera faunasının tespiti üzerine araştırmalar (II). Bitki Koruma Bülteni, 14(1): 3-18.
11. Kemal M. & Koçak A.Ö. (2014). Illustrated and annotated list on the Entomofauna of Gören Mount (Van Province, East Turkey), with ecological remarks. I. Period of April-June 2014. Priamus (Suppl.), 33: 5-206.

12. **Kemal M. & Koçak A.Ö. (2015).** On the Pterygota fauna of Hatay Province (S. Turkey), based upon the info-system of the Cesa. *Cesa News*, 102: 16 – 233.
13. **Kment P. (2012).** First exact records of Mediterranean Mantis, *Iris oratoria* (Dictyoptera: Mantodea: Tarachodidae) from Croatia. -*Časopis Slezského zemského muzea Opava*, (A) 61: 43-48.
14. **Koçak A.Ö. & Kemal M. (2010).** List of the species of some pterygot orders recorded in the Province Van (East Turkey) and a description of a new species in the family Cicadidae (Insecta). *Priamus*, 12 (5): 130-149.
15. **Memişoğlu H., Özkan M. & Melan K. (1986).** Orta Anadolu Bölgesi çeltik alanlarında faunistik survey çalışmaları. *Bitki Koruma Bülteni*, 26 (3-4): 97-111.
16. **Salman S. (1978).** Ağrı, Kars ve Artvin İllerinin Orthoptera (Insecta) faunası üzerine taksonomik araştırmalar. Atatürk Üniversitesi Fen Fakültesi Yayınları, Erzurum, 184 s.
17. **Sert O., Şabanoglu B. & Fırat S. (2013).** A study on determination of insect fauna of Karagöl-Sahara Natural National Park (Artvin, Turkey). *Hacettepe Journal of Biology and Chemistry*, 41 (3): 225-234.
18. **Sert O. & Kabalak M. (2013).** A preliminary study on determination of insect fauna of Inkumu and its surrounding area (Bartın, Turkey). *Hacettepe Journal of Biology and Chemistry*, 41 (1): 59-65.
19. **Sevgili H., Demirsoy A.İ. & Durmuş Y. (2011).** Orthoptera and Mantodea fauna of Kazdağı (İda) National Park with data on the calling songs of some bush-crickets. *Turkish Journal of Zoology*, 35 (5): 631-652.
20. **Tezcan S. (2020).** Analysis of the insect fauna of Turkey and suggestions for future studies. *Munis Entomology & Zoology*, 15 (2): 690-710.
21. **Uvarov B.P. (1930).** Orthoptera collected by M. Sureya Bey in Turkey. *Eos*, 6 (4): 349-373.
22. **Yaşla A. (1983).** Antalya İli zeytin zararlıları ile doğal düşmanlarının tesbiti üzerinde ön çalışmalar. *Bitki Koruma Bülteni*, 23 (4): 188-206.
23. **Yaşla A., Kelten M., Davarcı T. & Salman A. (1995).** Antalya İli zeytinliklerindeki zararlılara karşı biyolojik mücadele olanaklarının araştırılması. *Bitki Koruma Bülteni*, 35 (1-2): 63-91.