

Tachinidae Parasitoids of *Traumatocampa ispartaensis* from Turkey

Mustafa Avcı¹ and Kenan Kara²

Tachinid parasitoids of *Traumatocampa ispartaensis* Doğanlar & Avcı (Lepidoptera, Thaumetopoeidae), which was found to be a new species, were collected from the cedar forests around Isparta-Kapıdağ. The species found were *Blondelia nigripes* (Fall.), *Compsilura concinnata* (Meig.), *Pales processioneae* (Ratz.), *Phryxe caudata* (Rond.), *Exorista segregata* (Rond.) and *Carcelia iliaca* (Ratz.). Within the six species of Tachinidae, *B. nigripes* was the most common one, parasitizing up to 4.6% of *T. ispartaensis* pupae.

KEY WORDS: Parasitoid; Tachinidae; *Traumatocampa ispartaensis*; *Blondelia nigripes*; Turkey.

INTRODUCTION

The Tachinidae are the second largest family of the Diptera and the most important group of entomophagous parasitoids (14). The larvae of all tachinid species are endoparasitoids, mainly of insects. *Compsilura concinnata* and *Blondelia nigripes* are unspecialized tachinids of many Lepidoptera, whereas *Phryxe caudata*, *Carcelia iliaca* and *Pales processionea* are typical parasitoids of the family Thaumetopoeidae (9,20). There are several records on Tachinidae as parasitoids of the four Thaumetopoeidae species described in Turkey (6,11,16,18,19): *Thaumetopoea pityocampa* (Den. & Schiff.), *T. processionea* (Linnaeus), *T. wilkinsoni* Tams and *Thaumetopoea solitaria* (Freyer). The cedar processionary moth, known so far as *T. solitaria* in Turkey, has recently been described as a new species named *Traumatocampa ispartaensis* Doğanlar & Avcı (4). *T. solitaria* is distributed from Macedonia, through Greece, Israel, Jordan and Saudi Arabia to Afghanistan. The main host plants of *T. solitaria* are *Pistacia* species, *Cypressus sempervirens* L. and *Schinus terebinthifolius* Raddi, while *T. ispartaensis* is found on cedar (*Cedrus libani* A. Rich.). In the laboratory the larvae also feed on *Rhus* species.

Two species of the Thaumetopoeidae family, *T. bonjeani* (Powell) and *T. libanotica* Kiriakoff & Talhouk, are the only cedar pests recorded to date. *T. bonjeani* is widely distributed in North Africa (Tunisia, Morocco and Algeria) feeding on *Cedrus atlantica* Man. (3,5); *T. libanotica* feeds on *C. libani* in Lebanon (12).

Traumatocampa ispartaensis, on the other hand, were first obtained as feeding on needles of cedar (*C. libani*) in Senirkent, Kapıdağ, Isparta, Turkey, during a study of the characters of the species of Thaumetopoeidae (4). The material found in Isparta were

Received Sept. 7, 2001; received in final form March 11, 2002; <http://www.phytoparasitica.org> posting July 2, 2002.

¹Süleyman Demirel University, Faculty of Forestry, Forest Entomology and Protection Dept., Isparta, Turkey [Fax: +90-246-2371810; e-mail: avci@orman.sdu.edu.tr].

²Gaziosmanpaşa University, Faculty of Agriculture, Plant Protection Dept., Tokat, Turkey [Fax: +90-356-2521488; e-mail: kkara@mail.gop.edu.tr].

different from the rest of the species of the subfamily, thus presenting a new species. It differs from *T. bonjeani* and *T. libanotica* in having a frontal process of special appearance and very long uncus and gnathos, the valva concave on the costal border (4). In addition, the larvae of *T. bonjeani* and *T. solitaria* live together in subsocial populations without a nest (3,7) and *T. solitaria* larvae do not construct webs (7,8). However, the mature larvae of *T. ispartaensis* live in aggregations in silky nests. The present article specifies tachinids of this species collected from the cedar forests in Turkey.

MATERIALS AND METHODS

Traumatocampa ispartaensis larvae were collected from *C. libani* in the area of Senirkent-Kapıdağ, Isparta (alt. 1100–1750 m). A total of 18 nests was studied during 3 years: six, five and seven nests were collected on 10.VI.1998, 18.V.1999 and 06.VI.2000, respectively. Ninety-six larvae were found on average in a nest (range 71–121) and the number of total larvae studied was 1728. The larvae were further kept on their host plants in the laboratory and emergence of tachinids was recorded. The flies were determined according to Tschorsnig and Herting (20) and Tschorsnig and Richter (21).

LIST OF TACHINIDAE FOUND

Subfamily: Exoristinae

Blondelia nigripes (Fallen, 1810)

Material: Isparta, Senirkent-Kapıdağ [(16 ♂, 10 ♀, 19–24.V.1999) (13 ♂, 14 ♀, 3–8.V.2000) (13 ♂, 14 ♀, 22–29.IV.2001) (4.6%)].

Distribution: *Europe*: Northwards to Great Britain and Scandinavia; *Russia*: Transcaucasus, Soviet Middle Asia, East Siberia, Far East; *Asia*: Mongolia, Japan (10).

Hosts: Polyphagous, on Lepidoptera, Tenthredinidae (Hymenoptera) (20).

This species emerged from *T. ispartaensis* larvae (collected on 6.VI.2000) in the following spring. Eighty specimens of *B. nigripes*, the number remaining approximately constant in each year, were obtained during the 3 years in which the study was conducted. The ratio of this number to the total number of *T. ispartaensis* larvae was 4.6%. Under laboratory conditions adults were observed from the end of April to mid-May.

Compsilura concinnata (Meigen, 1824)

Material: Isparta, Senirkent-Kapıdağ [(1 ♂, 2 ♀, 8–10.VIII.1998) (- ♂, 6 ♀, 1–6.VIII.1999) (5 ♂, 4 ♀, 11–21.VIII.2000) (1%)].

Distribution: *Europe*: Northwards to England and Sweden; *Russia*: Transcaucasus, Soviet Middle Asia, West Siberia, East Siberia; *Asia*: Israel, Japan (10).

Hosts: Polyphagous, parasitoid on hairy caterpillars (Lepidoptera); Microlepidoptera, also a few records on Tenthredinidae (Hymenoptera) (7,8,20).

The adults of *C. concinnata* emerged in August.

Pales processionea (Ratzeburg, 1840)

Material: Isparta, Senirkent-Kapıdağ [(- ♂, 2 ♀, 5.VII.1998) (- ♂, 4 ♀, 17-18.VII.1999) (5 ♂, 5 ♀, 3–11.VII.2000) (0.9%)].

Distribution: *Europe*: Austria, German Federal Republic, France, Italy, Turkey (10).

Hosts: *Thaumetopoea processionea* L. (Lep.: Thaumetopoeidae) (20).

A total of 17 specimens of *P. processionea* was obtained in July; ten of them had emerged in the previous year and their effects were very limited.

Phryxe caudata (Rondani, 1859)

Material: Isparta, Senirkent-Kapıdağ [(1♂, - ♀, 19.VI.1998) (6♂, 10♀, 10–17.VI.1999) (3♂, 3♀, 17–22.VI.2000) (1.3%)].

Distribution: *Europe*: Mediterranean Region (10).

Hosts: *Ctenocampa pityocampa* Fabr., *Thaumetopoea processionea* L., *T. wilkinsoni* Tams. (Lep.: Thaumetopoeidae) (1,2,13,15,17).

The adults of *P. caudata* were observed mostly in the second half of June.

Exorista segregata (Rondani, 1859)

Material: Isparta, Senirkent-Kapıdağ [(5♂, 10♀, 14–19.VI.1998) (-♂, 1♀, 20.VI.1999) (3♂, 3♀, 8–17.VI.2000) (1.3%)].

Distribution: *Europe*: Mediterranean Region; *Russia*: Central European Territory, Transcaucasus, Soviet Middle Asia; *Asia*: Mongolia (10).

Hosts: Lepidoptera: Lymantriidae, Zygaenidae, Noctuidae, Lasiocampidae, Arctiidae, Thaumetopoeidae, Nymphalidae, Pieridae and Saturniidae (7,8,20).

Fifteen samples of *E. segregata* were obtained in 1998. The following 2 years only seven samples were observed in mid-June.

Carcelia iliaca (Ratzeburg, 1840)

Material: Isparta, Senirkent-Kapıdağ [(-♂, -♀, 1998) (-♂, 1♀, 20.VI.1999) (3♂, 1♀, 8–11.VI.2000) (0.3%)].

Distribution: *Europe*: Switzerland, German Federal Republic, France, Hungary, Italy (10).

Hosts: *Thaumetopoea processionea* L., *T. pinivora* Treits. (20).

C. iliaca, with an effect of only 0.3%, is a species which has the least effect on the pest.

DISCUSSION

The cedar processionary moth *Traumatocampa ispartaensis* Doğanlar & Avcı causes severe damages in some parts of the *C. libani* forests in Turkey. With the possible control of this species in mind, it is useful to investigate its natural enemies. For this reason, parasitoids of the larval and pupal stage were studied. Six species of the family Tachinidae were recorded. Only *B. nigripes* was determined as an important natural enemy. The five other species apparently have a minor impact in the control of *T. ispartaensis*. Additionally, the mature larvae, prepupating larvae and pupae were often affected in outdoor breeding by *Beauveria bassiana* Vuill.

Halperin (8) reported five tachinid species developing in the larvae of *T. solitaria*: *C. concinnata*, *Exorista segregata*, *Exorista sorbillans* (Wied.), *Pales pavidus* (Meig.) and *Drino imberbis* (Wied.); the most common tachinid was *D. imberbis*, parasitizing an average 4.5% of the pupae. *E. segregata* is known to parasitize *T. wilkinsoni* in Cyprus, Turkey and Israel. This species has limited parasitism on 4th and 5th instar larvae of *T.*

wilkinsoni in Israel (8). *C. concinnata* and *P. caudata* are known from many Mediterranean countries as parasitoids of *T. pityocampa* (2,8). *C. concinnata* emerged occasionally from pupating larvae of *Thaumetopoea jordana* (Stgr.) in Israel (8). *Exorista* sp. was obtained as a pupal parasitoid of *T. bonjeani* in Morocco by El Yousfi (5). No record was found about natural enemies of *T. libanotica* in Lebanon.

REFERENCES

1. Biliotti, E. (1958) Les parasites et prédateurs de *Thaumetopoea pityocampa* Schiff. *Entomophaga* 3:23-24.
2. Buxton, R.D. (1990) The influence of host tree species on timing of pupation of *Thaumetopoea pityocampa* Schiff. (Lep., Thaumetopoeidae) and its exposure to parasitism by *Phryxe caudata* Rond. (Dipt., Larvaevoridae). *J. Appl. Entomol.* 109:302-310.
3. Demolin, G. (1988) La processionnaire du cedre: *Thaumetopoea bonjeani* (Powell), Rapport Scientifique et Rapport Iconographique – Intensification de la Protection Phytosanitaire des Forêts, Algeria. 1986-1987 FAO Report.
4. Doğanlar, M. and Avcı, M. (2001) A new species of *Traumatocampa* Wallengren (Lepidoptera: Thaumetopoeidae) feeding on cedar from Isparta (Turkey). *Türk. Entomol. Derg.* 25(1):19-22.
5. El Yousfi, M. (1989) La processionnaire del cedro, *Thaumetopoea bonjeani* (Powell). *Bol. Sanidad. Veg. Plagas* 15:43-46.
6. Haeselbarth, E. (1983) Determination list of entomophagous insects. International Union for Biological Sciences, International Organisation for Biological Control (IOBC) of Noxious Animals and Plants. West Palearctic Regional Section VI (1):1-49.
7. Halperin, J. (1983) *Thaumetopoea solitaria* Freyer (Lepidoptera: Thaumetopoeidae) in Israel. *Phytoparasitica* 11:71-82.
8. Halperin, J. (1990) Natural enemies of *Thaumetopoea* spp. (Lep., Thaumetopoeidae) in Israel. *J. Appl. Entomol.* 109:425-435.
9. Herting, B. (1960) Biologie der Westpaläarktischen Raupenfliegen. Dipt., Tachinidae. *Monograph. Angew. Entomol.* No. 16. Paul Parey, Hamburg, Germany.
10. Herting, B. and Dely-Draskovits, A. (1993) Family Tachinidae. in: Soos, A. and Papp, L. [Eds.] Catalogue of Palearctic Diptera. Anthomyiidae – Tachinidae. Vol. 13, pp. 118-458. Typesetting Pars Ltd., Budapest, Hungary.
11. Kara, K. (1998) Systematic Studies on the Phasiinae and Exoristinae (Diptera: Tachinidae) Flies of Tokat Province. Gaziosmanpaşa University, Ph.D. thesis, Tokat, Turkey (Turkish, with English abstract).
12. Kiriakoff, G. and Talhouk, A.S. (1975) *Thaumetopoea libanotica* spec. nov. (Lepidoptera: Thaumetopoeidae). *Opusc. Zool. (Munich)* 137:1-5.
13. Masutti, L. and Battisti, A. (1990) *Thaumetopoea pityocampa* (Den. & Schiff.) in Italy: Bionomics and perspectives of integrated control. *J. Appl. Entomol.* 110:229-234.
14. Mellini, E. (1990) Sinossi di biologia dei Ditteri Larvevori. *Boll. Ist. Entomol. "Guido Grandi" Stud. Bologna* 45:1-38.
15. Mesnil, L.P. (1944-1965) Larvaevorinae (Tachininae). in: Lindner, E. [Ed.] Die Fliegen der Palearktischen Region. Parts I, II, III. E. Schweizerbartsche Verlags., Stuttgart, Germany.
16. Oğurlu, İ. (2000) [Biological Control.] Süleyman Demirel Univ. Press, Isparta, Turkey (in Turkish).
17. Schmidt, G.H., Breuer, M., Devkota, B. and Bellin, S. (1990) Life cycle of natural enemies of *Thaumetopoea pityocampa* (Den. & Schiff.) in Greece. *Proc. Thaumetopoea- Symp.* (Neustadt/Rbge., Germany, 1989), p. 36.
18. Soydanbay, M. (1976) The list of natural enemies of some plant pests in Turkey. Part I. *Bitki Koruma Bül.* 16:32-46 (Turkish, with English abstract).
19. Tosun, İ. (1975) [Studies on predators and parasitoids of some important species and harmful insects in coniferous forests in Mediterranean Region.] General Directorate of Forestry, Publ. no. 612. Istanbul, Turkey (Turkish, with German abstract).
20. Tschorsnig, H.-P. and Herting, B. (1994) Die Raupenfliegen (Diptera: Tachinidae) Mitteleuropas: Bestimmungstabellen und Angaben zur Verbreitung und Ökologie der einzelnen Arten. *Beitr. Naturk. Stuttgart Ser. A (Biol.)* No. 506.
21. Tschorsnig, H.-P. and Richter, V.A. (1998) Family Tachinidae. in: Papp, L. and Darvas, B. [Eds.] Contributions to a Manual of Palearctic Diptera. vol. 3, pp. 691-827. Science Herald, Budapest, Hungary.