

Sandfly (Diptera:Psychodidae) Distribution in Northern Greece¹

P. KARANIS², C. FRANK³, H. SCHMALLE², T. J. NAUCKE², U. JÖRDEN²,
C. METALLINO², S. HARALABIDIS⁴, W. A. MAIER², H. M. SEITZ²,
and C. HIMONAS⁴

² Institut für Medizinische Parasitologie, Universität Bonn, D-53127 Bonn, Germany,

³ Helixor Heilmittel GmbH, P.O. Box 8, D-72344 Rosenfeld,

⁴ Laboratory for Parasitology and Parasitic Diseases, Veterinary Faculty,
Aristotelian University, Thessaloniki, Greece

ABSTRACT

This study is a part of investigations on leishmaniasis vectors which began in 1992. Sandflies were collected in different areas of Kassandra, Sithonia and Athos and in several biotopes of the Xanthi district in Thrace. A total of 811 sandflies were caught using oil-traps in peridomestic sites in the town of Neos Marmaras in 1992, and 4264 specimens were collected by CDC miniature light traps in different parts of Chalkidiki in 1993. Similarly 3465 specimens were collected in Xanthi in 1996. Eight species of sandflies were identified: *Phlebotomus (Larroussius) neglectus* Tonnoir 1921, *P. (L.) tobbi* Adler et al. 1930, *P. (L.) perfiliewi* Parrot 1930, *P. (Paraphlebotomus) sergenti* Parrot 1917, *P. (Adlerius) simici* Nitzulescu & Nitzulescu 1931, *P. (Phlebotomus) papatasi* Scopoli 1786, *Sergentomyia minuta* Rondani 1843 and *S. dentata* Sinton 1933. The roles played in the transmission of leishmaniasis by different species of sandflies is discussed..

Introduction

In Greece, the anti-malarial vector control campaign initiated in 1946 resulted concomitantly in dramatic reduction of sandfly population (WHO 1990). As a consequence, the incidence of leishmaniasis in human populations declined for many years during the anti-malarial vector control program and subsequently.

Leishmaniasis was described early in the 20th century (Cardamatis, 1909). *Phlebotomus (Larroussius) neglectus* Tonnoir 1921, was found implicated as vector for *L. infantum* in Greece (Lèger et al., 1988; Garifallou et al., 1989). Investigations on the Greek sandfly fauna have been carried out in many regions of the country by a number of workers with an interest in entomology

and disease. According to those studies there are 12 sandfly species, 9 of which belong to the genus *Phlebotomus* and 3 to the genus *Sergentomyia* (Lèger et al., 1986; Chaniotis et al., 1994; Papadopoulos and Tselentis, 1994). The objective of our field studies was to determine the species composition of sandflies in different parts of Northern Greece.

Materials and Methods

Sandflies were collected in peridomestic places of Neos Marmaras in 1992, in different places of Kassandra, Sithonia and Athos, the three peninsulas of Chalkidiki in 1993, and in the district of Xanthi (Thrace) in 1996.

A total of 811 sandflies were collected from July to October 1992 in domestic and peridomestic sites around of Neos Marmaras (Sithonia) using papers sheets (20×30 cm) smeared with

¹ Received for publication November, 1996.

olive oil. A total of 4264 sandflies were collected from June to October 1993 in different biotopes of Kassandra, Sithonia and Athos and continental parts of Chalkidiki using CDC miniature light traps. The traps were operated all night and set at irregular intervals in some biotopes and more frequently in others that were considered to be potential sandfly resting sites. In many cases, efforts were focused to collect sandflies in places where dogs lived. The trapped sandflies from paper sheets were removed with a fine brush or probe, washed in detergent water to remove the oil, and stored in 70% ethanol. Sandflies in light traps were immobilized at 4ÆC, separated from other insects and stored also in 70% ethanol. From June to October 1996 a total of 3465 sandflies were collected in domestic and peridomestic sites around of Xanthi (Thrace) using light traps. The identification of the flies was based on taxonomic keys published by Lèger et al. (1986).

Results

Seven sandfly species were among the insects trapped in Neos Marmaras, Sithonia: from a total of 811 collected sandflies, 803 (99%) belonged to the genus *Phlebotomus* and only 8 (1%) to the genus *Sergentomyia*. *Phlebotomus* (*Larrousius*) *neglectus* Tonnoir 1921 (80.2%) and *P. (L.) tobbi* Adler et al. 1930 (13.8%) were the dominant species. The other species were *P. (Paraphlebotomus) sergenti* Parrot 1917 (3%), *P. (Adlerius) simici* Nitzulescu & Nitzulescu 1931 (1.9%), *P. (L.) perfiliewi* Parrot 1930 (1.1%), *Sergentomyia minuta* Rondani 1843 (0.7%) and *S. dentata* Sinton 1933 (0.3%). The sex ratio was 683 m: 128 f. Results on the number and species composition of sandflies collected in the area are listed in Table 1.

TABLE 1. Species and number of sandflies collected from July to October 1992 in peridomestic areas of Neos Marmaras, Sithonia, Chalkidiki by oil traps.

| Species | Males | Females |
|----------------------|-------|---------|
| <i>P. neglectus</i> | 554 | 96 |
| <i>P. tobbi</i> | 95 | 17 |
| <i>P. sergenti</i> | 8 | 7 |
| <i>P. simici</i> | 8 | 1 |
| <i>P. perfiliewi</i> | 13 | 4 |
| <i>S. minuta</i> | 3 | 3 |
| <i>S. dentata</i> | 2 | 0 |

A total of 4264 sandflies of eight different species were caught in Kassandra, Sithonia and Athos. The sandflies were identified as: *P. perfiliewi* (52.7%), *P. tobbi* (18.9%), *P. simici* (15.7%), *P. neglectus* (6.6%), *S. dentata* (4.1%), *S. minuta* (1.4%), *P. sergenti* (0.5%), and *P. (Phlebotomus) papatasi* Scopoli 1786 (0.1%). The genus *Phlebotomus* represented about 98% of the sandflies captured. The sex ratio was 1 180 m:3 084 f. Results on the number and species composition of sandflies collected in the area are listed in Table 2.

TABLE 2. Species and number of sandflies trapped in light traps from early June to late October 1993 in several biotopes of Kassandra, Sithonia, the Holy Mount of Athos and other parts of Chalkidiki.

| Species | Males | Females |
|----------------------|-------|---------|
| <i>P. perfiliewi</i> | 484 | 1 763 |
| <i>P. tobbi</i> | 144 | 660 |
| <i>P. simici</i> | 249 | 423 |
| <i>P. neglectus</i> | 155 | 127 |
| <i>S. dentata</i> | 96 | 79 |
| <i>S. minuta</i> | 14 | 18 |
| <i>P. sergenti</i> | 6 | 14 |
| <i>P. papatasi</i> | 2 | 1 |

A total of 3465 sandflies of seven different species were caught in Xanthi. The sandflies were classified as: *P. perfiliewi* (79%), *P. tobbi* (12.20%), *P. simici* (0.20%), *P. neglectus* (6.75%), *S. dentata* (0.99%), *S. minuta* (0.84%), and *P. sergenti* (0.03%). The genus *Phlebotomus* represented again more than 98% of the sandflies captured. The sex ratio was 2223 m:1242 f. Results on the number and species composition of sandflies collected in the area are listed in Table 3.

TABLE 3. Species and number of sandflies trapped in light traps from early July to early October 1996 in several biotopes of Xanthi (Thrace).

| Species | Males | Females |
|----------------------|-------|---------|
| <i>P. perfiliewi</i> | 975 | 1762 |
| <i>P. tobbi</i> | 141 | 282 |
| <i>P. simici</i> | 2 | 5 |
| <i>P. neglectus</i> | 108 | 126 |
| <i>S. dentata</i> | 10 | 10 |
| <i>S. minuta</i> | 5 | 24 |
| <i>P. sergenti</i> | 0 | 1 |

Discussion

Our survey of sandflies in Northern Greece confirmed the occurrence of eight species. The sandfly species *P. alexandri*, *P. balcanicus*, *P. mascitii* and *S. theodori* that have been previously reported to occur in Greece (Léger et al., 1986) were not found in the present survey. These are some differences in the species composition in the different regions. These differences may be the result of using different collection methods (light traps or oil papers), and of collecting at irregular or regular time intervals in various biotopes. Seasonal changes and weather conditions can affect the sandfly populations too.

The sandfly fauna of the Mediterranean Basin and its implication in the transmission of *Leishmania* spp. varies in different geographic regions. Sandfly species, like *Phlebotomus ariasi* and *P. perniciosus* are vectors in France and Italy, whereas *P. sergenti* and *P. neglectus* are vectors in Greece. *P. neglectus* is a proven vector of *L. infantum* in Greece (Léger et al., 1988).

We expect to shed more light on the leishmaniasis situation in Northern Greece in the future. Current research is aimed at collecting data about the biotopes of the sandflies, their ecology, the prevalence and molecular characterization of *Leishmania* spp. in Northern Greece. Research on the epidemiology, diagnosis and transmission of leishmaniasis is essential in the proposed area of study because the epidemiological significance of domestic and feral dogs and other animals acting as reservoirs of infection, and the roles played in transmission by different species of sandflies, requires more clarification.

Acknowledgements

The project was supported by the Volkswagen Foundation, Hannover, Germany. We thank also the Boehringer Ingelheim Fonds/Germany for partially supporting this study.

References

- Cardamatis, J.P. 1909. Leishmaniose en Grèce (Bouton d'Orient). Bull. Soc. Path. Exotique 2: 257-261.
- Chaniotis, B., and Y. Tselentis. 1995. Leishmaniasis, sandfly fever and phlebotominae sandflies in Greece: an annotated bibliography. WHO/LEISH/94.34: 1-49.
- Chaniotis, B., G. Gozalo-Garcia, and Y. Tselentis. 1994. Leishmaniasis in Greater Athens, Greece. Entomological studies. Ann. Trop. Med. and Parasitol., 88: 659-663.
- Garifallou, A., M. Hatziantoniou, L.F. Schnur, B. Yuval, A. Warburg, R.L. Jacobson, E. Pateraki, M. Patrikussis, Y. Schlein, and C. Sérié. 1989. Epidemiology of human

and canine leishmaniasis on the island of Zakynthos. In: Leishmaniasis. The current status and new strategies for control (D.T. Hart, ed.), NATO ASI series. Series A, Life Sciences, Plenum Press New York, 163: 1011-1015.

- Léger, N., B. Pesson, and G. Madulo-Leblond. 1986. Les Phlébotomes de Grèce. Biologia Gallo-Hellenica, 11 (2): 165-192.
- Léger, N., M. Gramiccia, L. Gradoni, G. Madulo-Leblond, B. Pesson, H. Ferté, N. Boulanger, R. Killick-Kendrick, and M. Killick-Kendrick. 1988. Isolation and typing of *Leishmania infantum* from *Phlebotomus neglectus* on the island of Corfu, Greece. Trans. Royal Soc. Trop. Med. and Hygiene, 82: 419-420.
- Karanis, P. 1994. Untersuchungen zur Verbreitung von Leishmaniosen und Phlebotomen in Nord-Griechenland. Report to Volkswagen-Stiftung, 64 pp.
- Papadopoulos, B., and Y. Tselentis. 1994. Sandflies in the greater Athens Region, Greece. Parasite 1: 131-140.
- Schnur, L. F., C. Stamatopoulos, A. Garifallou, M. Patrikousis, and R.L. Jacobson. 1989. Feral reservoirs of Leishmaniasis on the island of Zakynthos. In: Leishmaniasis. The current status and new strategies for control (D.T. Hart, ed.), NATO ASI series. Series A, Life Sciences, Plenum Press New York, 163: 1007-1010.
- WHO. 1990. Control of the leishmaniasis. Report of a WHO Expert Committee. World Health Organization Tech. Rept. Series 793.

KEY WORDS: Diptera, Psychodidae, sandflies, *Phlebotomus*, *Sergentomyia*, Greece.

Εξάπλωση Φλεβοτόμων (Diptera: Psychodidae) στη Βόρεια Ελλάδα

Π. ΚΑΡΑΝΗΣ¹, C. FRANK², H. SCHMALLE¹, T. J. NAUCKE¹, U. JÖRDEN¹,
X. ΜΕΤΑΛΛΙΝΟΥ¹, Σ. ΧΑΡΑΛΑΜΠΙΔΗΣ³, W. A. MAIER¹, H. M. SEITZ¹,
X. ΧΕΙΜΩΝΑΣ³

¹ Institut für Medizinische Parasitologie, Universität Bonn, D-53127 Bonn, Germany

² Helixor Heilmittel GmbH, P.O. Box 8, D-72344 Rosenfeld,

³ Εργαστήριο Παρασιτολογίας και Παρασιτικών Νοσημάτων, Τμήμα Κτηνιατρικής,
Αριστοτέλειο Πανεπιστήμιο, 54006 Θεσσαλονίκη

ΠΕΡΙΛΗΨΗ

Στην παρούσα εργασία αναφέρονται τα αποτελέσματα ερευνών σχετικά με την εξάπλωση των φλεβοτόμων (σκνιπών) στη Μακεδονία και τη Θράκη. Η σύλληψη των φλεβοτόμων έγινε σε περιοχές της Χαλκιδικής (Κασσάνδρα, Σιθωνία και Άθως) και του Νομού Ξάνθης, σε τρεις περιόδους. Για τη σύλληψη των εντόμων χρησιμοποιήθηκαν παγίδες ελαίου και παγίδες με φως. Συνολικά περισυλλέχτηκαν: α) το 1992 στο Νέο Μαμαρά (Σιθωνία) 811 φλεβοτόμοι με παγίδες ελαίου, β) το 1993 στην Κασσάνδρα, τη Σιθωνία και τον Άθω, 4.264 φλεβοτόμοι με παγίδες με φως, και γ) το 1996 σε περιοχές του Νομού Ξάνθης 3.465 φλεβοτόμοι με παγίδες με φως. Συνολικά ταυτοποιήθηκαν τα εξής 8 είδη φλεβοτόμων: *Phlebotomus (Larroussius) neglectus* Tonnoir 1921, *P. (L.) tobbi* Adler et al. 1930, *P. (L.) perfiliewi* Parrot 1930, *P. (Paraphlebotomus) sergenti* Parrot 1917, *P. (Adlerius) simici* Nitzulescu & Nitzulescu 1931, *P. (Phlebotomus) papatasi* Scopoli 1786, *Sergentomyia minuta* Rondani 1843 και *S. dentata* Sinton 1933. Ορισμένα από τα είδη αυτά είναι πιθανόν να διατελέσουν φορείς *Leishmania* spp. Συζητείται ο ρόλος των ειδών φλεβοτόμων στην επιδημιολογία της λεισμανίασης.