

ABOUT THE EASTERN LIMIT OF DISTRIBUTION OF *PHLEBOTOMUS ARIASI* (DIPTERA: PSYCHODIDAE)

MAROLI M.*, PONTUALE G.*, KHOURY C.*, FRUSTERI L.* & RAINERI V.**

Summary :

The note reports the data of a sandfly investigation carried out in the provinces of Liguria region (Italy) during the sandfly season of 1995. A total of 2,216 sandflies was collected in the four provinces during 3 months. The following species were identified: *P. perniciosus* (31.8 %), *P. ariasi* (0.8 %) and *Sergentomyia minuta* (67.4 %). *P. perniciosus*, the proven vector of visceral leishmaniasis in Italy was present in all the positive sites sampled. On the contrary, *P. ariasi* was collected only in the provinces of Imperia and Savona. The eastern geographical distribution of *P. ariasi* is discussed.

KEY WORDS : *Phlebotomus ariasi*, distribution, Italy.

Résumé :

OBSERVATIONS SUR LA RÉPARTITION GÉOGRAPHIQUE ORIENTALE DE *PHLEBOTOMUS ARIASI* (DIPTERA: PSYCHODIDAE)
Cette note fait part des résultats des enquêtes entomologiques menées en 1995 dans les provinces de la région de Ligurie (Italie) pendant la période d'activité des phlébotomes. Un total de 2 216 phlébotomes a été récolté dans quatre provinces en l'espace de 3 mois. Les espèces suivantes ont été identifiées : *Phlebotomus perniciosus* (31,8 %), *P. ariasi* (0,8 %) et *Sergentomyia minuta* (67,4 %). *P. perniciosus*, vecteur de leishmaniose viscérale en Italie, a été récolté dans toutes les stations positives. Au contraire, *P. ariasi* a été capturé seulement dans les provinces d'Imperia et de Savona. La répartition géographique orientale de *P. ariasi* fait l'objet d'une discussion.

MOTS CLÉS : *Phlebotomus ariasi*, distribution, Italie.

INTRODUCTION

The geographical distribution of *Phlebotomus ariasi* Tonnoir, 1921 is restricted to the Western Mediterranean areas of Europe and North Africa, as reviewed by Lewis (1982). Up to now, this species has been found chronologically in the following countries: Spain (Tonnoir, 1921), France (Nitzulescu, 1930), Algeria (Parrot, 1936), Morocco (Gaud, 1947), Portugal (Meira & Ferreira, 1944), Italy (Rioux *et al.*, 1964) and Tunisia (Croset *et al.*, 1966).

Concerning the distribution in Italy, after the first report of Rioux *et al.* (1964), *P. ariasi* has been reported only in two regions, namely Liguria and Piedmont (Biocca *et al.*, 1977); its presence in Sicily and Sardinia was hypothesized by Rioux & Golvan (1969). The present note reports the data of a sandfly investigation carried out in the provinces of Liguria region during the sandfly season (June-October) of 1995. Moreover, in order to verify the hypothesis of Rioux

& Golvan (1969) about the probable presence of *P. ariasi* in Sicily and Sardinia, previous entomological surveys carried out by various authors in the two islands during the last 20 years are reviewed.

MATERIALS AND METHODS

The method used for collecting adult phlebotomine sandflies was the sticky traps (Rioux *et al.*, 1967). This method was chosen for the simplicity and also because it is the most suitable to search resting sites in wide areas. Sheets of 20 × 20 cm, smeared with castor oil, were placed in all possible sandfly resting sites.

The survey was carried out in the provinces of Liguria region, namely Imperia, Savona, Genoa and La Spezia. 33 collecting stations were chosen along itineraries stretching over a wide range of habitats (rural, urban and peri-urban sites). Holes and cracks in rocks and walls, buttress crevices, stables and other domestic environments were investigated for the presence of sandflies. Collections were carried out during a period of three month (June-October 1995).

All sandflies were subsequently identified according to keys of Theodor (1958). Previous data (localities) on geographical distribution of *P. ariasi* in Italy were

* Department of Parasitology, Istituto Superiore di Sanità, Viale Regina Elena, 299, 00161 Rome, Italy.

** Museo Civico di Storia Naturale « Giacomo Doria » Genoa, Italy.

Correspondence: Michele Maroli

Tel : ++39 6 49902302 – Fax: ++39 6 49 38 70 65

e-mail: maroli@pop3.iss.it

reviewed from studies carried out by Rioux *et al.*, in 1964 and by the late Pr. A. Coluzzi during the period 1968-73 (see also Biocca *et al.*, 1977).

RESULTS AND DISCUSSION

A total of 2,216 sandflies was collected in the four provinces of Liguria region during the all period of collections. The following species

were identified: *P. perniciosus* (31.8 %), *P. ariasi* (0.8 %) and *Sergentomyia minuta* (67.4 %).

Table I reports for each station the number of specimens and their percentages in each species. *P. perniciosus*, the proven vector of visceral leishmaniasis in Italy (Bettini *et al.*, 1986; Maroli *et al.*, 1994), was present in all the positive sites sampled. On the contrary, *P. ariasi* was collected only in the provinces of Imperia and Savona, in the communes of Diano Castello [S. Sebastiano (0.9 %) and Madonna delle Neve

N.	Locality	Communes	Specimens	% males	% <i>P. perniciosus</i>	% <i>P. ariasi</i>	% <i>S. minuta</i>
Imperia province							
1	S. Sebastiano	Diano Castello	613	64.8	70.9	0.9	28.2
2	Madonna Neve	Diano Castello	61	85.2	62.2	8.1	29.7
3	Matteotti	Diano Castello	2	100	50.0	—	50.0
4	Diano Gorleri	Diano Marina	7	100	100	—	—
5	Dei Francesi	Imperia	371	67.1	12.9	—	87.1
6	S. Agata	Imperia	1	100.0	100.0	—	—
7	Argine destro	Imperia	—	—	—	—	—
8	Verezzo	Sanremo	18	94.4	83.3	16.7	—
9	Coldirodi	Sanremo	3	100	100	—	—
10	Colleluori	Sanremo	8	87.5	87.5	—	12.5
11	Zappa	Sanremo	1	100.0	100.0	—	—
12	S. Bartolomeo	Sanremo	105	71.4	1.0	—	99.0
13	Trucco	Ventimiglia	190	83.7	16.3	—	83.7
14	Roverino	Ventimiglia	22	68.1	50	—	50.0
15	Canile	Ventimiglia	144	54.1	13.2	—	86.8
Total			1,544	68.8	39.9	0.9	59.2
Savona province							
1	Accame	Tovo S. Giacomo	9	77.8	55.5	—	44.5
2	Crescia	Tovo S. Giacomo	—	—	—	—	—
3	S. Carlo	Bardino Vecchio	9	77.7	66.6	33.4	—
4	Casanova	Varazze	—	—	—	—	—
5	Pineta Marini	Boissano	4	100.0	100.0	—	—
6	Liggia	Savona	5	60.0	100.0	—	—
Total			27	66.6	74.1	11.1	14.8
Genoa province							
1	Rosada	Genoa	—	—	—	—	—
2	S. Siro	Genoa	12	75.0	33.3	—	66.7
3	Preli	Genoa	5	80.0	20.0	—	80.0
4	Molassana	Genoa	—	—	—	—	—
5	Trento	Genoa	6	83.3	—	—	100.0
6	Vicino Chiesa	Sestri Ponente	24	54.2	4.2	—	95.8
7	Antica Romana	Quarto	—	—	—	—	—
Total			47	65.9	12.8	—	87.2
La Spezia province							
1	La Serra	Lerici	568	58.1	10.2	—	89.8
2	Pezzino	Le Grazie	4	25.0	50.0	—	50.0
3	Stagnoni	La Spezia	20	75.0	15.0	—	85.0
4	Felettino	La Spezia	6	83.3	—	—	100.0
5	Dante	Ceparana	—	—	—	—	—
Total			598	59.0	10.5	—	89.5
Overtotal			2,216	66.1	31.8	0.8	67.4

Table I. — Sandfly species identified in Liguria region in 1995 (June-October).

(8.1 %), Sanremo [Verezzo (16.7 %)] and Bardino Vecchio [S. Carlo (33.4 %)]. *S. minuta* was present in many stations with high percentages. The results of the sandfly investigation show that *P. ariasi* is apparently absent in the provinces of Genoa and La Spezia located far from the foci of Southern France. All the localities where the species has been collected up to now are listed in Table II; their distribution is shown on the map (Fig. 1). The altitudinal range of these localities varies from 90 m to 1,060 m a.s.l. with a maximum peak around 500-600 m. Considering the present distribution of *P. ariasi* in Italy, it appears that, as in Spain and France, the species is prevalent at high altitude and shows a decrease near the seaside.

The analysis of the wide sandfly searches carried out during the last 25 years by the late Pr. A. Coluzzi, by Pr. S. Bettini and by one of the authors (M.M.) in Sicily and Sardinia (more than 40,000 specimens were identified from a wide range of habitats) *P. ariasi* seems to be absent in the two major Italian islands (Biocca *et al.*, 1977; Bettini *et al.*, 1991; Maroli *et al.*, 1994a). Moreover, by previous and recent entomological investigations its presence can be excluded also in other Italian regions (Maroli *et al.*, 1994a). Therefore, it is reasonable to suppose that the present distribution of *P. ariasi* in Italy is limited to the boarding areas of France, Piedmont and Liguria regions.

P. ariasi and *P. neglectus* have been supposed to share a common origin. *P. neglectus* is distributed with a similar chorology, through the eastern Mediterranean basin from Italy to Syria without overlap of the distribution area of *P. ariasi*. At the middle of Miocene, a common ancestor could have invaded Western Europe coming from the East, round the North of the Alps down to the Iberian peninsula (Pesson *et al.*, 1994). Nevertheless, it is difficult to state precisely where the speciation of *P. ariasi* occurred. During its further migrations it could have colonised North Africa (up to Tunisia) across the Betico-Rifan bridge and reached Italian peninsula along the northern Mediterranean coast. *P. ariasi* was never reported from Sardinia as well as from Corsica; recently it has been reported in Majorca island by Gil Collado *et al.* (1989).

In conclusion, at present it is hard to explain why, along the Mediterranean coast, despite the favourable ecological condition, comparable to those in Spain and Magreb, the spreading of *P. ariasi* was limited to the present occidental border provinces of Liguria and Piedmont. The paleogeographic alpine barrier can explain the split of an ancestor between western and eastern Mediterranean regions but the factors limiting the dissemination of *P. ariasi* along Tyrrhenian coast are still to be determined.

Communes (Locality)	Altitude	Habitat m a.s.l. ²	Total ³	<i>P. ariasi</i> %	References ⁴
Imperia province					
Borgo di Ranzo	540	a	3	100.0	Unpublished data
Diano Castello	135	a, b	484	2.3	Present data
Molini di Triora	430	a	5	60.0	Rioux <i>et al.</i> , 1964
Montalto Ligure (Badalucco)	90	a	2	50.0	Unpublished data
Pieve di Teco	220	a	4	75.0	Unpublished data
Pieve di Teco (Colle di Nava)	600-800	a	83	98.8	Unpublished data
Pieve di Teco (Colle S.Bartolomeo)	405-590	a	21	95.2	Unpublished data
Pieve di Teco (Cosio d'Arroscia)	830	a	4	100.0	Unpublished data
Pigna (Passo Langan)	420-1060	a	88	82.9	Rioux <i>et al.</i> , 1964
Sanremo (Verezzo)	233	a, b	18	16.7	Present data
Savona province					
Bardino Vecchio	140	b, c	7	14.3	Unpublished data
Erlì (Colle S.Bernardo, Berioli)	520	b	19	42.1	Present data
Finale Ligure	90	a, c	12	41.7	Unpublished data
Cuneo province					
Aisone (Vallata della Stura)	870	a	26	96.2	Unpublished data
Garessio	650	a	1	100.0	Unpublished data
Ormea	700	a	4	100.0	Unpublished data
Overtotal			779	31.8	

¹ Habitat inspected (a = rural; b = domestic; c = peri-domestic);

² Max. and min. altitudes of the collecting stations along the "transect";

³ Total specimens of genus *Pblebotomus* identified;

⁴ Unpublished data of late Pr. A. Coluzzi, partially reported by Biocca *et al.*, 1977.

Table II. — Geographical distribution of *Pblebotomus ariasi* Tonnoir, 1921 in Italy¹.

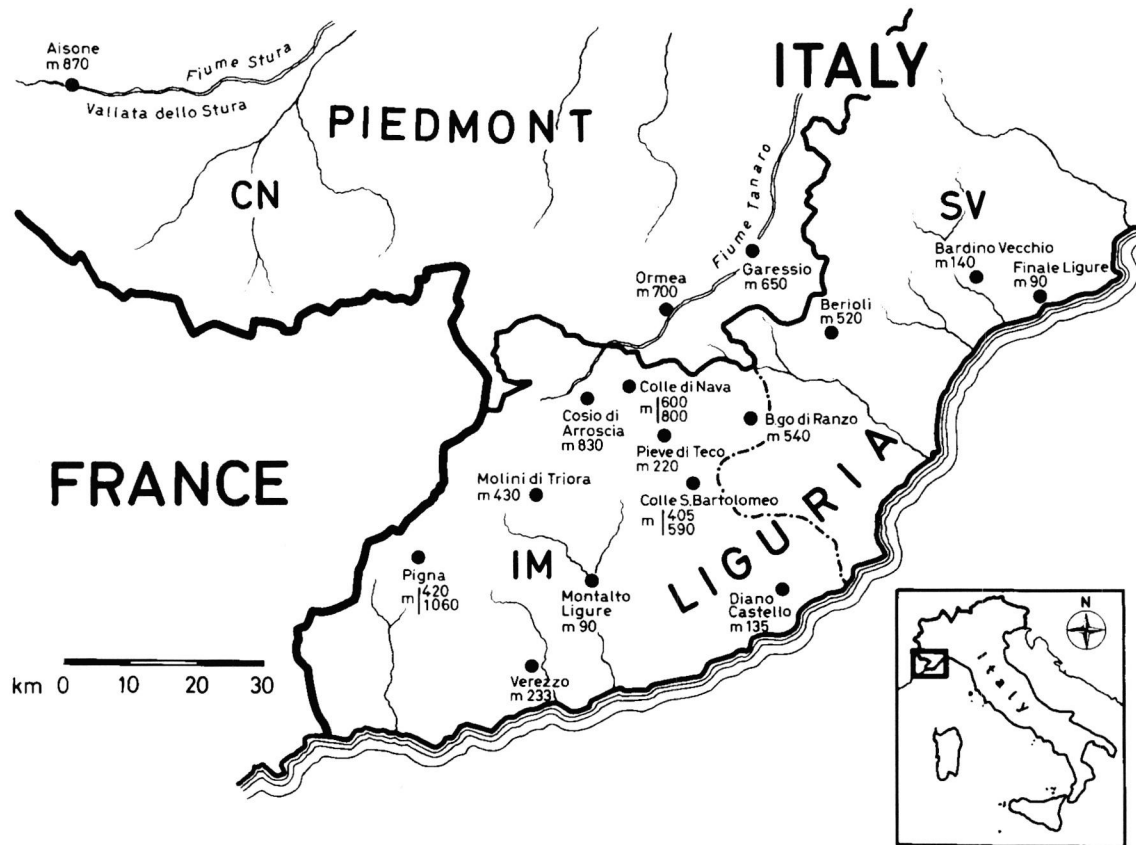


Fig. 1. — Geographical distribution of *Phlebotomus ariasi* in Italy. (●) = locality where *P. ariasi* has been reported; CN = Cuneo; IM = Imperia; SV = Savona; m = meter.

Further genetic studies on different populations of *P. ariasi* originating from Europe and North-Africa are needed to compare this taxon to other close related species as *P. chadlii* and *P. mariae* and try to clarify its migrations and its geographical distribution.

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