

# Vector-borne diseases in Corsica: exploratory study of Sand fly population

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## Context :

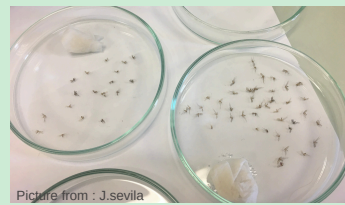
Sand flies are haematophagous dipterans that are known since the 18th century as **vectors of human and/or canine leishmaniasis**, diseases that are classified as **neglected tropical diseases** but are re-emerging in Europe and have major health worldwide implications. More recently, sand flies have been incriminated in the emergence of human neuroinvasive virus called **Toscana virus (TOSV)** around the Mediterranean basin. Corsica, a French Mediterranean island, is endemic for *Leishmania infantum* leishmaniasis, with some canine clusters still persisting. Moreover, a recent study shows a high level of TOSV circulation despite the absence of clinical cases. **The most recent collections of sand flies in Corsica date back to the 1970s**, when four species were described, distributed heterogeneously across the island: *Phlebotomus perniciosus*, *Ph. mascittii*, *Ph. sergenti* and *Sergentomyia minuta*, the most abundant. Regarding sand fly species in Corsica, ***Ph. perniciosus* is considered as the main vector of *Le. infantum* and TOSV**. The vector role of *Ph. sergenti* and *Se. minuta* remains to be determined.

**Aim of our study to update knowledge on sand fly populations in the central corsican region.**



## Methods :

Sand flies were caught using six CDC light-trap between April and November 2023 in center of Corsica (around Corte), at altitude of 280m, 480m and 760m a.s.l. (cf.map). For each altitude, one trap was positioned outdoors (near a ruin or dry-stone wall) and another inside a livestock building (sheepfold or goat fold). The sand flies collected were counted and identified individually by dissection of the head and the genitalia and their observation under the microscope.



## Results :

During summer 2023, **150 captures** were carried out and **2095 sand flies** caught (sex ratio = 1.74). Emergence occurred from mid-June to mid-October, with a peak in July and August. **Sand flies were significantly more abundant at lower altitude** ( $pV < 0.05$ ) and **when the trap was indoor** ( $pV = 0.003$ ), but these two variables are not independent (Pearson test,  $pV = 0.866$ ), suggesting a site-dependent effect.

Number (%)	Outdoor	Indoor	Total
Altitude : 280m	264 (12,6%)	1230 (58,7%)	<b>1494 (71,3%)</b>
Altitude : 480m	86 (4,1%)	428 (20,4%)	<b>514 (24,5%)</b>
Altitude : 760m	16 (0,7%)	71 (3,4%)	<b>87 (4,1%)</b>
<b>Total</b>	<b>366 (17,4%)</b>	<b>1729 (82,5%)</b>	<b>2095 (100%)</b>

22 (1.1%) sand flies could not be identified due to conservation problems. **The four species previously described in Corsica were found. *Ph. perniciosus* (69%) and *Se. minuta* (29%) were the most abundant** and were found in all the six stations at the three altitudes. *Ph. mascittii* (0.2%) was also found in the three altitudes but in a much smaller quantity, and *Ph. sergenti* (0,8%) was only caught at 280m and 480m.

Species	number (%)
<i>Ph. perniciosus</i>	1445 (69,0%)
<i>Se. minuta</i>	607 (29,0%)
<i>Ph. sergenti</i>	16 (0,8%)
<i>Ph. mascittii</i>	5 (0,2%)
Unidentifiable	22 (1,1%)
<b>TOTAL</b>	<b>2095 (100%)</b>

## Conclusion and Discussion :

**The study enabled to gather data on sand flies in Corsica:** sand flies emergence occurs from June to October, sand flies abundance decreases with altitude, and traps placed indoors catch more sandflies than outdoors. These results are in line with data from Southern of France and other Mediterranean's countries as Spain or Algeria.

Despite sampling weaknesses, **our study shows a large predominance of *Ph. perniciosus***, the main vector of leishmaniasis and TOSV. This result highlights the importance of studying the circulation of these two pathogens and sand fly populations across the island.

Moreover, the four species present in Corsica were captured. **This is the 1st time that *Ph. sergenti* and *Ph. mascittii* have been described in the center of Corsica.** Two assumptions could explain our results: either these two species were present in the 70s but were not caught; or these two species, present in other regions of Corsica, have extended their distribution areas. The first hypothesis seems unlikely because the trapping (using sticky papers) carried out in 70s was extensive. The second hypothesis seems more likely in view of current global changes. However, and given the low capacity of dispersion of sand flies, **more in-depth studies are essential to determine the underlying mechanisms and their impacts on pathogen circulation.**

## Next steps

Detection of TOSV and *Leishmania* using **molecular tools** are currently in process. In order to refine our results, a **second capture season** is planned 2024.

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