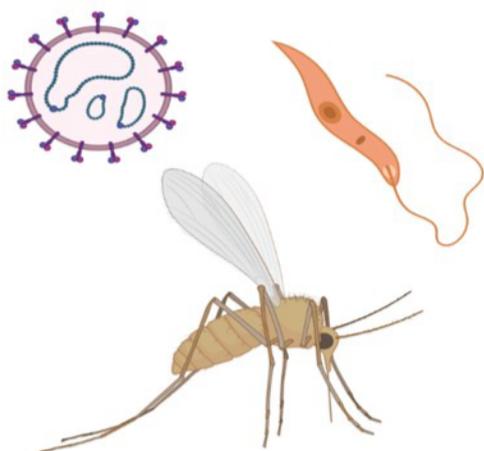


L-18

PHLEBOVIRUS TRANSMISSION BY SAND FLIES

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Arboviruses of the genus *Phlebovirus* are currently represented by 67 species found in Eurasia, Africa, and the Americas¹. Although they have a great impact on human and animal health, information about their biology and transmission is mostly missing. The predicted or confirmed vectors of most phleboviruses are sand flies (Diptera: Psychodidae), tiny bloodsucking insects occurring in latitudes between 50°N and 40°S. Both males and females feed on a natural sugar source, females need also the blood as a source of proteins to develop eggs. Our laboratory has more than 25 years of experience in studies on sand flies and *Leishmania*, maintains the largest collection of sand fly colonies and is considered as a leading team in this area. Here we decided to focus on the development, life cycle, and transmission of two most important phlebovirus species: *Toscana phlebovirus* (TOSV) and *Rift Valley Fever phlebovirus* (RVFV).

TOSV is a human pathogen with symptoms that varies from febrile illness to CNS disease. It is transmitted by sand flies in the Mediterranean area and North Africa^{2–5}. Despite a significant effort and examination of various vertebrates, no reservoir hosts of TOSV were confirmed and it is apparent that transovarial or sexual transmission between sand flies is not effective enough to maintain the virus cycle in nature^{2,4,6}. Two species, *Phlebotomus perniciosus* and *Phlebotomus perfiliewi*, are considered as proven vectors but the seroprevalence of TOSV in humans and animals in areas where these vectors are not present suggests the involvement of other sand fly species². Our experimental infections of various sand flies revealed high susceptibility of *Phlebotomus tobbi* (infection and dissemination rates of 59.5% and 46% respectively). Moreover, our previous experiments on closely-related *Massilia* virus suggest the role of sugar meal as a source of sand fly infection⁷.

RVFV is endemic in sub-Saharan Africa and the Arabian Peninsula. It affects mainly domestic animals, causing haemorrhagic fever accompanied by anorexia, abortions, and a high rate of death in young animals. RVFV also affects humans, occasionally causing encephalitis or haemorrhagic fever with potential mortality. Mosquitoes are considered as main RVFV vectors^{8,9} but the role of sand flies should not be ignored as they co-occur in the same areas. There are only two experimental studies on African sand flies; RVFV developed and disseminated in *Phlebotomus sergenti* and *Sergentomyia schwetzi*¹⁰ and was transmitted to hamsters by *Phlebotomus duboscqi*¹¹. However, nothing is known about the susceptibility of European sand fly species to RVFV although this knowledge could be crucial for risk assessment of RVFV spread to Europe.

In addition to phleboviruses, sand flies also transmit *Leishmania* parasites which co-circulate in the same areas as TOSV and RVFV^{5,8}. However, no information is available about phlebovirus-leishmania interaction, even though this tripartite interaction may have significant epidemiological significance. We are the only laboratory in Europe keeping all three organisms (sand flies, phleboviruses, leishmania) and able to do such co-infections.

Results obtained within this complex project will clarify various aspects of phlebovirus circulation in nature, reveal the risk of TOSV and RVFV spread in Europe, and help to understand the co-circulation of sand fly-borne pathogens.

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