The first record of *Lutzomyia longipalpis* in the Argentine northwest

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In 2004, the urban presence of Lutzomyia longipalpis *was recorded for the first time in Formosa province. In 2006, the first autochthonous case of human urban visceral leishmaniasis (VL) was recorded in Misiones in the presence of the vector, along with some canine VL cases. After this first case, the vector began to spread primarily in northeast Argentina. Between 2008-2011, three human VL cases were reported in Salta province, but the presence of* Lu. longipalpis *was not recorded. Captures of Phlebotominae were made in Tartagal, Salta, in 2013, and the presence of* Lu. longipalpis *was first recorded in northwest Argentina at that time. Systematic sampling is recommended to observe the distribution and dispersion patterns of* Lu. longipalpis *and consider the risk of VL transmission in the region.*

Key words: *Lutzomyia longipalpis* - visceral leishmaniasis - Argentina

The urban presence of *Lutzomyia longipalpis* (Lutz & Neiva, 1912) (Salomón & Orellano 2005) was first recorded in Argentina in Formosa province in 2004; it was associated with an outbreak of visceral leishmaniasis (VL) in the neighbouring city of Asunción, Paraguay Republic. In 2006, in Posadas, which is located in Misiones province (also on the Paraguay border), the first autochthonous case of urban human VL with the presence of *Lu. longipalpis* was recorded, along with some canine VL cases (Salomón et al. 2008b). Subsequently, the vector began spreading throughout the northeast region of Argentina and eventually reached Puerto Iguazú (on the border with Brazil and Paraguay) before moving toward the south to Corrientes, Entre Ríos and Chaco provinces (Salomón et al. 2009, 2011a, b) and to Artigas and Salto departments, Uruguay (Salomón et al. 2011a). The spread encompassed the ecoregions of humid Chaco, Paraná forest and spinal vegetation (Burkart et al. 1999). From 2006-2012, 103 cases of human VL were confirmed, with the highest incidence reported in Misiones province (Gould et al. 2013). In Santiago del Estero province, from 2007 to the present date, six VL cases were recorded, with *Migonemyia migonei* (França, 1920) present as the putative vector in the Chaco region (Salomón et al. 2010). Thus far, three VL cases in Salta province have been reported to the Health Surveillance National System, Ministry of Health of the Nation (Gould et al. 2013). To study one of these cases, Barrio et al. (2012) used an epidemiological survey to identify an area with the ecological characteristics of Dry Chaco (located 70 km from the study area of the present work) as the likely location of human infection, without any reports of entomological captures associated with the case. In the present paper, the results of captures performed during the first half of 2013 are presented to determine the species of sandflies that are present in Tartagal city, an area that corresponds to a transition between the "Yungas" jungle foothills and Dry Chaco. Tartagal city (22º31'00''S 63º47'35''O) is located in General José de San Martín department, to the northeast of Salta province, 360 km from the capital city, 55 km south of the international limit with Bolivia and at least 100 km away from the VL case recorded in 2009 (A, B in Figure). To determine the presence of Phlebotominae, 30 CDC-type light traps (Sudia & Chamberlain 1998) were used in each season. Trapping was simultaneously performed at 10 different sites for at least two consecutive nights in each place, with at least 400 m between each site (C in Figure). From April-May, site 8 was not sampled and a new site was included (8N). Samplings were performed in 2013 between January 28-30 (2 consecutive days) and between April 29-May 2 (3 consecutive days), corresponding to the summer and fall seasons, respectively. The average temperature was 22ºC at minimum and 42ºC at maximum during the summer sampling and 21ºC at minimum and 29ºC at maximum during the autumn sampling. The sites were selected using the "worst scenario" criterion (e.g., the presence of animals, associated vegetation and shade) (Feliciangeli et al. 2006, Correa Antonialli et al. 2007). The captured Phlebotominae were identified following the Galati key (Galati 2003).

The most abundant species in both samplings was *Lu. longipalpis*. A total of 277 Phlebotominae were captured. They corresponded to the following species (listed from most to least abundant): *Lu. longipalpis* (63%), *Mg. migonei* (22%), *Evandromyia cortelezzi-sallesi* complex (11%, the females in both species are indistinguishable) and *Nyssomyia neivai* (4%). The overall female/male ratio for *Lu. longipalpis* was 0.3

doi: 10.1590/0074-0276130358
Financial support: FMS
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Received 11 July 2013
Accepted 4 October 2013

TABLE

Phlebotominae (females/males) sampled by sites and species in Tartagal, Salta, Argentina

	Tr+/TTr	*Lutzomyia longipalpis*	*Migonemyia migonei*	*Evandromyia cortelezzii-sallesi*	*Nyssomyia neivai*	F:M
January	6/10	15/24	-	-	-	0.6
April-May	7/10	26/114	23/39	19/12	5/5	0.2

F:M: *Lu. longipalpis* females/males ratio; Tr+/TTr: traps with *Lu. longipalpis*/number of total traps.

Phlebotominae capture site locations in Tartagal, Salta, Argentina. A: Argentina, location of Salta; B: Salta, location of Tartagal, human case of VL; C: Tartagal city, sampling spots.

(Table). In January, *Lu. longipalpis* was the only species captured and it was found at most of the sampling sites (1, 2, 3, 6, 7 and 9) (Table). During the period from April-May, four Phlebotominae species were found, with *Lu. longipalpis* being the most abundant species (57%) present at sites 2, 3, 6, 7, 9, 8N and 10. Until then, *Lu. longipalpis* had been recorded in northeast Argentina, in Misiones (Salomón et al. 2001b, 2011c), Formosa (Salomón & Orellano 2005), Corrientes (Salomón et al. 2009), Chaco (Salomón et al. 2011c) and Entre Ríos (Salomón et al. 2011b, Gould et al. 2013) provinces. In the present work, *Lu. longipalpis*, the main vector that has thus far been found to be responsible for VL transmission in Argentina (Gould et al. 2013), was recorded for the first time northwest Argentina. This vector was detected in peridomicile and urban environments that had an abundance of *Mg. migonei*, which is a putative vector in Santiago del Estero province (Salomón et al. 2010). This species was also associated with natural infection by *Leishmania (Leishmania) infantum* (= *chagasi*) in a Brazilian focal point (de Carvalho et al. 2010). In entomological studies performed in Salta province during the 1988-2000 period, no presence of *Lu. longipalpis* was recorded (Salomón et al. 2001a). In 2005, captures were performed near the area under study (at a distance between 3-13 km), but there was no record of the main species responsible for VL transmission (Salomón et al. 2008a). Based on a review of historic (pre-1950) VL cases in Argentina, four VL cases were recorded in Salta province. Considering the absence of *Lu. longipalpis,* it was stated that these cases must have been caused by *Leishmania* spp visceralisation in areas that are hyperendemic for tegumentary leishmaniasis or VL enzootic foci, with sporadic and exceptional human transmission (Salomón et al. 2001a). After the urban introduction of VL to northeast Argentina in 2006 and the broad dispersion of parasites caused by the migration of infected dogs, three VL cases were reported in Salta province (Gould et al. 2013). In one case, the presence of the *L. (L.) infantum* parasite was confirmed and identified by polymerase chain reaction. An area with deforestation activities that was located 70 km away from the study area of the present work has been suggested as the likely source of infection (Barrio et al. 2012). After confirming the presence of *Lu. longipalpis* in this study and after the parasite circulation in the region increased because of canine migration and VL outbreaks in Paraguay and northeast Argentina, the risk of urban VL epidemic transmission in northwest Argentina will increase, necessitating the implementation of (pursuant to legislation) human case surveillance and the estimation of canine prevalence. Regarding vector surveillance, given the lack of information about the vector's temporal and spatial distribution in the northwest region, close to the Bolivian border, it is recommended that stratified surveillance and longitudinal monitoring over time be performed, along with assessment of the dispersion and risk levels. Additionally, given the dispersion and distance between the previous records of *Lu. longipalpis* in Argentina from 2004 to date [i.e., the records of *Lu. longipalpis* in Uyuni, Potosí department, Bolivia, approximately 500 km from Tartagal (Le Pont & Desjeux 1985, Le Pont et al. 1989), and a record of *Lu. longipalpis* in Boquerón department, Paraguay, approximately 250 km from Tartagal (MTR, unpublished observations)], it is important to perform comparative research (De la Riva et al. 2001) to define whether the population identified in this paper is the same population that was present in the northeast region of Argentina.

ACKNOWLEDGEMENTS

To Tartagal municipality and to Pan American Energy.

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