Available online at www.sciencedirect.com
SCIENCE DIRECT®
ELSEVIER
Acta Tropica 95 (2005) 160–163
ACTA TROPICA
www.elsevier.com/locate/actatropica

Short communication

Seasonal variation in the home range and host availability of the blood-sucking insect *Mepraia Spinolai* in wild environment

Carezza Botto-Mahan[a,*], Pedro E. Cattan[b], Mauricio Canals[a], Mariana Acuña[b]

[a] *Departamento de Ciencias Ecológicas, Facultad de Ciencias, Universidad de Chile, Casilla 653, Santiago, Chile*
[b] *Departamento de Ciencias Biológicas Animales & Departamento de Patología Animal, Facultad de Ciencias Veterinarias y Pecuarias, Universidad de Chile, Casilla 2 correo 15, Santiago, Chile*

Received 19 November 2004; received in revised form 19 April 2005; accepted 1 May 2005
Available online 8 June 2005

Abstract

In this study, we quantify the home range of *Mepraia spinolai*, a wild vector of *Trypanosoma cruzi*, and the abundance of wild mammals during summer and winter seasons in a protected area of north-central Chile. Results revealed significant differences between seasons for home range size and host availability. *M. spinolai* presented larger home range sizes, and mammal hosts were more abundant in summer, indicating that *T. cruzi* would have a higher probability of being transmitted during warmer months.

Keywords: Triatominae; Reduviidae; Protozoa; Parasite; Vector; Chagas disease

In vector-borne parasites, transmission depends on the frequency of effective contacts between definitive hosts and vectors. Therefore, the probability of a host being infected will increase with the number of times the host is bitten (Dobson and Hudson, 1995; Canals et al., 1999a,b). Within this context, life history characteristics of vectors, such as longevity and mobility, are crucial for transmission (Dye and Williams, 1995). Mobility can be thought as neighborhood dispersal, i.e., the process by which individuals migrate into adjacent areas. Mobility in animals depends on their home range size that is the area over which individuals search for food, mates, and shelters. Many blood-sucking insects are vectors of disease, and the assessment of their home range, in an individual or colonial base, is valuable in the study of disease transmission.

Mepraia spinolai Porter, 1934, is a blood-sucking insect restricted to semiarid and arid zones of north-central Chile. This insect is the only conspicuously

* Corresponding author. Tel.: +562 678 7232; fax: +562 272 7363.
E-mail address: cbotto@uchile.cl (C. Botto-Mahan).

0001-706X/$ – see front matter © 2005 Elsevier B.V. All rights reserved.
doi:10.1016/j.actatropica.2005.05.001

polymorphic triatomine species, presenting macropterous, brachypterous or micropterous males, and micropterous females (Lent and Wygodzinsky, 1979). This endemic species has been reported as naturally infected by *Trypanosoma cruzi*, the causative agent of Chagas disease (Lent and Wygodzinsky, 1979; Ordenes et al., 1996). DNA evidence of *T. cruzi* in *M. spinolai* populations from northern Chile indicates that 46.2% of the insects are infected (Botto-Mahan et al., 2005). Recently, Canals et al. (2001) reported a human blood index for this species of 4.6%, which is almost 2-fold higher than the one previously reported. Even though, *M. spinolai* individuals are often found in stony hills, rock crevices, nest of birds and mammals, and corrals of domestic animals, they can occasionally be collected in human dwellings (Lent and Wygodzinsky, 1979; Frías et al., 1995; Canals et al., 1999a,b). Therefore, *M. spinolai* is a potentially dangerous species due to the high level of *T. cruzi* infection and increasing house colonization in country areas specially after the domestic vector, *Triatoma infestans*, has been technically eradicated (Valdés et al., 2001; Cattan et al., 2002).

Unlike other triatomines, *M. spinolai* is a diurnal insect with a peak of activity at noon (Canals et al., 1997). This long-lived species is relatively sedentary in the absence of potential hosts, showing a general sit-and-wait strategy for host finding. However, a high locomotory capability is shown as soon as a potential host comes close to their refuges, being able to detect and actively follow mammals over several meters (P. Cattan, unpublished data). In this sense, the home range of *M. spinolai*, quantified as a colony, will depend on the insect mobility and availability of potential hosts in the area, and this in turn will impact on the probability of transmission and dispersal of *T. cruzi*. In this study, we assess the transmission potential of *T. cruzi* during summer and winter seasons, by quantifying the home range of wild populations of *M. spinolai* and the availability of host mammals in a protected area of northern Chile.

This study was conducted in a protected area, Las Chinchillas National Reserve, located approximately 300 km north from Santiago (31°30′S, 71°06′W; Chile). In this area, the climate corresponds to a semiarid Mediterranean type with scarce rainfall concentrated in the winter season (di Castri and Hajek, 1976). Fieldwork was carried out in January and July 1999 (austral summer and winter, respectively) in stony sites with scarce human activity and traffic of cattle yard animals.

Home range size was estimated by using capture, marking and recapture procedures in nine and six sites for summer and winter, respectively. Capturing areas presented similar microtopographic features, therefore, nymphs could equally disperse in all directions Estimation trials were carried out at midday in consecutive days. In each trial, fifty nymphs (IV and V instars) were captured by hand, painted with non-toxic red powder on the connexivum, and released at the center of a 2 m radius capturing area. Two hours later, in a trial of 1 h, two observers distant 2 m from the releasing point recorded the location of painted nymphs in the capturing area or beyond it. In order to avoid any influence of observers in the locomotion behavior of *M. spinolai*, the observers moved randomly every 10 min keeping constant the distance to the releasing point. The home range size was estimated through the minimum-area method (Southwood and Henderson, 2000). In addition, the maximum distance traveled by insects was recorded. Data were log-transformed for normality and analyzed by one-way ANOVAs with season as single factor (Sokal and Rohlf, 1995).

We estimated the abundance of natural hosts of *M. spinolai* including native rodents *Phyllotis darwini* (Muridae), *Octodon degus* (Octodontidae), *Abrothrix olivaceus* (Muridae), *Olygorizomis longicaudatus* (Muridae) and *Abrocoma benetti* (Abrocomidae), and the native marsupial *Thylamys elegans* (Didelphidae) (Canals et al., 2001). Host abundance was estimated in January and July 1999 using trapping lines. Each 20 × 1 trapping line had stations separated by 10 m, covering an area of 10 m × 200 m including a boundary strip of 5 m. Trapping lines were equipped with Sherman traps activated during 14 and 7 consecutive nights for summer and winter seasons, respectively. Traps were baited with oat flakes and checked every morning. The captured animals were hair marked and released at the trapping place. Host abundance was estimated as the average number of mammals captured during consecutive nights in the trapping area. As before, data were log-transformed for normality and contrasted by one-way ANOVA with season as single factor (Sokal and Rohlf, 1995).

The home range of *M. spinolai* differed significantly between seasons (one-way ANOVA: $F_{1,13} = 7.03$;