

## Ecology of *Triatoma rubrovaria* (Hemiptera, Triatominae) in Wild and Peridomestic Environments of Uruguay

Roberto Salvatella, Raquel Rosa, Yester Basmadjian, Andres Puime, Luis Calegari, Jorge Guerrero, María Martínez, Gabriela Mendaro, Daniel Briano\*, Carlos Montero\*\*, Cristina Wisnivesky-Colli\*\*\*

Departamento de Parasitología/Unidad de Biología Parasitaria, Instituto de Higiene, Universidad de la República, Av. A. Navarro 3051, CP 11600, Montevideo, Uruguay \*Departamento de Higiene, Municipalidad de Rivera \*\*Departamento de Higiene, Municipalidad de Artigas, Uruguay \*\*\*Unidad de Ecología de Reservorios y Vectores de Parasitos, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Argentina

*This paper describes population structure, spatial distribution and habitat selection of wild and peridomestic populations of Triatoma rubrovaria (Blanchard, 1843). Field studies were carried out at Las Piedras and La Bolsa in the Northern Department of Artigas, Uruguay. A semicircular sampling area, divided in seven or eight triangular sectors was sequentially examined from October 1990 to November 1991. At Las Piedras (typical wild habitat) 1063 T. rubrovaria bugs were collected from 84% of the rocky outcrops ("pedregales"). Abundance varied by season peaking in October-November (spring). Throughout the year, most of the population was made up of third, fourth and fifth instar nymphs; adults were found from October to March. In the peridomestic environment of La Bolsa, however T. rubrovaria was less common and showed a more irregular instar distribution. Colonized ecotopes, were those close to houses. In both sites T. rubrovaria was mainly associated with the geckonid Homonota uruguayensis and the cockroach Blaptica dubia.*

Key words: *Triatoma rubrovaria* - triatomines - Uruguay - ecology

*Triatoma rubrovaria* (Blanchard) (Hemiptera, Reduviidae) was first described as *Conorhinus rubrovarius* in 1843, from specimens collected at Maldonado, Uruguay (Lent 1942). Its distribution covers parts of northeastern Argentina, Southern Brazil and Uruguay (Lent & Wygodzinsk 1979) where it is often found amongst outcrops of rocks ("pedregales"). In Uruguay, *T. rubrovaria* sustains the enzootic cycle of *Trypanosoma cruzi* (Salvatella 1986) and is commonly found in the peridomestic habitats, wherever pedregales are close to human habitations and/or people use rocks to construct fences. Moreover recent observations from Rio Grande do Sul (Silveira et al. 1984) and the Northern Departments of Rivera and Artigas in Uruguay, (Salvatella et al. 1991) detected indoor colonies in houses of different construction types. *T. rubrovaria* may therefore assume greater importance in domestic transmission of *T. cruzi*, especially where the main do-

mestic vector, *T. infestans* has been controlled by insecticide spraying.

This paper describes the habitat, espacial distribution and population structure of wild and peridomestic populations of *T. rubrovaria* from Northern Uruguay.

### MATERIALS AND METHODS

Two rural sites, Las Piedras and La Bolsa located in the Department of Artigas, near the Brazilian border were chosen for this study (Fig. 1). Criteria selection were: (a) frequent presence of *T. rubrovaria* populations and (b) contrasting features of the two areas: Las Piedras represented a typical wild habitat and La Bolsa met the conditions promoting peridomestic invasion of bugs from nearby rocky outcrops.

The semicircular sampling area was divided in seven or eight triangular sectors of 200x100m each, that were further subdivided every 50m. In Las Piedras, the landscape of basaltic outcrops scattered in the prairie was fairly homogeneous and the sampling area was centered on an elevated point (Fig. 2). In La Bolsa, the centre was a house surrounded by a complex peridomestic area with several outdoor premises: storeroom, stone fenced corrals, chicken coop. Neighbouring dwellings were also included in the sampling area (Fig. 3).

Projects: Ecología de Vectores. Enfermedad de Chagas. 02/004/106/90 y 91. Universidad de la República. CSIC. Uruguay. CEE. TS3\*-CT91-0029

Received 8 June 1994

Accepted 23 January 1995

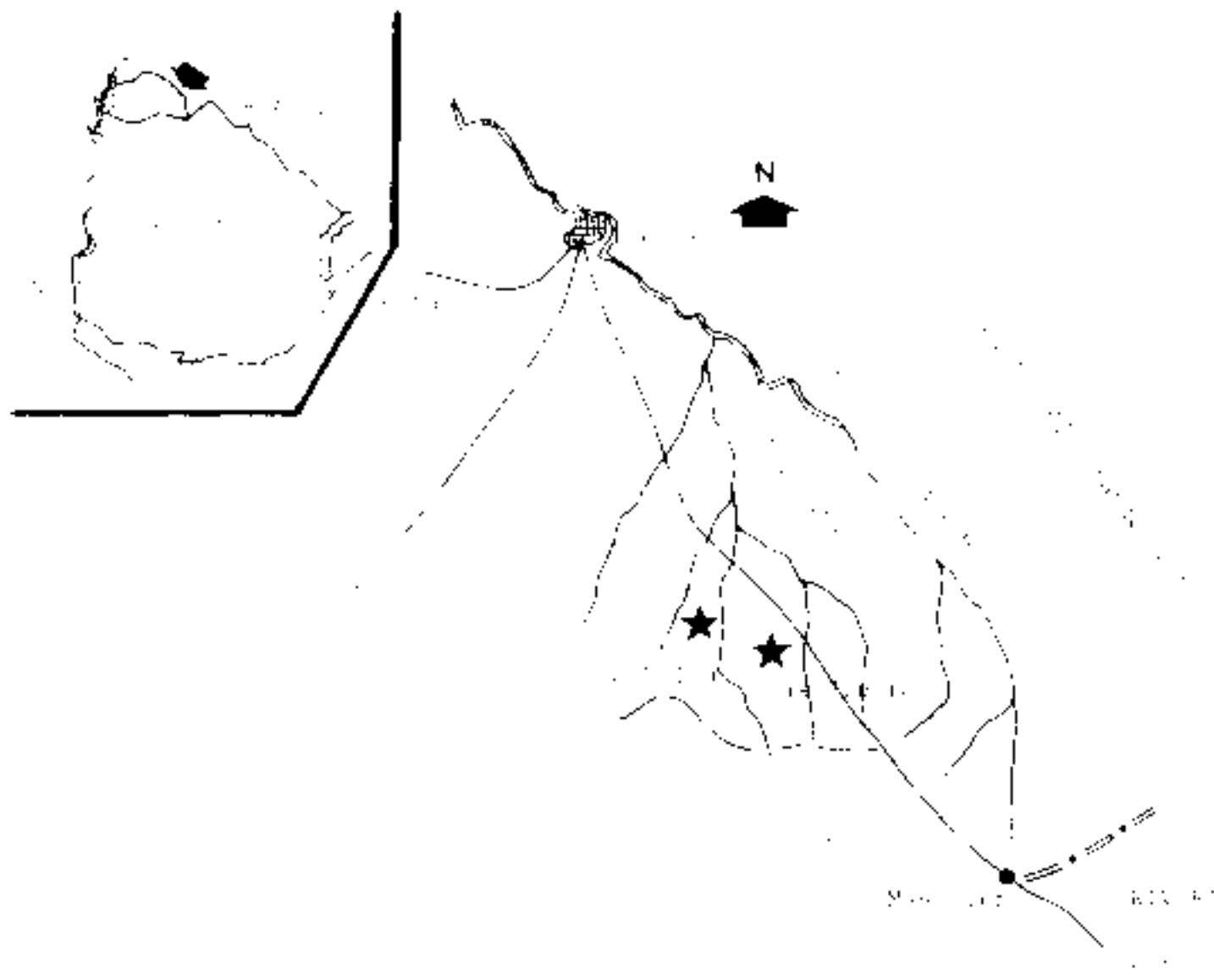


Fig. 1: A - Map of Uruguay, Department of Artigas in dotted lines. B - Area of the Department of Artigas with location of study areas: Las Piedras and La Bolsa.



Fig. 2: scheme of sampling sectors at "Las Piedras", wild natural environment. Natural stone grounds are drawn: white infested; black non infested.

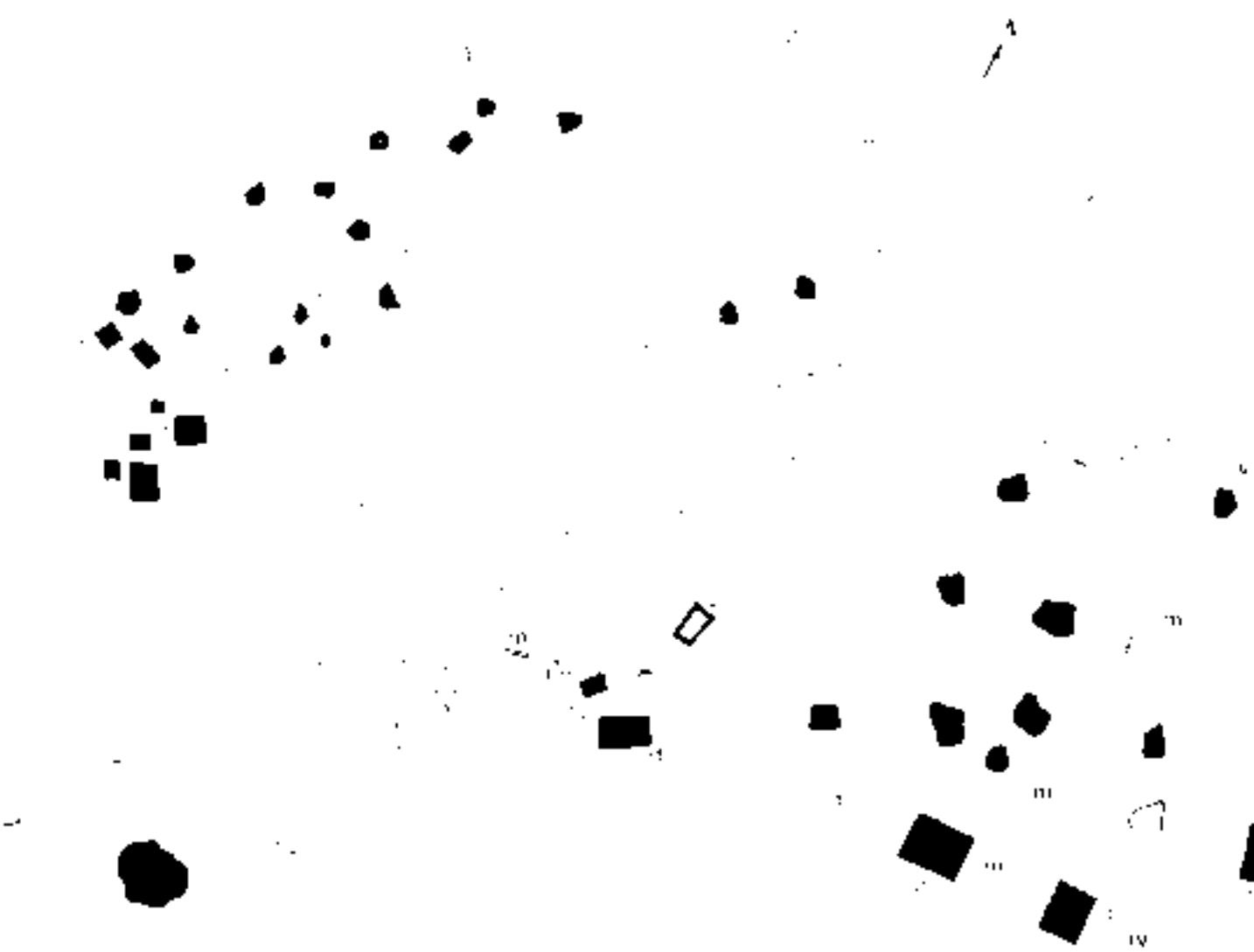


Fig. 3: scheme of sampling sectors at "La Bolsa", rural area with peridomestic environment. D: domiciles. C: stone yards. M: stone walls. G: henhouses. The rest are stonegrounds (untouched or modified) and piled stones.

At La Bolsa, the triangular sectors were sequentially examined in October and November 1990, January, March, May, June, October and November 1991. In Las Piedras, observations were made on the same dates, except for October 1991 when the area was inaccessible due to climatic conditions.

All ecotopes suitable for *T. rubrovaria* were first recorded on a diagram, and then thoroughly examined. Pedregales were dismantled and peridomestic structures and dwellings sampled by timed manual collection (Wisnivesky-Colli et al. 1987).

## RESULTS

**Las Piedras** - A total of 58 pedregales suitable to shelter *T. rubrovaria* were identified in the seven sections examined and 84% were colonized (Table I). Suitable ecotopes were those made up by overlapping flat stones on dry soil. Those sectors examined in May and June had few pedregales, but all harboured triatomines.

A total 1063 *T. rubrovaria* was collected of which 978 (92%) were nymphs (Table I). Abundance varied by season, peaking in October-November (spring). Throughout the year, more than 60% of the population was made up by third, fourth and fifth instar nymphs. The latter predominated in winter samples. Adults were found from October to March, males appeared before but females disappeared later.

Animals found with the *T. rubrovaria* colonies were as follows: **vertebrates**: *Homonota uruguayensis* (Vaz-Ferreira & Sierra) gekonid lizard (in 32 ecotopes, 65% of total colonized pedregales), *Tupinambis teguixin* (L.) iguana (in four ecotopes, 8% of the total), *Leptotyphlops munosi* Orejas-Miranda apodous saurian (in two ecotopes, 4% of the total), *Leptodactylus mistacinus* (Cope) frog (in one ecotope, 2% of the total), *Didelphis albiventris* (Temminck) opossum (in one ecotope, 2% of total), *Tropidurus* sp. iguana (in one ecotope, 2% of the total); **invertebrates**: *Blaptica dubia* (Serville) cockroach (in 29 ecotopes, 59% of the total), *Grillus* sp. cricket (in nine ecotopes, 18% of total), *Zelus* sp. predatory bug (in three ecotopes, 6% of total), *Triatoma circummaculata* (Stal, 1859) triatomine, (in three ecotopes, 6% of the total), termite (in two ecotopes, 4% of the total). There were also *Bothriurus bonaerensis* (Koch) scorpion, *Gramostola* sp. spider, butterfly larva and miriapod, each one of those in one ecotope.

**La Bolsa** - Habitat heterogeneity was the principal feature of the peridomestic sampling area at La Bolsa (Fig. 3). Examined ecotopes included: natural stonegrounds (pedregales), either untouched or modified by stone extraction, stones piled after field clearing (stone heaps),

stone walls, stone fences of yards, henhouses, piled bricks, storerooms and houses.

A total of 67 ecotopes suitable to shelter *T. rubrovaria* was identified in the eight sections examined, and 32 were colonized (Table II). Searching of 11 man made structures, excluding yards, rendered three *T. rubrovaria* nymphs found in two henhouses located close to stone walls.

A total of 291 bugs was captured of which, 91% were nymphs. Adults were found only in October and November; eight males in 1990 and nine males and five females in 1991. Instar distribution of bugs in pedregales differed from those at Las Piedras, frequent some instars were about and there was not a progressive sequence of stages. Table II shows the proportion of different ecotopes that were infested, as well as the median number and range of *T. rubrovaria* bugs found in

each one. Stone walls and yards were the most heavily infested.

Animals cohabiting with *T. rubrovaria* in pedregales at La Bolsa were as follows: vertebrates: *H. uruguayensis* (in eight ecotopes, 25% of the total), chicken (in five ecotopes, 16% of the total), *Didelphis albiventris* opossum (in two ecotopes, 6% of total), cricetid rodents (in two ecotopes, 6% of the total); invertebrates: *B. dubia* cockroach (in 18 ecotopes, 56% of the total), *Strophocheilus* sp. terrestrial snail (in six ecotopes, 19% of total), *Lycosa raptor* (Walckenaer) spider (in five ecotopes, 16% of total), *Grammostola mollicoma* (Ausserer) spider (in two ecotopes, 6% of total), *Segestria ruficeps* Guerin spider, together with butterfly larva, termite and miriapod, each one of those in one ecotope. As in Las Piedras, the lizard *H. uruguayensis* and the cockroach *B. dubia* predominated, but overall were fewer wild associated vertebrates.

TABLE I

Colonized ecotopes and *Triatoma rubrovaria* bugs collected in natural stonegrounds at Las Piedras, Department of Artigas, Uruguay (October 1990-November 1991)

Date	Section	A <sup>a</sup>	Nymphs	Adults		Adults Total	Total
				M	F		
Oct. 90	A	8/8	469	42	9	51	520
Nov. 90	B	10/13	81	4	4	8	89
Jan. 91	C	10/11	88	1	2	3	91
Mar. 91	D	6/6	34	-	2	2	36
May 91	E	2/2	24	-	-	-	24
Jun. 91	F	4/4	133	-	-	-	133
Nov. 91	H	9/14	149	9	12	21	170
Total	-	49/58	978	56	29	85	1063

<sup>a</sup>: No. positive ecotopes/Total ecotopes examined; M: males; F: females.

TABLE II

Infested ecotopes and median density of *Triatoma rubrovaria* in La Bolsa, Department of Artigas, Uruguay (October 1990-November 1991)

	No. examined	No. positive (%)	Median bug density (range)
Stone walls and stone yards	8	7 (88)	19 (8-33)
Natural altered stonegrounds	8	3 (38)	3(1-9)
Stone heaps	38	18 (47)	6 (1-29)
Houses and peridomestic premises	11	2 (18)	2 (2)
Natural stonegrounds (untouched)	2	2 (100)	15 (15)
Total	67	32 (48)	6 (1-33)

## DISCUSSION

Las Piedras represents the natural habitat for *T. rubrovaria* where big colonies develop in the extense pedregales of the prairie, especially in those located at the most elevated points. Suitability of this environment is shown by the high proportion of colonized ecotopes. Highest relative abundance was found in those pedregales formed by overlapping flat stones on dry soil that made up a laberinthic structure suitable to shelter vertebrates, including small mammals.

*T. rubrovaria* colonies showed the typical instar distribution already reported for other wild triatomine species, being predominantly immature stages (Forattini et al. 1977, Wisnivesky-Colli 1993). Abundance was strongly correlated with climatic conditions, as reported for other silvatic triatomines (Rabinovich 1985). First instar nymphs were present all year around, although numbers increased in spring and summer. However adults were not collected from April to October and those few nymphs found in winter could be insects that hatched during late summer and experienced slower growth during the following winter. In the cold season fifth instar nymphs predominated, probably due to the higher resistance of older nymphs to adverse environmental conditions (Salvatella et al. unpublished data). Males appeared earlier than females, although females seemed to live longer.

In the peridomestic environment of La Bolsa, *T. rubrovaria* colonized stone walls and stone fences. Colonized ecotopes were always those close to houses. Comparison of colony patterns between La Bolsa and Las Piedras suggest that human activity affects the development of *T. rubrovaria*, for example by extracting stones from natural pedregales by burning and clearing the fields, by planting trees, by piling up rubbish, and by raising domestic animals that may displace wild vertebrates. Peridomestic colonies showed an irregular instar distribution but the overall insect collection was smaller than in Las Piedras, in spite of the presence of abundant local food sources. In January 1991, only four bugs were caught in natural stonegrounds (sector C); these showed the characteristic pattern of suitable ecotopes but were shaded by cultivated Eucalip-tusces.

Association of *T. rubrovaria* with the geckonid *H. uruguayensis* and the cockroach *B. dubia*

was common in both wild and peridomestic environments. This strongly suggested that those animals could have a trophic relationship with *T. rubrovaria*, a fact lately confirmed in our laboratory (Salvatella et al. unpublished data).

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