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# ARTIGOS

## EPIDEMIOLOGICAL ASPECTS OF THE BRAZILIAN SPOTTED FEVER: SEASONAL ACTIVITY OF TICKS COLLECTED IN AN ENDEMIC AREA IN SÃO PAULO, BRAZIL

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*Ticks were collected from vegetation and animals at monthly intervals during one year (1993-1994) in an endemic area of Brazilian spotted fever in the County of Pedreira, State of São Paulo. Six species of ticks were identified* Amblyomma cajennense, Amblyomma cooperi, Amblyomma triste, Anocentor nitens, Rhipicephalus sanguineus *and* Boophilus microplus. *Only the first species was sufficiently numerous to permit a quantitative study with seasonal activity, although the distribution and source of capture of other species were observed and are reported. This information is correlated with the epidemiology of tick-borne rickettsiosis.*

*Key-words: Brazilian spotted fever. Ticks. Seasonality. Epidemiology.*

Since 1985, Brazilian spotted fever caused by *Rickettsia rickettsii* has been reported in the County of Pedreira, State of São Paulo, where eight clinical cases were confirmed and spotted fever group rickettsia was isolated from ticks[5]. This rickettsiosis is transmited by ticks, that are vectors and reservoirs[3]. In Brazil the most important vector is the horse tick, *Amblyomma cajennense*[2 4 6 8].

Considering the scarce information about this rickettsiosis and especially about the ticks in endemic areas of Brazilian spotted fever, we initiated studies of ecology of the species of ixodides as part of a multidisciplinary project in areas where cases of spotted fever occurred. The seasonal variation of the parasitic and non-parasitic stages of ticks collected were correlated with epidemiology of the spotted fever.

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## MATERIAL AND METHODS

*Study location*. The County of Pedreira (22 44'21''S; 46 57'27''W) has an area of 116km$^2$ and is located 584m above sea level, in a mountainous area. It is a region of semi-hot tropical climate with an average temperature between 30ºC/35ºC and a rainfall of 1600mm. The confluence of three rural localities (Jaguari Farm, Fortaleza Farm and Workers Colony Nadir Figueiredo Industry), 3.0km from urban center, was selected for surveillance because of high prevalence of confirmed human cases. Captures of ticks in vegetation were carried out along Jaguari River. Two other localities were studied, Basílio, where a human case ocurred in 1994 and Santa Helena Farm, without reported cases.

*Description of vegetation and land use.* The vegetation of the studies areas was consisted of grasses, herbage and secondary vegetation of mainly pine. A remainder of ciliate forest was observed rarely and abandoned farm fields serving as pasture dominated.

*Collection of ticks.* Considering the difficulties of estimating the density of ticks, two methods were used simultaneously: a) removal of feeding ticks from their hosts (human, domestic and wild animals), and b) collection of free-living ticks from vegetation by "flagging" vegetation using a white flannel cloth of 180 x 70cm.

Monthly during one year ticks were collected in human, animals and vegetation. Carefully,

well-definided places were flagged in same period. After taxonomic identification, the ticks were divided in two groups: one group was carried to Entomological Collection Departament (FIOCRUZ) and the other was submitted to a hemolymph test and inoculated in Vero cell culture for isolation (subject of other article).

## RESULTS

Among 43217 ixodids collected, six species were taxonomically confirmed: *A. cajennense*, *A. cooperi*, *A. triste*, *Anocentor nitens*, *Rhipicephalus sanguineus* and *Boophilus microplus*.

At focus from the County of Pedreira in 1993-1994, 29197 ticks were collected and *A. cajennense* was taken from humans, dogs, horses, cattle, *Hydrochaeris hydrochaeris*, *Myocastor coypus bonariensis*, *Didelphis marsupialis*, and vegetation (Table 1). Flagging vegetation and tick collection from horses produced numerous adults and immature specimens of *A. cajennense* (Figures 1 and 2).

In Santa Helena Farm, 12792 samples of ticks were collected, *A. cajennense* (12704); *A. cooperi* (85) and *A. nitens* (3) showing similar distribution of ticks to focus. *A. cajennense* collected from vegetation showed also a definite pattern of seasonal activity. Larvae were abundant during the winter with peak in July and nymphs were active between August and October.

*Table 1 - Distribution of species of ticks taken from vegetation and animals on foci of Brazilian spotted fever in County of Pedreira, São Paulo, Brazil (1993-1994).*

| Specie | Source | Fase | | | Total |
|---|---|---|---|---|---|
| | | adult | nymph | larvae | |
| | human | 6 | 14 | 0 | 20 |
| | horse | 1133 | 433 | 76 | 1642 |
| | cattle | 1 | 1 | 0 | 2 |
| | dog | 1 | 124 | 5 | 139 |
| *Amblyomma cajennense* | *H. hydrochaeris* | 120 | 19 | 3 | 142 |
| | *M. coypus* | 0 | 34 | 0 | 34 |
| | *D. marsupialis* | 6 | 19 | 0 | 25 |
| | vegetation | 859 | 7207 | 8779 | 26845 |
| *Rhipicephalus sanguineus* | dog | 46 | 4 | 0 | 50 |
| *Anocentor nitens* | cattle | 1 | 0 | 0 | 1 |
| | horse | 180 | 7 | 0 | 187 |
| *Amblyomma cooperi* | *H. hydrochaeris* | 41 | 0 | 0 | 41 |
| *Amblyomma triste* | *D. marsupialis* | 3 | 0 | 0 | 3 |
| *Boophilus microplus* | cattle | 62 | 4 | 0 66 | |
| Total | | 2459 | 7866 | 18863 | 29197 |

In Basílio, 1143 samples of *A. cajennense* were collected from vegetation and similar seasonal activity was demonstrated. Larvae were abundant between April and June and nymphs were found between August and January.

## DISCUSSION

Results of our survey show that *A. cajennense* was the predominant species of the six species of ticks recovered from animals and vegetation in the County of Pedreira. Although *A. cajennense* collected from vegetation in an endemic area of Brazilian spotted fever was found throughout the year, all the stages showed a definite pattern of seasonal activity. *A. cajennense* adults were found in small number throughout the year, but high numbers were observed during the late summer with a clear peak during February and March. Larvae were abundant between March and August and a decrease in abundance in June may be due to the presence of rainfall high during this month, difficulting the flagging of vegetation. Free-living nymphs were present mainly during the winter (June to September) showing one peak of activity in August.

Similar seasonal activity was demonstrated on flagging vegetation in other two areas, Basílio and Santa Helena Farm, the latter locality

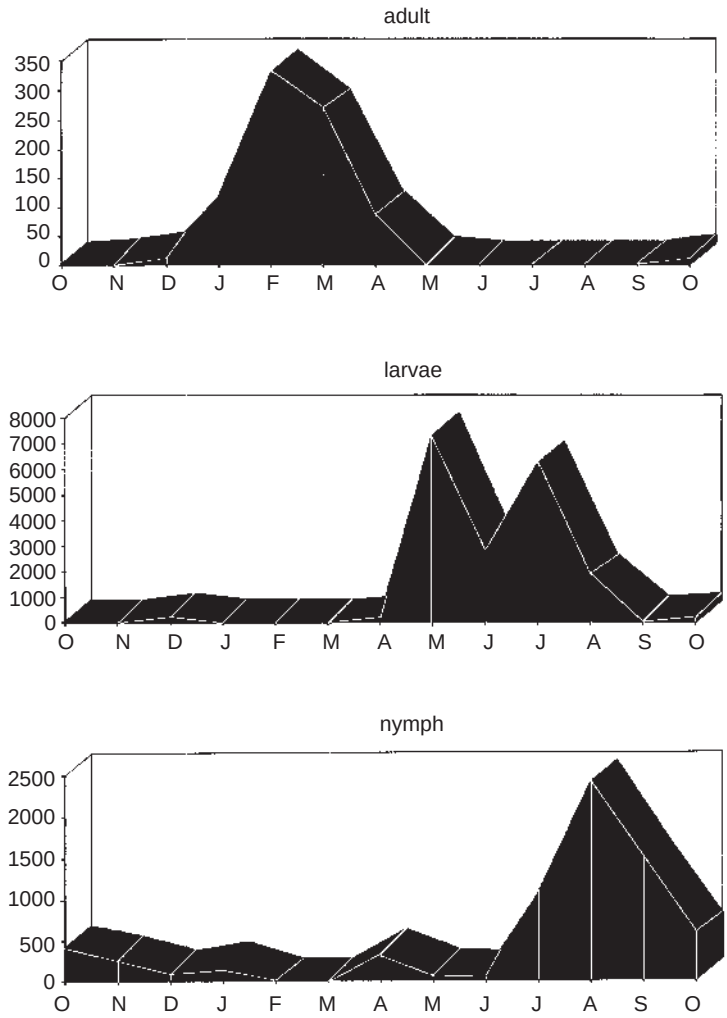


*Figure 1 - Seasonal distribution of* A. cajennense *in an endemic area of Brazilian spotted fever by flagging vegetation, Pedreira, State of São Paulo, Brazil (1993-1994).*

withouth reported clinical cases and with the monthly study of population of tick from Frebuary to October, 1994. Larvae were abundant on vegetation during the auttumn and winter and nymphs were more numerous after of the peak of larvae. Althought the seasonal periodicity shows that tick activity occurs in response to similar factors observed in all studied areas, the absence of cases in Santa Helena Farm must be attributed to unknown factors within the biotype. It may be due to land use where the pasture are used for continuous feeding of cattle; the preservation of forest near the farm; and greater control of ticks infestation on domestic animals.

The results of our tick survey on vegetation provide similar information about clear seasonal occurrence of the non-parasitic stages in pastures of the State of Rio de Janeiro, althought larvae had been predominant in the first quarter of the year, nymphs from May to August, and adults from September to December[7].

All of stages of *A. cajennense* collected from horses also demonstrated a clear pattern of activity with a decrease in the adult population starting in June, where high numbers of the earlier stages were found with one peak in July.

Considering that the most number of reported cases of Brazilian spotted fever in the

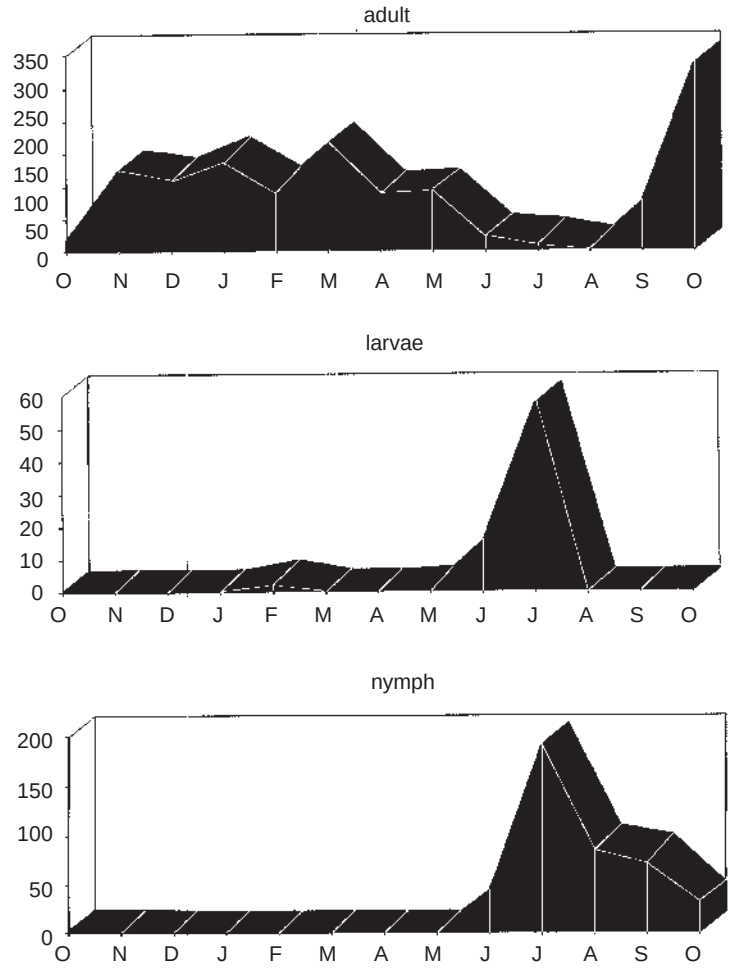


*Figure 2 - Seasonal distribution of* A. cajennense *collected from horses in an endemic area of Brazilian spotted fever, Pedreira, State of São Paulo, Brazil (1993-1994).*

County of Pedreira occured between June and October since 1985, we can observe that there is a relationship between this period with a peak of activity of the immature stages. The presence of *A. cajennense* in different hosts including man, demonstrates its eclectic behavior, and its abundance in an endemic area, reaffirming that it is the most important vector in the transmisssion of this zoonose to human being in Brazil.

Other tick species were collected on vegetation and on animals, but none was captured on human beings, althought man can be host to *R. sanguineus*[1] and *A. cooperi* (Manhães, 1996: personal communication). This fact does not decrease the importance of these species of tick in an endemic area of Brazilian spotted fever because they can perpetuate rickettsial activity.

Considering few observations concerning the significance of ticks in the ecology of *R. rickettsii* a longitudinal study is in progress and the results will be reported in a later paper.

## RESUMO

*Carrapatos de vegetação e de animais foram coletados mensalmente durante o período de um ano (1993-1994) em uma área endêmica de febre maculosa brasileira no município de Pedreira, São Paulo. Seis espécies de carrapatos foram identificadas* Amblyomma cajennense, Amblyomma cooperi, Amblyomma triste, Anocentor nitens, Rhipicephalus sanguineus *e* Boophilus microplus. *Somente a primeira espécie foi suficientemente abundante para permitir um estudo quantitativo com atividade sazonal, embora a distribuição e fonte de captura de outras espécies fossem observadas e aqui relatadas. Estas informações são correlacionadas com a epidemiologia da rickettsiose transmitida por carrapato.*

*Palavras-chaves: Febre maculosa brasileira. Carrapatos. Sazonalidade. Epidemiologia.*

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