

## Rodents of the subfamily Sigmodontinae (Myomorpha: Cricetidae) as hosts for South American hard ticks (Acari: Ixodidae) with hypotheses on life history

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### Abstract

Historical information shows that Sigmodontinae are irrelevant hosts for South American ticks of the genera *Haemaphysalis* Koch, *Rhipicephalus* Koch and *Dermacentor* Koch. Nine *Amblyomma* Koch species were found on Sigmodontinae but only *Amblyomma triste* Koch, 1844 appears strongly related to them. Eighteen species of *Ixodes* Latreille were determined on these hosts. Four species sporadically infest Sigmodontinae; eight are found mostly on Sigmodontinae but the records are too few for any inference. Six: *I. amarali* Fonseca, 1935, *I. longiscutatus* Boero, 1944, *I. loricatus* Neumann, 1899, *I. luciae* Sénevet, 1940, *Ixodes sigelos* Keirans, Clifford and Corwin, 1976 and *I. venezuelensis* Kohls, 1953 are usual parasites of Sigmodontinae. It is proposed that the *Ixodes*-Sigmodontinae relationship evolved from a South American tick ancestor parasite of Didelphidae. Their descendants are two extant clades, one formed by *I. loricatus*-*I. luciae* defined by analysis of 16S rDNA sequences further including *I. amarali* and *I. schulzei* by morphological affinities. These species (*I. schulzei* excluded) have adult ticks feeding on Didelphidae and sub-adult ticks feeding on Didelphidae and several species from five sigmodontin tribes. The second clade is formed by *I. abrocomae* Lahille, 1916 (known from few specimens, mostly collected from Sigmodontinae), *I. sigelos* (mainly a parasite of Sigmodontinae), *I. stilesi* Neumann, 1911 (parasite of deer), and possibly *I. taglei* Kohls, 1969 (parasite of deer) by morphological affinity. This clade is related to *I. neuquensis* Ringuelet, 1947, an exclusive parasite of *Dromiciops gliroides* Thomas (Microbiotheriidae Ameghino).

**Key words:** Sigmodontinae, hosts, ticks, Ixodidae, Prostriata, Metastriata, life history

### Introduction

Rodentia Bowdich originated in the ancient continent of Laurasia around the Cretaceous-Tertiary extinction event (65 mya) and is now represented by more than 40 % of extant species of mammals worldwide. It is speculated that caviomorph rodents rafted from Africa into isolated post-Gondwanian South America *circa* 30 mya with a rapid radiation thereafter (Benton, 2009). However, the most numerous species of rodents in South America belong to the Cricetidae Fischer, a family of probable Eocene origin in Asia (Gomes Rodrigues *et al.* 2010) that contains several hundred extant species with a wide distribution that encompasses the Nearctic, Neotropical, Oriental, and Palearctic Zoogeographic Regions (Musser and Carleton, 2005); therefore, Cricetidae has an origin independent of rodent ancestors introduced into South America from Africa. According to Musser and Carleton (2005) Cricetidae contains six subfamilies, but Sigmodontinae Wagner, is the predominant South American (Neotropical) subfamily. It contains more than 80 genera and *circa* 400 extant species, divided into several tribes. It is postulated that sigmodontins entered into northern South America not later than about 5 mya (Pliocene) because the first Sigmodontinae fossil is near this historical time in Argentina (Pardiñas *et al.* 2010). Many sources indicate that the radiation of Sigmodontinae was strong and diverse, with extant species occupying habitats at sea level, including riparian and arboreal species, up to high altitude deserts, taking advantage of different types of food resources throughout the Neotropics and southern Nearctic, but most species are South American (Pardiñas *et al.* 2002).

Ixodidae Murray (species of ticks with all postembryonic stages with the dorsum partially or totally covered by a chitinous scutum) contains 702 species in two groups: Prostriata represented by the 242 species of the genus *Ixodes* Latreille and Metastriata that contains 458 species in 11 extant genera (Guglielmone *et al.* 2010b). However, French workers divide *Ixodes* into several genera (Camicas and Morel, 1977; Camicas *et al.* 1998). Prostriata