

## THE TICK *IXODES GRANULATUS* INFESTS *RATTUS RATTUS* POPULATING A SMALL ISLAND OFFSHORE OF SINGAPORE

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### Summary:

The ixodid tick *Ixodes granulatus* Supino 1897 was found infesting *Rattus rattus* in Semakau island, one of the small offshore islands fringing Singapore to the south. None of the examined *R. rattus* from the other islands fringing Singapore, or from Singapore island were found infested. *Ixodes granulatus* occurs, however, on Singapore island on *Rattus annandalei*, resident of undisturbed forested habitats. We speculate that invading black rats in Semakau replaced autochthonous sylvatic rodent population and contracted their associate tick population.

**KEY WORDS :** tick, *Ixodes granulatus*, *Rattus rattus*, *Rattus annandalei*, Singapore, offshore island.

### Résumé :

INFESTATION DE LA POPULATION DE *RATTUS RATTUS* D'UNE PETITE ÎLE AU LARGE DE SINGAPOUR PAR *IXODES GRANULATUS*  
*L'infestation de Rattus rattus par la tique Ixodes granulatus Supino 1897 a été mise en évidence dans la petite île de Semakau au sud de Singapour. Aucun des R. rattus examinés dans l'île de Singapour ou dans les autres îles de la région n'a été trouvé infesté. Cependant, Ixodes granulatus est présent chez Rattus annandalei dans les forêts de l'île de Singapour. On suppose que le rat noir, en envahissant l'île de Semakau, a remplacé le rongeur sylvatique autochtone et a contracté sa tique.*

**MOTS CLÉS :** tick, *Ixodes granulatus*, *Rattus rattus*, *Rattus annandalei*, Singapour, île.

During 1998 and in 2002, rats were trapped in Singapore and its fringing islands to study *Rattus rattus* and *Python reticulatus* transmitted *Sarcocystis* spp. (Paperna & Martelli, 2001; Paperna *et al.* 2004). Rats were trapped by 260 × 175 × 120 mm spring traps and killed by chloroform in plastic bags.

In Semakau island, one of the small (area 64.7 ha) offshore islands fringing Singapore to the south, infestation of *Ixodes granulatus* Supino 1897 occurred in 32 % of the 22 examined black rats, *Rattus rattus*: in two out of 11 (18 %) females and five of 11 (45 %) males. Mean number of ticks per infested rat was  $5.6 \pm 4.4$  ( $v > m =$  overdispersed); the youngest rat found infested was of 49.5 g, but there was no correlation with size (Pearson's  $r = -0.15$ ). All found ticks, in both male and female rats were either larvae or nymphs (total collected 23 nymphs, 14 larvae), eight nymphs molted to adult females, none to males.

None of the examined 48 *R. rattus* from the other fringing islands were found infected. Catch percentage of traps on Semakau was 63 %, in only another island, it was higher, 75 %, in all other islands it was lower (Paperna *et al.*, 2004). Tick infestation was also absent from all *R. rattus* caught and examined from Singapore Island (70 in 1998, 44 in 2001, Paperna & Martelli, 2001, and pers. obs.).

*Ixodes granulatus* occurs on the Singapore rat *R. annandalei*, resident of undisturbed forested habitats on Sin-

gapore island. Of 13 rats comprising, both adult males and females caught in Bukit Timah forest, three were infested by three-five adult ticks per rat, and additional one had multiple larval-bite lesions. Of a six additional rats from the forest adjoining the Zoo, three were found infested, one with three females and a nymph, the others, each with one engorged larva. Author also experienced massive attack of larvae while walking in the central forest. Some undetected larvae succeeded to engorge and induced lesion at the attachment site.

*I. granulatus* has been reported from wild or feral rats (*R. r. diardi*, *R. r. jalorensis*, *R. exulans*) only from sylvatic habitats (Kohls, 1957; Audy *et al.*, 1960). We speculate that in Semakau the invading *R. rattus* replaced past sylvatic rodent population, the natural hosts of this tick, and inherited their ticks.

According to Kohls 1957, *I. granulatus* occurs from eastern India through SE Asia – China to Okinawa (on various small mammals including species of *Rattus*, but not on the commensal *R. rattus*). Audy *et al.* (1960) report finding of *I. granulatus* in Malaysia from several sylvatic rat species, as well as *Tupaia glis*, some shrews, squirrels and also from men.

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