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Research Note

An experimental infestation of *Amblyomma testudinarium* Koch larvae (Acarina: Ixodidae) on the lizard, *Takydromus tachydromoides* (Schlegel) (Lacertilia: Lacertidae)

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Abstract: The feeding and development of *Amblyomma testudinarium* Koch larvae on the lizard, *Takydromus tachydromoides* (Schlegel) were observed at 24℃ under a 16L–8D photoperiod and compared with those of the larvae on mice. The mean feeding periods of the larvae were 13.7 and 5.4 days on the lizards and the mice, respectively. The mean feeding period on the lizards was significantly longer than that on the mice. However, the molting success of the engorged larvae was 97% or more on both hosts. The mean developmental periods of the engorged larvae were 22.4 and 22.6 days on the lizards and the mice, respectively. The difference in the mean developmental period between the two hosts was not significant, suggesting that the difference in the host suitability between the two hosts is slight. Thus, the reasons why the immature ticks of *A. testudinarium* infest more frequently on mammals than on reptiles can not be explained by the difference in the host suitability between the cold-blooded and warm-blooded animals.

INTRODUCTION

The tick, *Amblyomma testudinarium* Koch is widely distributed in the southwestern part of Japan and has a wide host range (Yamaguti *et al.*, 1971). According to Kitaoka (1977), the larvae and nymphs of this tick infest reptiles, in addition to mammals and birds. In the field, however, the immature ticks appear to be collected mainly from mammals and sometimes from reptiles. On Amami-oshima island, for example, the immature ticks were collected abundantly from domestic dogs, wild rabbits and wild boars, but not from reptiles (Kitaoka and Suzuki, 1974). This may be due to the difference in the host suitability between the two different host types; cold-blooded and warm-blooded animals. In this study, I observed the feeding and development of *A. testudinarium* larvae which were experimentally infested on the lizard, *Takydromus tachydromoides* (Schlegel) and then compared with those of the larvae that infested mice.

MATERIALS AND METHODS

The larvae used in this study were collected by the flagging method in the Rokko Mountains, Hyogo Prefecture, in May 1999. The lizards were collected on a hilly region of Saitama Prefecture in June 1999. The unfed larvae were placed on the backs of lizards with an infestation

density of 30–40 per lizard, and were kept at 24℃ with a 16L–8D photoperiod. Four lizards (adults more than 5.0 cm snout-hindlimb length) were used for the larval feeding experiment. The infested lizards were kept in plastic containers (28×17×18 cm) with Petri dishes (9.0 cm in diameter) for water supply and allowed to feed on maggots everyday. The number of engorged larvae that dropped from lizards was counted daily to find the feeding period. The detached engorged larvae were placed in Petri dishes (3.0 cm in diameter) with wet filter paper on the bottom, and kept in an incubator at 24℃ with a 16L–8D photoperiod. The developmental period (days from the drop-off to the following ecdysis) was calculated by noting the molting date. After all the engorged ticks had molted, the percentage of molting success (molting percentage) was found.

The feeding and development of the larvae on the mice were also observed in order to compare it with those on the lizards. Four mice (about eight-week-old) were confined individually in small cages (food cages for mice) to prevent movement and placed in an incubator at 24℃ under a 16L–8D photoperiod. The unfed larvae were placed on the heads of the mice with an infestation density of 30–40 per mouse. The mice were confined in the cages for 8 hrs after infestation and then they were set free. The feeding period, developmental period, and molting percentage of the larvae were found by using the same methods as described above.

Results and Discussion

Table 1 shows the feeding periods of *A. testudinarium* larvae on lizards and mice at 24℃. The feeding period of the larvae on lizards ranged from 12 to 17 days, with a mean of 13.7 ; on mice, the period ranged from 5 to 7 days, with a mean of 5.4. The period on the lizards was significantly longer than that on the mice (t-test, $P<0.001$). Similar results have been reported for the larvae and nymphs of *Ixodes ricinus* (Linnaeus) (Balashov, 1972) and *I. nipponensis* Kitaoka and Saito (Fujimoto, 1990). The prolonged feeding period of larvae can be explained as follows. In general, the feeding speed of ticks depends largely on the body temperature of the host. The body temperature of the lizards at 24℃ was lower than that of the mice (about 38℃). Therefore, the larvae which fed on lizards took longer for engorgement than those fed on the mice. This prolongation of the feeding period appears to occur in all the host reptiles of *A. testudinarium*, and the feeding period becomes longer as the temperature falls (Fujimoto, 1990).

Table 2 shows the percentages of molting success and the developmental periods of the engorged larvae fed on lizards and

Table 1. Feeding periods of *A. testudinarium* larvae fed on lizards and mice at 24℃ under a 16L–8D photoperiod.

Host	No. of hosts used	No. of larvae examined	Mean feeding period (days±SD)
Lizard	4	93	13.7±1.4
Mouse	4	64	5.4±0.6

Table 2. Developmental periods and percentages of molting success of engorged *A. testudinarium* larvae fed on lizards and mice at 24℃ under a 16L–8D photoperiod.

Host	No. of larvae examined	No. of larvae molting into the nymphal stage	% molting	Mean developmental period (days±SD)
Lizard	90	89	98.9	22.4±2.2
Mouse	67	65	97.0	22.6±3.0

mice at 24℃. Both on lizards and mice, 97–99% of the engorged larvae molted into nymphs. The mean developmental periods of the engorged larvae fed on lizards and mice were 22.4 and 22.6 days, respectively. The difference in the mean developmental period between the two hosts was statistically insignificant (t-test, $0.5 < P < 0.8$). These results suggest that the development of engorged *A. testudinarium* larvae is not affected by different host types; cold-blooded or warm-blooded animals.

In conclusion, both lizards and mice appear to be suitable hosts for *A. testudinarium* larvae, although the feeding period differs between the two hosts. Thus, the reasons why the immature ticks of *A. testudinarium* are more frequently found on mammals than on reptiles can not be explained by the difference in the host suitability between the cold-blooded and warm-blooded animals. Concerning the host-seeking behavior of the immature ticks, hereafter, more detailed studies will be necessary because their behavior may make it difficult for them to encounter the host reptiles.

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摘　要

タカサゴキララマダニ幼虫の実験的カナヘビ寄生

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カナヘビに寄生したタカサゴキララマダニ幼虫の吸血と発育を 24℃, 16L–8D の日長条件で観察し，マウスに寄生した幼虫のそれらと比較した．カナヘビ上での幼虫の吸血期間は平均 13.7 日，マウス上でのそれは 5.4 日で，カナヘビ上での吸血期間はマウス上より明らかに長かった．しかし，飽血幼虫の脱皮率は両宿主とも 97% 以上であった。飽血幼虫の発育期間はカナヘビ上では平均 22.4 日，マウス上では 22.6 日で，両宿主の間に大きな違いは見られなかった．以上の結果から，幼虫に対する両宿主の宿主適合性の違いはわずかであると考えられた．従って，タカサゴキララマダニ幼，若虫が爬虫類より哺乳類により多く寄生している理由を温血動物と冷血動物の宿主適合性の違いによって説明できない．