Louse Infestations of Tree Shrews (Tupaia glis)\(^1,2,3\)

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Summary
Nine adult tree shrews, *Tupaia glis*, recently imported from West Malaysia were visually examined for ectoparasites while under general anesthesia. Three shrews were infested by the sucking louse, *Sathras durus*, and six shrews had louse ova belonging to this species; two shrews had neither lice nor ova. A total of 20 adult females, 10 adult males, and three third instar nymphal lice was collected. Lice were located on the head, flanks, and dorsal body of shrews while ova were recorded mainly from the anterior flanks but also from some adjacent host sites. The tree shrews appeared to tolerate the lice well although louse vector capacity was not assessed. The last date that lice were recorded from shrews was 22 days after colony set-up, and the last date on which seemingly viable ova were recorded was 64 days after set-up showing that the infestations were ultimately lost.

Key Words
Parasitism — Lice — Anoplurn — Tupaidea

Louse infestations in laboratory colonies of tree shrews, *Tupaia glis* (Diederik), do not appear to have been recorded in the past. In their native south-east Asia, the Tupaideae (tree shrews) are the normal hosts for two species of sucking lice (1,2,3): both louse belonging to monospecific genera in the family Polypaludicidae (3). These are, *Sathras durus* Johnson, and *Deocephalurus acinetus* Waterhouse, whose true hosts appear to be the tree shrews, *T. glis* and *Anoplura Ellioti* Waterhouse, respectively. All lice comprising the infestations described herein were *S. durus* (Figure 1) as first described from *T. glis* in Malaysia (2).

Colony Background
Twelve commercially purchased *T. glis*\(^4\) were received and quarantined on 16 November 1982; all animals were originally captured in West Malaysia. Random fecal analyses revealed some strongly positive, and although no nematode control was attempted, fecal analyses 14 days later revealed complete self-cure. The shrew diet consisted of cat food and vegetables plus some extra treats. From 14 December 1982 onwards shrews also were provided pythamidone\(^5\) (four crumbs per day) for vitamin K\(_2\) supplementation. All animals were caged as pairs (one male with one female) as shown in Table 1. No tree shrews or their cages were ever treated with insecticides or other procedures that might be considered detrimental to ectoparasites.

Louse Collections
Nine of the twelve shrews were visually processed for ectoparasites while under general anesthesia for experimental vision research. Since these animals were perfused shortly after experimentalation, each individual was examined only once. Louse detection was achieved by diligent pelage searches using microscopes and probes to push fur aside. Considerable effort was expended to collect all the lice present on each host but it is conceivable that some may have escaped notice. Louse ova (nits) were located in a similar manner and when present, small samples of these were collected by plucking the individual host hairs to which they were cemented. Lice and ova were stored in 70% ethyl alcohol until microscopic examination. Attention was given to host attachment sites for lice and ova alike. Because no lice were taken from shrews after 7 December 1982, ova located on hosts after this date were carefully examined microscopically to assess their viability; for these viability tests, 10 ova were taken from each animal as randomly as possible.

Results
Louse infestations for the nine tree shrews examined are shown in Table 1. Three shrews had lice and six shrews had ova with two shrews having neither of these. Host site analysis showed that of the 33 lice collected, three (9.1%) were taken from the head, 21 (63.6%) from the flanks and rump (27.3%) from the dorsal body. Similar analysis for the ova showed that the majority (192 or 50.3%) were recorded from the anterior flanks (posterior to the head), with 10 (2.6%) on the medial flanks,

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\(^3\) We are grateful to Dr. Louis Levy and the Division of Animal Care for frequently assuring the health of these animals.
\(^4\) South American Primates, Miami, FL.
\(^5\) Pyltan cut-shoo\(^5\) Halosol Parma, St. Louis, MO.
\(^6\) Aquaphytrion* Merck, Sharpe & Dohme, Division of Merck & Co, West Point, PA.
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83 (21.7%) on the anterior dorsal body, 96 (25.1%) on the medial dorsal body and one (0.3%) on the fore legs. No obvious pruritus was associated with the louse infestations and the epidermal disorganization that normally encircles sucking louse bites (4.5) was barely discernable on the tree shrews. Ova viability analyses showed that 60% of the 19 eggs examined from animal 10 (11 January 1983) appeared to be viable, 20% from animal 16 (18 January 1983) and 0% from animal 15 (2 March 1983).

Discussion

Relatively little is known concerning the biology of Sphenophorus densus and even less on its host associations with T. glis. Although S. densus could feasibly transmit pathogens between tree shrews, the present survey was not designed to resolve vector potential. In high concentrations or adverse infestations the lice themselves could detrimentally affect their hosts by causing pruritus, dermatitis, anemia, toxicity (with or without coexistent anemia), or allergic reactions (4.6). However, none of these negative reactions were noted since the tree shrews appeared healthy at all times prior to surgery. This apparent good host health combined with the absence of noticeable pruritus and the very small areas of skin disorganization surrounding louse bites suggests that T. glis tolerated S. densus well.

Although only three of the nine tree shrews had lice at their time of examination at least seven shrews had lice at some time as revealed by the presence of ova on these animals. It may be significant that two of the animals that were caged together (1 and 17) both had lice and this could have resulted from louse interchange between them.

Most of the data suggest that the louse populations on the tree shrews were diminishing and ultimately lost. The fact that no lice were taken after 7 December 1982, and that fewer ova taken from hosts appeared to be viable with progressing time (so that by 2 March 1983, none were considered viable) comply with this. The non-viable ova had either hatched previously (but remained cemented to hairs) or appeared to be dead (no embryological development evident). Since embryological development of anopluran eggs takes 5 to 17 days in species surveyed thus far (6), viable eggs were presumably deposited by gravid female lice 17 or less days prior to host examination. The very low proportion of immature lice also suggests a declining population but these data should be accepted with caution because of the possibility that this segment of the louse population was undersampled (because of their small size). Quarantine colony conditions including climate, high quality food intake and/or increased self or mutual grooming may have contributed to louse losses.

Host site data show that attachment locations used by these lice and ova are similar to those used by lice parasitic on rodents similar in size to T. glis (4,9). While it is difficult to suggest a reason for the exact site locations used by these lice, the percentage batch of the ova in many louse species is strongly influenced by tem-

References


Table 1

<table>
<thead>
<tr>
<th>Animal</th>
<th>Lice examined</th>
<th>Lice</th>
<th>Ova</th>
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<tbody>
<tr>
<td>T. glis</td>
<td>17 Nov 1982</td>
<td>3</td>
<td>1 male, 1 nymph</td>
</tr>
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<td>T. glis</td>
<td>22 Dec 1982</td>
<td>18</td>
<td>3 males, 3 nymphs</td>
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<td>29 Dec 1982</td>
<td>18</td>
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<tr>
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<td>30 Dec 1982</td>
<td>18</td>
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<td>7 Jan 1983</td>
<td>18</td>
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<td>18</td>
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<td>18</td>
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<td>T. glis</td>
<td>9 May 1983</td>
<td>18</td>
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<td>Total</td>
<td>108</td>
<td>20</td>
<td>3 males, 3 nymphs</td>
</tr>
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</table>

* denotes lice examined by the same method, 3 males, 3 nymphs, 3 females.