

Medico-zoological Studies in Tokara Archipelago,
Kagoshima Prefecture, Japan — Records of Acari
and Flea Found on an *Apodemus* mouse on Naka-
noshima Island Comprising the Archipelago

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Abstract: Acari and a flea taken from an *Apodemus* mouse newly found on Nakanoshima Island, Tokara Archipelago, Kagoshima Prefecture, Japan, were recorded. Such the permanent parasites of the mouse as *Myobia nodae* Matuzaki and *Afrolistrophorus apodemi* Fain are suggestive of the host mouse being conspecific with *Apodemus speciosus*. Morphological accounts are given for a form of *Haemogamasus quadrisetatus* Vitzthum and *Neopsylla specialis* Jordan new to Japan, which are thought to be the faunal components of the Oriental region.

Key words: Tokara Archipelago, *Apodemus speciosus*, *Neopsylla specialis*, *Haemogamasus quadrisetatus*.

INTRODUCTION

The junior author caught an *Apodemus* mouse under various types of habitats on Nakanoshima Island for the first time from Tokara Archipelago, Kagoshima Prefecture, Japan. This unexpected finding of *Apodemus* from its southern-most range in Japan has stimulated Japanese mammalogists to have diverse studies on the target mouse.

The present paper deals with the record of arthropods parasitic or phoretic on the mouse. All the specimens were collected by the junior author in July and November, 1981, and were sent to the senior author for identification.

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Among the arthropods, there were some ectoparasites indicative of taxonomical and distributional peculiarity of the host mouse occurring on Nakanoshima Island. Using such the indicator parasites as above, comments on the systematic position of the mouse will be given below. As a form of the mite and a flea new to Japan were included in the present material, the morphology for both the species is also to be presented with the Figures.

Records of arthropods taken from an *Apodemus* mouse on Nakanoshima Island in 1981.

Table 1. Arthropods found on an *Apodemus* mouse on Nakanoshima Island, Tokara Archipelago, Kagoshima Pref., Japan, in 1981.

ACARINA	
Mesostigmata	
Laelapidae	
<i>Hypoaspis (Geolaelaps)</i> sp.	1 ♀
<i>Hypoaspis (Euandrolaelaps) pavlovskii</i> (Bregetova)	1 ♂, 2 ♀ ♀
<i>Haemogamasus quadrisetatus</i> Vitzthum (a form**)	4 ♂ ♂, 5 ♀ ♀, 6DN
<i>Laelaps jettmari</i> Vitzthum*	2 ♂ ♂, 22 ♀ ♀, 4PN
Prostigmata	
Cheyletidae	
<i>Eucheyletia</i> nr. <i>sinensis</i> Volgin*	8 ♀ ♀
Myobiidae	
<i>Myobia nodae</i> Matuzaki*	2 ♂ ♂, 3 ♀ ♀
Ereynetidae	
<i>Paraspeleognathopsis bakeri</i> Fain*	3
Cunaxidae	
<i>Neocunaxoides whartoni</i> (Baker et Hoffmann)	2 ♀ ♀
Pygmephoridae	
<i>Pygmephorus</i> sp. (damaged)	1 ♀
Astigmata	
Acaridae	
Gen sp. (hypopus)	1
Glycyphagidae	
Gen. sp. (nymphs)	21
<i>Xenoryctes</i> sp. (hypopi)	20
Listrophoridae	
<i>Afrolistrophorus apodemi</i> Fain*	160 ♂ ♂, 87 ♀ ♀
SIPHONAPTERA	
Hystriechopsyllidae	
<i>Neopsylla specialis</i> Jordan**	5 ♂ ♂, 6 ♀ ♀

*: Parasite usually found on *Apodemus speciosus* in Japan.

** : New to Japan

The acari and flea taken from the *Apodemus* mouse on Nakanoshima Island in July and November, 1981, are listed in Table 1. The asterisked species are ectoparasites of the mouse, though there are unsolved problems on the feeding habits of *Eucheyletia* nr. *sinensis* Volgin that is now on hand of Dr. Nobuo Kumada, Nagoya University, for identification, and the remainders are nidicolous or accidentally adhered species.

The di-asterisked 2 species are new to Japan. Although *Haemogamasus quadrisetatus* Vitzthum taken from *Apodemus speciosus* and *Urotrichus talpoides* in Honshu, Japan, was once recorded by Asanuma *et al.* (1952), the present specimens of the mite are separable from their specimens as described below. Thus the mites represent a form new to Japan. On the other hand, the flea *Neopsylla specialis* Jordan has not so far been recorded in Japan. Kumada (1958) originally described *N. japonica* as a subspecies of *N. specialis*, but the flea has been elevated to a full species. A form of the mite and the flea newly recorded in the present study are regarded as the faunal components of the Oriental region, reflecting a southern range of the *Apodemus* mouse.

All the mono-asterisked species of the mites have repeatedly found on *A. speciosus* in Japan. Some are permanent parasites suggestive of the taxonomical or phylogenetic position of their host. Among such the species, *Myobia nodae* Matuzaki, *Paraspeleognathopsis bakeri* Fain and *Afrolistrophorus apodemi* Fain are known to occur only on *A. speciosus* in Japan, and, especially, *M. nodae* is thought to be specific to *A. speciosus* spp. The *Apodemus* mouse from Nakanoshima Island, thus, shares too many important parasitic mites with *A. speciosus* not to be conspecific with the latter. On recording the endoparasites of the same mouse from Nakanoshima Island, Yagi *et al.* (1983) already identified the host mouse as *A. speciosus*. The present authors agree with the above treatment of the mouse.

Some of the unasterisked species or their relatives have been found so often on the small mammals of Japan. Although the glycyhagid mite, *Lophioglyphus japonensis* Lukoschus, Kroos et Uchikawa, is known to be adherent to the tail and nest of *A. speciosus* (Lukoschus *et al.*, 1977), the nymphs taken in the present study are different from those of *L. japonensis*.

Morphology of a form of *Haemogamasus quadrisetatus* Vitzthum and *Neopsylla specialis* Jordan new to Japan.

Haemogamasus quadrisetatus Vitzthum

The mite was described by Vitzthum (1926) on the female from *Mus lepturus* in Java. Then, Asanuma *et al.* (1952) reported an aberrant form of the female with the modified dorsal shield from Japan, and presented its detailed morphology. Delfinado (1960) provided the definition of the mite with the further variant female from *Macaca philippinensis mindanensis* in Mindanao as the mite being a variable species. Additional records of the mite from Java, New Guinea, Taiwan and Viet Nam were presented by Allred

(1969). Although 3 males were included in the material of Allred (1969), detailed morphological accounts have so far been given only for the female.

Female (Fig. 1). Dorsal shield broadly rounded or with weak projection posteriorly (Fig. 1). Two pairs of long and sinuate setae present subterminally on idiosoma, and a pair of setae of almost the same nature antero-lateral from the preceding ones. Internal seta on palpal trochanter inflated and with weakly dentate margin. Other structures and setal nature as in Asanuma *et al.* (1952).

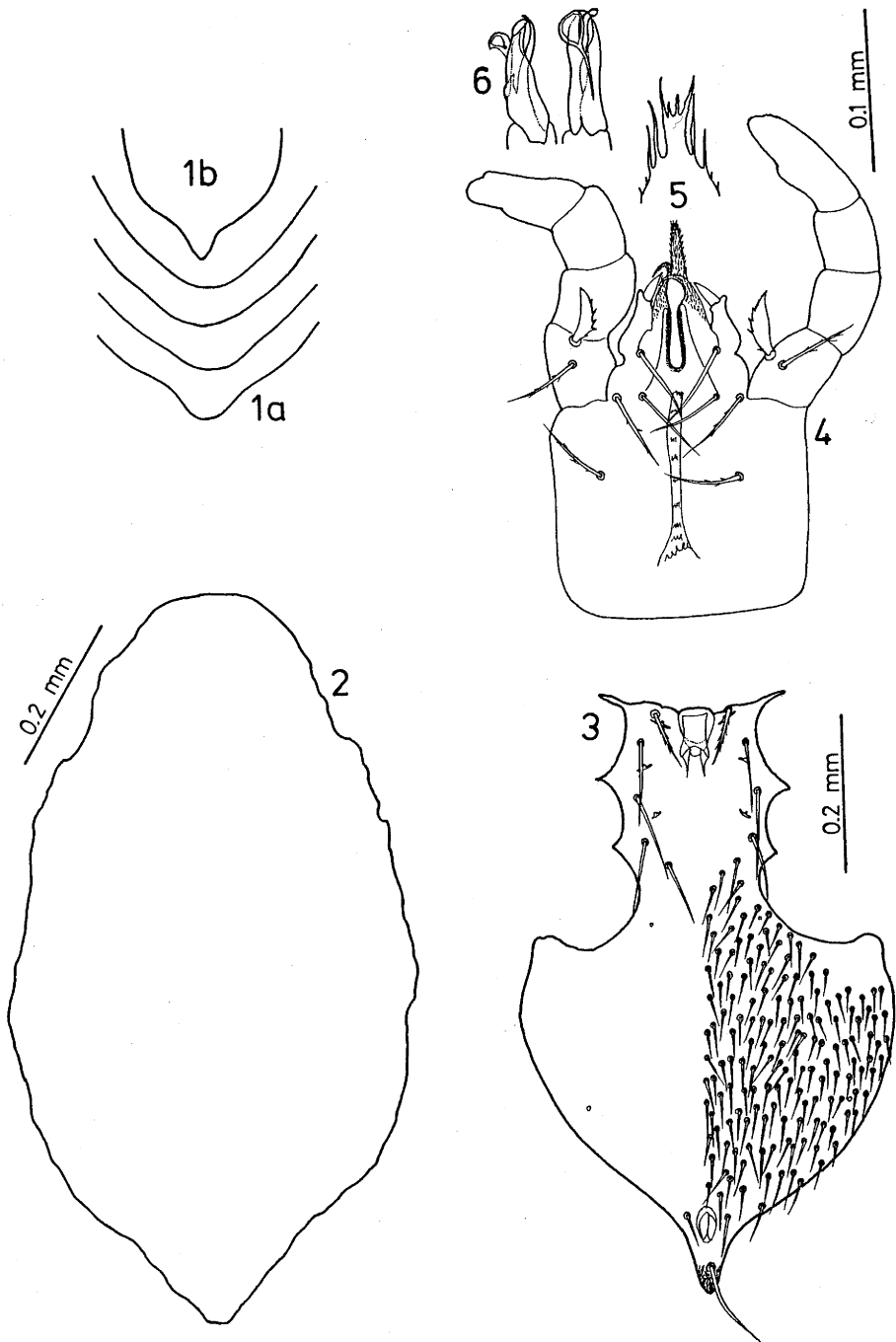
Male (Figs. 2-6). Dorsal shield irregularly demarcated, leaving idiosoma uncovered laterally; posterior margin narrowed, reaching to end of idiosoma (Fig. 2); setae densely covering the shield very weakly serrate. Postero-lateral setae dorsally on soft integument serrate and longer than those on dorsal shield; 3 pairs of long and sinuate setae present as in female, but anterior pair being distinctly shorter than subterminal 2 pairs. Holoventral shield as in Fig. 3; posterior-most part narrow and long; 1st sternal setae feathered and 2nd sternal to metasternal setae nude; accessory setae on the shield posterior to metasternal setae almost nude, excluding some marginal weakly serrate ones; nude adanal setae and serrate post anal seta flanking anus. Postero-lateral setae ventrally on soft integument rather long and serrate. Gnathosoma, inclusive of structure of chelae, epistome and deutosternum, as in Figs. 4-6; internal seta on palpal trochanter conspicuous in its formation.

Duetonymph (Figs. 7-9). Dorsal shield with a pair of deep lateral invaginations at posterior one third, leaving dorsum widely uncovered (Fig. 7). Three pairs of conspicuous, sinuate setae posteriorly on soft integument as in adult stage. Sterno-genital shield narrowed posterior to metasternal setae; 1st sternal setae feathered (Fig. 8). Anal shield lacking accessory setae (Fig. 9). Legs and gnathosoma essentially as in female. Leg setae, excluding some ones spico-ventrally on each tarsus, lightly feathered.

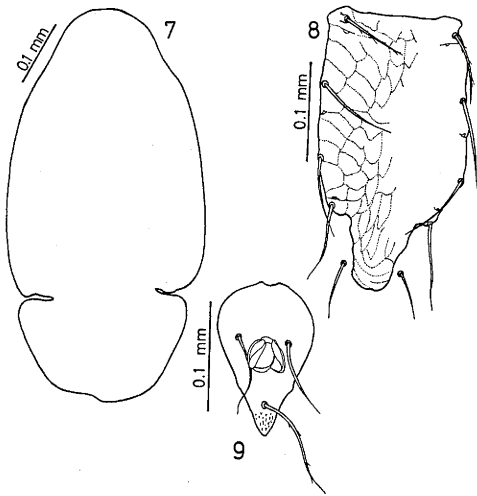
Material examined. Four males, 5 females and 6 deutonymphs as in Table 1, of which only a female was taken in July, 1981, and all the other specimens on November 15 and 18, 1981.

H. quadrisetatus Vitzthum is characterized by the elongate, membranous and edentate chelae on the chelicera and by the paired elongate setae subterminally on the idiosoma. The morphology of the female specimens from Nakanoshima Island well accords with that of the Philippine specimen presented by Delfinado (1960).

Radovsky (1960a) established the *H. liponyssoides* complex basing on the long slender chelae in the female, but did not relegate *H. quadrisetatus* to this complex. In addition to the cheliceral structure, the species of the complex are said to share following features: The deutonymphs lacks lateral invaginations in the dorsal plate. There nor-



Figs. 1-6. A form of *Haemogamasus quadrisetatus* Vitzthum, adult. 1a-Posterior part of the female dorsal shield. 1b-Posterior part of the female dorsal shield of the specimen from Honshu, Japan (from Asanuma *et al.*, 1952, scale not the same to that for 1a). 2-Male dorsal shield. 3-Holoventral shield (male). 4-Ventral view of gnathosoma (male). 5-Epistome (male). 6-Chelae (male).



Figs. 7-9. A form of *Haemogamasus quadrisetatus* Vitzthum, deutonymph.
7-Dorsal shield. 8-Genito-ventral shield. 9-Anal shield.

mally are 7 accessory setae on the female anale shield, arranged in a characteristic pattern. All setae on legs, gnathosoma and female sternal shield are smooth (Dadovsky, 1960a). *H. quadrisetatus* is, distinct in having the deutonymph with the dorsal shield laterally invaginated, and the female with serrate setae on the legs, gnathosoma and sternal shield.

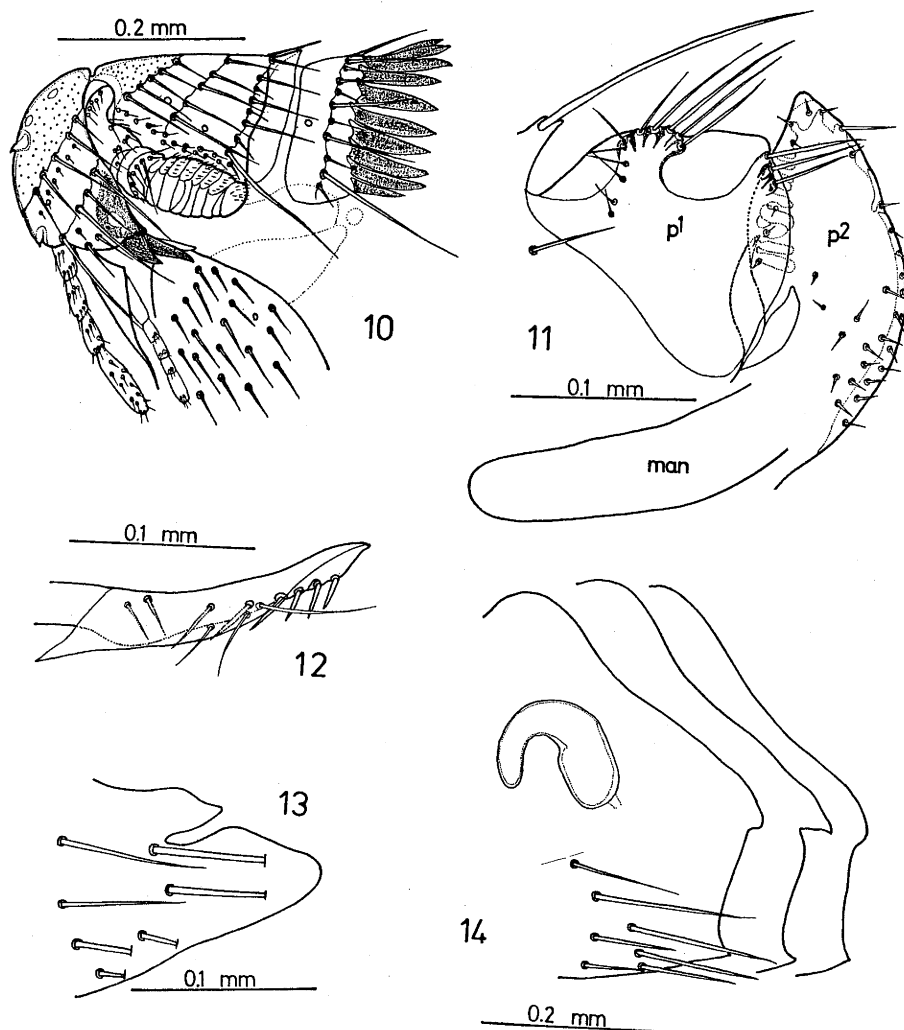
Radovsky (1960b) demonstrated that such the species as *H. liponysoides* was the obligatory parasite, while the other species of the complex was not. Accordingly, the feeding habit is not the same among the species with the chelicerae provided with the long slender chelae in the female. It is, however, reasonable to postulate that the feeding habits of the mites with such the chelae as above are different from those of other species of the genus *Haemogamasus* with another type of the chelae.

Neopsylla specialis Jordan

Neopsylla specialis Jordan was described on the two males taken from *Apodemus agrarius* in Yunnan (Jordan, 1932). Then, the partner female was found by Li in 1950-51 (Li *et al.*, 1964) Li (1956) recorded *Apodemus agrarius*, *Rattus norvegicus*, *R. flavipectus*, *Eothenomys melanogaster* and *Crocidura attenuata* from Yunnan or Kweiyuan as the hosts of the flea, and Li *et al.* (1964) further added the hosts and localities with description of the 2 new subspecies. Jameson and Hsieh (1971) recorded the flea from Taiwan, and mentioned that Taiwan *N. specialis* most closely resembled the nominate subspecies from Yunnan, and that all records were from the western slopes of the mountains from about 2,100m elevation to 2,500m, though records reflect, in part, the activity of the collectors.

Male (Figs. 10-13). Clypeal tubercle small. Ocular row of 4 long setae; frontal row of 6 moderately long setae; about 7 minute setae in a row between frontal and ocular

rows of setae; 1 minute and 2 moderate setae in front of eye. Two genal teeth overlapping. Eye not pigmented. Three rows of setae on postantennal area; minute and long setae arranged alternately only in the third setal row. About 15 minute setae along posterior margin of antennal fossa. Pronotum with a single row of fine and stout setae arranged alternately, and with pronotal comb of 11 teeth per side (Fig. 10). Spinelets on terga I-V 2, 2, 2, 1(2) and 1, respectively. Manubrium of clasper weakly curved and cylindrical apically (Fig. 11). Fixed process of clasper (p^1) bearing 4-5 long and 6 minute setae antero-dorsally and 3-4 moderate setae marginally on dorsoposterior part;



Figs. 10-14. *Neopsylla specialis* Jordan. 10-Head and pronotum (male). 11-Clasper: Fixed digit (p^1), movable digit (p^2) and apex of manubrium (male). 12-Apex of sternum IX (male). 13-Posterior part of sternum VIII (male). 14-Spermatheca and sternum VII (female).

movable process of clasper (p^2) stout and with a blunt tip (Fig. 11). Apex of sternum IX with membranous lobe bearing fine setae; 5 spiniform setae ventrally on apex (Fig. 12). Sternum VIII membranous, narrowed and with rounded tip (Fig. 13).

Female (Fig. 14). Setation on head and pronotum, pronotal and genal comb and spinelets on abdominal terga essentially as in male. Postero-dorsal margin of sternum VII variable, but usually bearing hook-like process as in *Neopsylla sasai* Jameson and Kumada (Fig. 14).

Material examined. Five males and 6 females as in Table 1, of which only a female was taken on July 29, 1981, and all the other specimens during the period between November 7 and 24, 1981.

Although the flea was not identified to the subspecies level, it should be relegated to the nominate subspecies. The Japanese *Neopsylla*, thus, comprises 4 species, inclusive of *N. specialis*. Newly recorded *N. specialis* is very close to *N. japonica* distributed in Kyushu, Shikoku and probably in Yamaguchi Prefecture (Sakaguti, 1962). The males of both the species are separable from each other by the form of the manubrium of clasper and the membranous terminal lobe of sternum VIII. The females of the two species are very easily separable by the form of sternum VII.

The outline of the present paper was read at the 36th annual meeting of the Japan Society of Sanitary Zoology (Hiroshima) in April, 1984.

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トカラ列島の医動物学的研究—中ノ島の *Apodemus* の外部寄生虫の記録

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著者の一人鈴木はトカラ列島から未記録であった *Apodemus* 属のネズミを中ノ島で多数採集した。本報では、このネズミの体表に認められた外部寄生虫を記録した。また、同時に採集された付着便乗種をも併わせて示した。両者をあわせた種類数は、ノミ類1, ダニ類3亜目9科12属に属す13の合計14であった (Table 1)。寄生ダニ類が、これまで本邦各地でアカネズミから記録されてきた種類と共通していることから、トカラ列島ではじめて見つかった宿主の *Apodemus* は、アカネズミ *A. speciosus* であろうと考える。なお、ノミ類の1種 *Neopsylla specialis* とアンボソダニの1種 *Haemogamasus quadrisetatus* の1型は、本邦未記録であったので、形態を示した。これらの外部寄生虫は、宿主の分布域の地理的分布の特徴を反映する東洋区の節足動物であろうと考える。

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