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NOTES ON THE GENUS *NOTOEDRES* RAILLIET, 1893, FROM EAST ASIAN HOSTS (ASTIGMATA: SARCOPTIDAE)*

by

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With 27 text-figures

ABSTRACT

Notoedres pahangi spec. nov. from *Rattus tiomanicus jalorensis*, *N. dohanyi* spec. nov. from *Tadarida mops*, *N. ismaili* spec. nov. from *Tadarida plicata*, *N. dewitti* spec. nov. from *Tadarida plicata* and hitherto unknown stages of *N. pseudomuris* Lavoipierre, 1968 (male and larva), *N. jame-soni* Lavoipierre, 1964 (larva), *N. musculi* (Kraemer, 1865) (larva), *N. alexfaini* Lavoipierre, 1968 (male and larva), *N. rajamanickami* Lavoipierre, 1968 (larva), *N. cheiromeles* Fain, 1959 (larva) and *N. tristis* Fain & Marshall, 1977 (larva) are figured and described. A key to the East Asian species of *Notoedres* is given.

INTRODUCTION

The last revision of the genus *Notoedres* Railliet, 1893 was made by Fain (1965). Since that date some new species have been described by Lavoipierre

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(1968) and Fain & Marshall (1977). During a stay at the Institute for Medical Research in Kuala Lumpur one of us (F.S.L.) obtained *Notoedres* specimens from freshly captured hosts. Additional material from the region had been collected from alcohol preserved hosts in museum collections. The new species and hitherto undescribed stages of known species will be described here. All measurements are given in microns (μm) in tabellated form. We follow the nomenclature of Fain (1965) for the chaetotaxy. For the hosts we have followed the nomenclature proposed by Corbet & Hill (1980).

Some remarks should be made about the chaetotaxy and solenidiotaxy of the legs in the genus *Notoedres*. The large number of specimens available allowed us to recognize some hitherto unknown structures. Fain (1965) and Lavoipierre (1968) mention two setae on the genua of legs I and II, one in a lateral and one in a dorsal median position. In various specimens the latter showed the shape and structure of a solenidion. It has the same localisation on the genu (dorso-anterior and median) as the solenidia on the tibia and tarsus (fig. 3B). Therefore we consider this structure to be a solenidion (σ_1). Close to this solenidion another structure is visible in several specimens, especially in the males of *N. pahangi* spec. nov. (fig. 4B). This may be a rudimentary sigma 2, a solenidion present in other genera of the Astigmata on the same place.

The large number of specimens also allowed a study of the gnathosoma. Figure 3D gives a ventral view of the gnathosoma of the female of *N. pahangi* spec. nov. The palps are short and consist of two segments. On the dorsal side one seta and one structure resembling a rudimentary seta are present on the second segment. The ventral side of the palps shows one solenidion and one spinose seta on the first segment and one seta on the second. On the gnathosoma one seta is present on the ventral side.

See p. 280 for abbreviations of collections.

KEY TO THE EAST ASIAN SPECIES OF THE GENUS *NOTOEDRES* RAILLIET, 1893

Females in Eastern Asia

- | | | |
|------|--|---|
| 1. — | Body elongated, anus terminal | 2 |
| — | Body globular or subglobular, anus on the dorsum | 3 |
| 2. — | Elongation in the podosoma, perianal setae not widely spaced | |
| | <i>N. (Neonotoedres) elongatus</i> Fain, 1963 | |
| — | Elongation in the opisthosoma, perianal setae widely spaced | |
| | <i>N. (Backeracarus) schoutedeni hyatti</i> (Fain, 1963) | |

3. — *g p* setae absent (fig. 22) 4
 — *g p* setae present (fig. 3) 8
4. — Central and posterior part of the dorsum scale-like 5
 — No scale-like structures on the dorsum 6
5. — Body length not exceeding 275 μm , dorsal setae strong
 *N. (Notoedres) cati* (Herring, 1838)
 — Average body length 400 μm , dorsal setae small
 *N. (N.) musculi* (Kraemer, 1865)
6. — *d 5* and *a* setae with furcate tips; *cx III* setae very short (average
 length 7 μm (figs. 20, 22) *N. (N.) ismaili* spec. nov.
 — *d 5* and *a* setae filiform; *cx III* setae longer 7
7. — Body length exceeding 750 μm , the *l 3* setae unequal in length to the *l 4*
 and *l 5* setae *N. (N.) tristis* Fain & Marshall, 1977
 — Body length not exceeding 400 μm , the *l 3* setae subequal in length to
l 4 and *l 5* setae (fig. 21) *N. (N.) dewitti* spec. nov.
8. — Dorsum completely striated (fig. 18) 9
 — Parts of the dorsum bare (fig. 1) 11
9. — Perianal setae with no furcate tips, epimera IV incurved
 *N. (N.) muris* (Megnin, 1877)
 — Perianal setae with furcate tips, epimera IV not incurved 10
10. — Striations on the dorsum faint, conspicuous secondary sclerotisations
 on the epimera II *N. (N.) rajamanickami* Lavoipierre, 1968
 — Striations on the dorsum conspicuous, no secondary sclerotisations
 on the epimera II *N. (N.) dohanyi* spec. nov.
11. — Less than 1/3 of the dorsal surface striated (fig. 15) 12
 — More than 1/3 of the dorsal surface striated (fig. 1) 13
12. — One pair of scale-like structures on the dorsum, posterior dorsal setae
 longer than the anterior dorsal setae
 *N. (N.) jamesoni* Lavoipierre, 1964
 — No scale-like structure on the dorsum, *l 3* setae long, all other dorsal
 setae shorter *N. (N.) cheiromeles* Fain, 1959

13. — A bare zone on the anterior half of the dorsum, posterior dorsal setae long (25–45 μm) *N. (N.) alexfaini* Lavoipierre, 1968
 — Anterior half of the dorsum striated, posterior dorsal setae less than 25 μm long 14
14. — No interrupted striations on the dorsum, hook-like appearance of the epimera III *N. (N.) pseudomuris* Lavoipierre, 1968
 — Striation in the central part of the dorsum interrupted, no hook-like appearance of the epimera III (fig. 1) *N. (N.) pahangi* spec. nov.

Males

1. — Large spines on the ventral side 2
 — No spines on the ventral side 3
2. — Average body length 180 μm , solenidia on the tibio-tarsi of legs IV not elongated *N. (Metanotoedres) miniopteri* Fain, 1959
 — Average body length 240 μm , solenidia on the tibio-tarsi of legs IV very long (25 μm) *N. (M.) verheyeni* Fain, 1959
3. — *sc i* setae almost twice as long as the *sc e* setae, solenidia on the tibio-tarsi of legs IV very long (27 μm)
 *N. (Backeracarus) schoutedeni* (Fain, 1959)
 — Difference in length of *sc i* and *sc e* setae smaller, solenidia on the tibia-tarsi of legs IV short 4
4. — *sh* setae twice as long as the *cx III* setae
 *N. (Notoedres) muris* (Megnin, 1877)
 — *sh* setae only slightly longer than the *cx III* setae 5
5. — Length of the pedicels of legs I and II less than 18 μm , length of the ventral setae less than 13 μm (fig. 4) 6
 — Length of the pedicels of legs I and II more than 23 μm , length of the ventral setae more than 18 μm (fig. 12) 7
6. — Transverse sclerite well developed, some striation on the anterior part of the dorsum (fig. 11) *N. (N.) pseudomuris* Lavoipierre, 1968
 — Transverse sclerite small, ending at the base of the epimera III, hardly any striation on the dorsum (fig. 4) *N. (N.) pahangi* spec. nov.

7. — *d 1* setae distinctly longer than the *sc i* setae
 *N. (N.) yunkeri* Fain, 1962
 — *d 1* setae subequal in length to the *sc i* setae
 *N. (N.) alexfaini* Lavoipierre, 1968

Larvae

1. — *sc i* setae distinctly longer (19–20 μm) than the *sc e* (3–5 μm)
 *N. (Backeracarus) schoutedeni* (Fain, 1959)
 — No such difference present 2
2. — At least one pair of dorsal setae longer than 15 μm (fig. 24) 3
 — No dorsal setae longer than 15 μm (fig. 5) 6
3. — All anterior dorsal setae very small (less than 5 μm), posterior dorsal
 setae with furcate tips (fig. 13)
 *N. (Notoedres) rajamanickami* Lavoipierre, 1968
 — Most of the dorsal setae long 4
4. — Heavy sclerotisations on the dorsal side, sternum ending forked.
 (figs. 26, 27) *N. (N.) tristis* (Fain & Marshall, 1977)
 — No sclerotized areas on the dorsum 5
5. — *d 1* setae very small (3 μm) (fig. 25) *N. (N.) dewitti* spec. nov.
 — *d 1* setae longer (11–13 μm) with furcate tips (fig. 24)
 *N. (N.) ismaili* spec. nov.
6. — Less than half of the dorsal surface striated, *sc i* setae not in the stria-
 ted area (fig. 15) 7
 — Half or more than half of the dorsal surface striated, *sc i* setae in the
 striated area (fig. 14) 10
7. — *l 4* setae much shorter than the *l 5* setae (fig. 16) 8
 — *l 4* setae not shorter than the *l 5* setae (fig. 15) 9
8. — *l 3* setae subequal in length to the *l 4* setae
 *N. (N.) oudemansi* Fain, 1965
 — *l 3* setae distinctly longer than the *l 4* setae (fig. 16)
 *N. (N.) alexfaini* Lavoipierre, 1968

9. — All posterior dorsal setae of approximately the same length (fig. 15)
 *N. (N.) jamesoni* Lavoipierre, 1964
 — *d* 4 and *l* 5 setae much smaller than the other posterior dorsal setae
 (fig. 17) *N. (N.) cheiromeles* Fain, 1959
10. — Posterior dorsal setae more than twice as long as anterior dorsal setae
 (fig. 14) 11
 — No such large differences present (fig. 8) 12
11. — Posterior dorsal setae with furcate tips *N. (N.) yunkeri* Fain, 1962
 — Posterior dorsal setae with rounded tips (fig. 14)
 *N. (N.) dohanyi* spec. nov.
12. — Dorsal striation wavelike (fig. 8) *N. (N.) musculi* (Kraemer, 1865)
 — No wavelike striation on the dorsum 13
13. — Striation of the dorsum complete, dorsal setae unequal in length (fig.
 7) *N. (N.) pseudomuris* Lavoipierre, 1968
 — No striation on the central part of the dorsum, all dorsal setae of ap-
 proximately the same length (fig. 5) *N. (N.) pahangi* spec. nov.

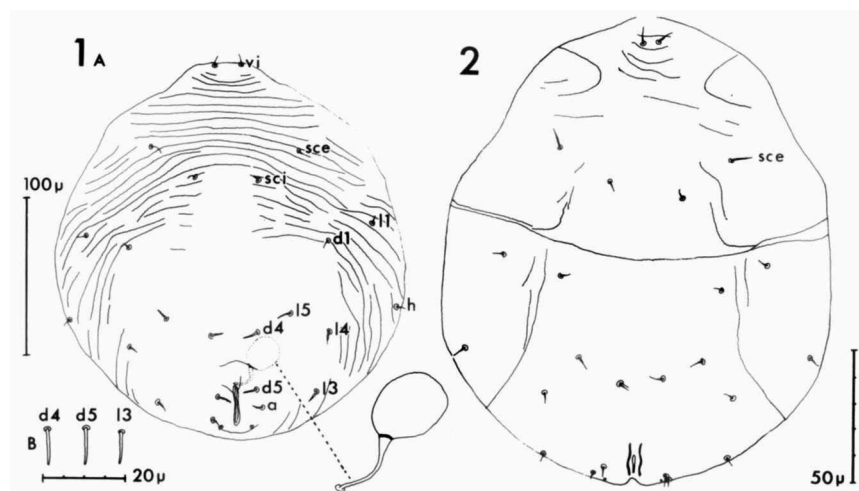
SYSTEMATICAL PART

***Notoedres pahangi* spec. nov.**
 (figs. 1–6)

This species is related to both *N. muris* (Megnin, 1877) and *N. pseudomuris* Lavoipierre, 1968. The distinguishing characteristic in the female is the interrupted striation of the dorsum. It can also be separated from the females of *N. muris* and *N. pseudomuris* by the shape of the epimera III and IV. The male differs from the male of *N. pseudomuris* in the shape of the transverse sclerite and in the striation of both dorsum and venter. The dorsal striation and the uniformity in length and shape of the dorsal setae are characteristic for the larva

Female. — Holotype, total length (including the gnathosoma) 264 μm and width 221 μm ; average of 10 paratypes, 281 (238–324) μm and 246 (190–278) μm respectively.

Dorsum (fig. 1A). Well marked striations encircle a bare disclike area on the posterior end of the dorsum. In the central part of the body these stria-



Figs. 1, 2. *Notoedres pahangi* spec. nov. 1, female (holotype); A, dorsum; B, some posterior dorsal setae; 2, male (allotype), dorsum.

tions are interrupted. Anterior dorsal setae smaller and finer than the posterior ones. Duct of the bursa copulatrix short with no convolutions.

Venter (fig. 3A). Discontinuous striations between coxae II and III. Epimera of legs I loosely united to form a sternum, the two components of which are clearly recognizable. Genital apodemes large and hook-like. The *sh* setae longer than the *h* setae. *gp* setae present. Terminal setae of legs III and IV nearly as long as the body. Measurements in Table I.

Male. — Allotype, total length 202 μm and width 151 μm ; average of nine paratypes 189 (168–211) μm and 146 (132–156) μm , respectively. Although the paratypes were specimens from different host species (five *Rattus tiomanicus jalorensis* (Miller, 1900), three *R. hoffmanni* (Matschie, 1887), one *R. adspersus penitus* (Miller & Hollister, 1921), no differences in measurements were apparent.

Dorsum (fig. 2). Surface divided into four clearly recognizable shields, the anterior half on the idiosoma consisting of one shield, the posterior half of three shields (one central, two lateral). Only a few striations are present on the anterior part. Dorsal sclerotisation in all specimens weak. Dorsal setae small and fine, *sce* being slightly longer than the other setae.

Venter (fig. 4A). A short sternum ends anterior to a poorly developed transverse sclerite. In some paratypes the sternum almost reaches this sclerite. Epimera II long. Hardly any striation. In the allotype one of the *gp* setae is missing, in one of the paratypes both of these setae are absent. In most paratypes however both *gp* setae are present. On the dorsal side of the genua of legs I

TABLE I: Measurements of dorsal and ventral setae in adults of *NOTOEDRES* spp. (In μm).

	<i>N. pahangi</i> spec. nov. ♀		♂		<i>N. pseudomuris</i> ♂Lavoipierre, 1968		<i>N. alexisani</i> ♂Lavoipierre, 1968		<i>N. ismaili</i> spec. nov. ♀		<i>N. dewitti</i> spec. nov. ♀		<i>N. dohanyii</i> spec. nov. ♀	
	holotype average	range (n = 10)	allotype average	range (n = 8)	figured specimen average	range (n = 10)	figured specimen average	range (n = 10)	holotype average	range (n = 3)	holotype average	range (n = 6)	holotype average	range (n = 7)
total body length	264	281-324	202	189-211	154	146-169	259	269-326	278	282-310	209	215-235	199	196-199
body width	221	246-278	151	146-156	116	114-126	192	204-233	204	226-259	154	171-194	165	172-185
vi	7	7-9	7	6-7	7	7-8	16	17-18	—	25-27	12	13-15	10	10-10
sci	6	6-8	5	5-7	7	7-8	12	13-15	66	—	66	—	5	6-7
sce	9	10-11	9	7-9	8	8-8	15	17-18	48	—	34	44-54	6	7-8
d1	6	6-6	5	5-5	7	6-7	10	12-14	61	—	53	—	6	6-7
d4	10	10-10	7	6-7	6	5-6	9	10-11	55	—	35	—	13	14-15
d5	10	10-10	6	5-6	7	6-7	12	13-14	17	17-19	18	—	16	16-17
t1	6	6-7	5	5-5	8	6-8	11	13-16	56	—	33	—	6	6-7
t3	8	8-8	5	4-5	5	4-5	13	13-16	47	—	37	—	7	8-9
t4	8	8-9	5	5-6	5	4-5	12	13-15	57	—	31	—	17	17-18
t5	10	10-10	8	7-8	7	6-8	9	10-10	58	—	45	—	16	17-18
a	7	7-8	4	3-4	5	6-6	13	13-14	17	17-20	26	25-28	14	14-15
h	6	7-8	7	6-8	8	7-9	16	18-22	31	—	38	—	7	6-7
sh	11	11-12	12	11-12	11	10-11	25	28-32	41	43-44	24	30-45	10	11-11
cx I	12	12-13	10	10-13	11	10-11	21	24-29	42	45-48	33	37-43	12	11-12
cx III	11	11-14	11	12-13	13	12-13	27	32-37	7	7-7	20	24-36	13	13-14
gp	8	7-10	12	11-12	7	6-7	11	11-13	—	—	—	—	7	6-7
pedicel on tarsus leg I	20	19-20	17	17-18	13	15-16	48	53-60	12	12-12	9	—	14	15-17
pedicel on tarsus leg II	19	19-20	18	17-18	15	14-16	51	56-62	11	11-11	9	—	14	15-16
pedicel on tarsus leg IV			10	10-11	9	9-10	33	38-43						
terminal seta on leg III	247	259-288	238	252-286	199	192-206	391	474-533	142	—	143	—	143	151-163
terminal seta on leg IV	269	271-305							180	—	143	—	190	224-262

and II a rudimentary solenidion σ 2 is visible near the σ 1 solenidion (fig. 4B). Terminal setae of legs III longer than the body. Measurements in Table I.

Tritonymph. — This nymph differs from the female in the absence of the genital slit, the genital apodemes and the *bursa copulatrix*. In other characteristics it resembles the female.

Protonymph. — The protonymph differs from the tritonymph in the absence of the *g p* setae and the setae on the trochanters of legs III.

Larva. — (figs. 5, 6): The chaetotaxy of the larva differs from that of the protonymph in the absence of the *a* setae. Total length of figured specimen 151 μm and width 108 μm , average of nine paratypes 143 (137–151) μm long and 102 (94–108) μm wide. The dorsal surface is striated as in the female but without interruptions. All dorsal setae small and fine and of subequal length. The *h* and *sh* setae subequal in length. Terminal setae of legs III slightly longer than the body. Measurements in Table II.

Eggs. — The average length of ten eggs was 156 (154–158) μm and the width 87 (79–97) μm .

Host and locality. — *Rattus tiomanicus jalorensis* (Miller, 1900) from Bukit Lanjan, Selangor, Malaysia, 7.v.1979, Medical Ecology, Kuala Lumpur,

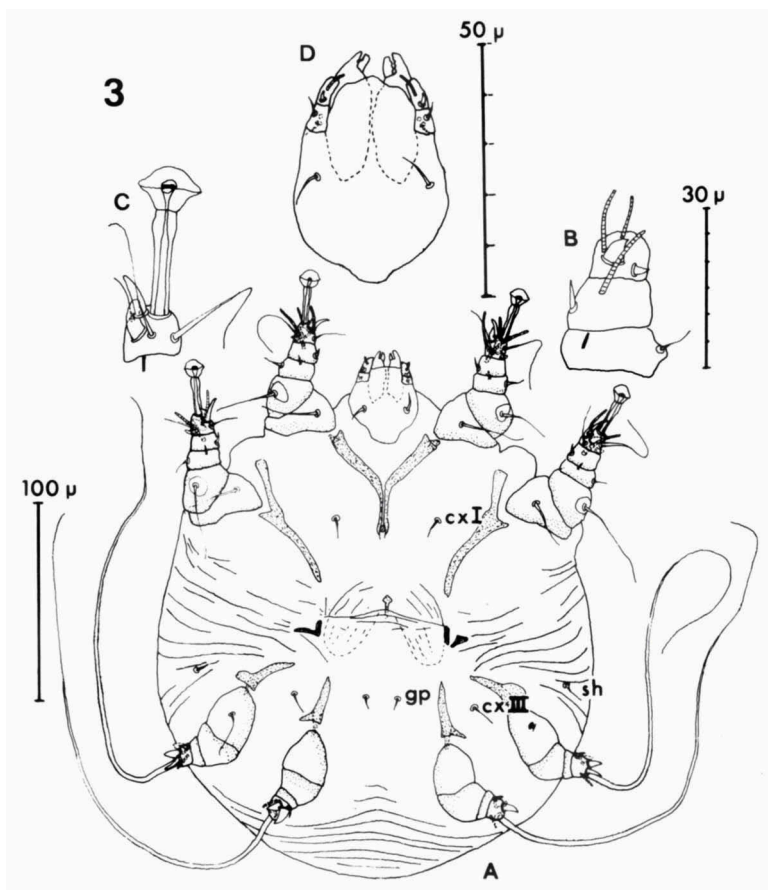


Fig. 3. *Notoedres pahangi* spec. nov.: 3A, female (holotype), venter; 3B, dorsal view of tarsus, tibia and genu of leg I; 3C, ventral view of the tarsus of leg I; 3D, gnathosoma venter.

coll.no. 110563 (holotype ♀, figured larva, 26 ♀, 5 ♂, 35 nymphs, 16 larvae); same host species from Subang Forest, Selangor, 7.v.1979, IMR, coll.no. 121 (Allotype ♂, 16 ♀, 15 nymphs, five larvae). The mites were taken from the dorsal pelvis region. *Rattus hoffmanni* (Matschie, 1887) from Indonesia, coll. Van Peenen, host in USNM, no. 502095 (17 ♀, three ♂, 16 nymphs, five larvae); *Rattus adspersus penitus* (Miller & Hollister, 1921) from Indonesia coll. Van Peenen, host in USNM, no. 502099 (five ♀, one ♂, two nymphs, three larvae); *Rattus argentiventer* (Robinson & Kloss, 1916) from Ulu Jenderam, Selangor, 1.iv.1979, IMR, coll.no. 180 (four ♀); *Rattus jerdoni* (Blyth, 1863) from Mt. Carin, Burma, 1885, coll. Fea, host in ZMH (five ♀, four nymphs, three larvae); *Rattus exulans* (Peal, 1848) from Mt. Katanglad, Mindanao, Philippine Isl., October 1965, coll. Bregulla, host in SMF, no. 30945 (21 ♀, six nymphs, eight larvae).

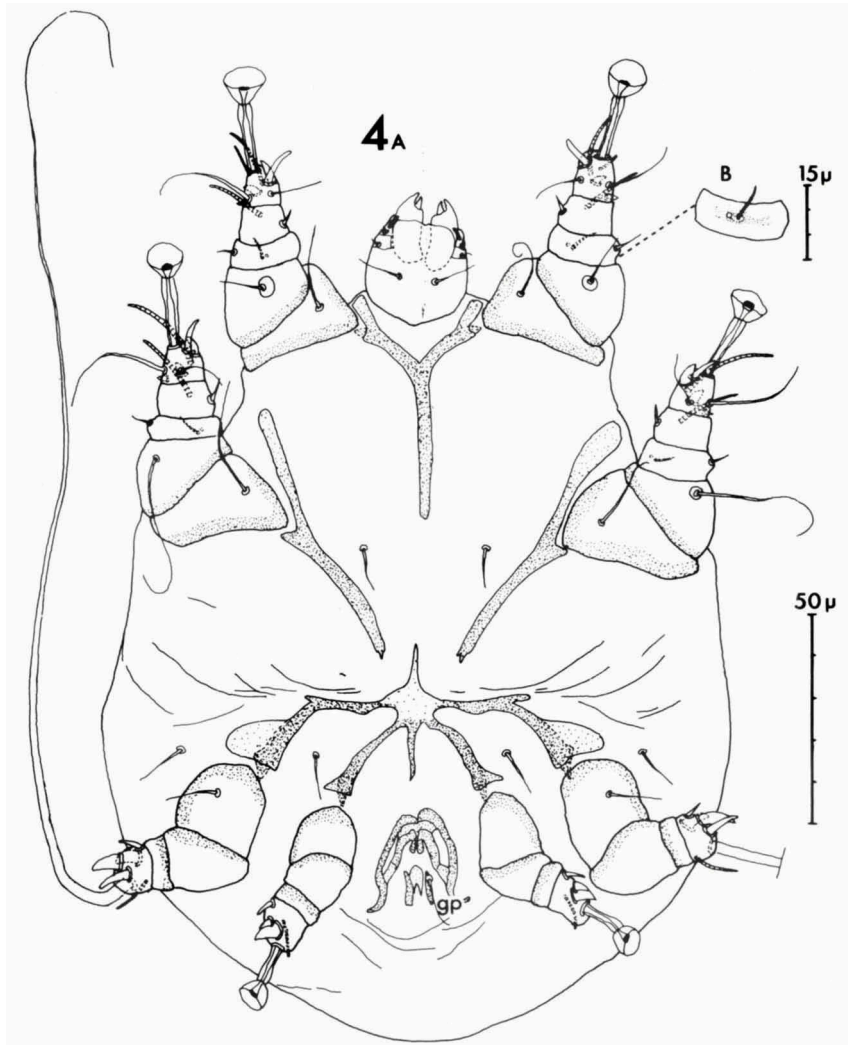
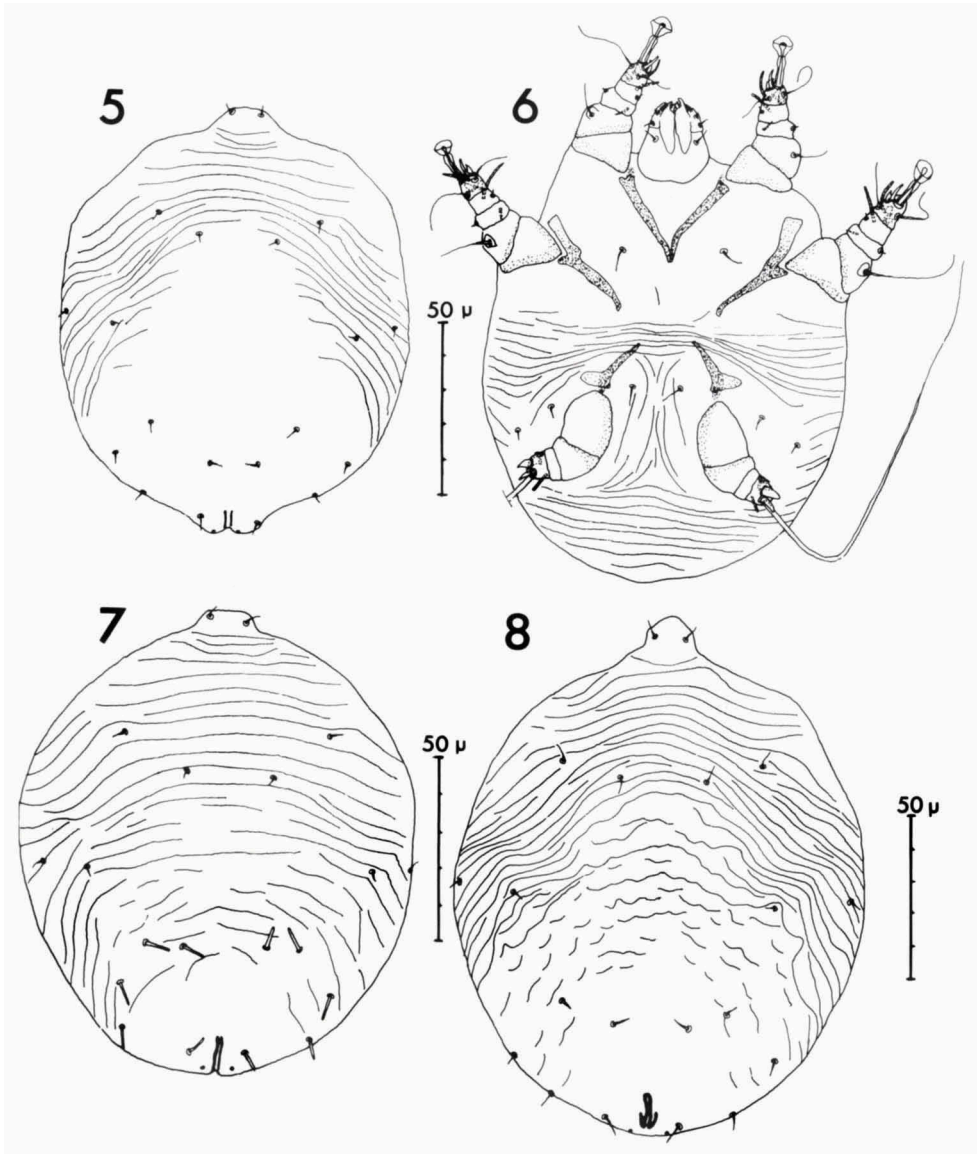


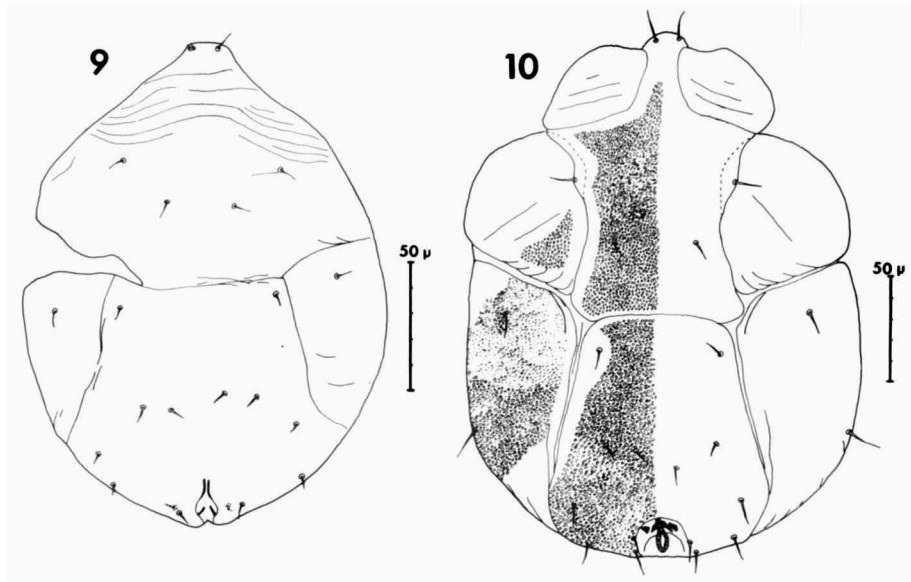
Fig. 4. *Notoedres pahangi* spec. nov. 4A, male (allotype), venter; 4B, dorsal view of genu I.

Deposition of types. — Holotype ♀ (coll.no. 1980.9.22.1), allotype ♂ (coll.no. 1980.9.22.3–4) and figured larva (coll.no. 1980.9.22.2) in British Museum (Natural History), London [= BM]. Paratypes in: Bernice P. Bishop Museum, Honolulu, Hawaii [= BBMH]; U.S. National Museum of Natural History (Smithsonian Institution), Washington D.C. [= USNM]; Senckenberg Museum, Frankfurt am Main [= SMF]; Zoologisches Museum, Hamburg [= ZMH]; Rocky Mountain Laboratory, Hamilton, Montana [= RMLH]; The Acarology Laboratory, Columbus, Ohio [= ALC]; Field Mu-



Figs. 5–8. *Notoedres* larvae. 5, 6, *Notoedres pahangi* spec. nov.; 5, dorsum; 6, venter; 7, *Notoedres pseudomuris* Lavoipierre, 1968, dorsum; 8, *Notoedres musculi* (Kraemer, 1865), dorsum.

seum of Natural History, Chicago [= FMNH]; Zoological Institute, Academy of Sciences, Leningrad [= ZIAC]; Institute of Parasitology, Prague [= IPP]; School of Veterinary Medicine, Davis, California [= SVM]; Muséum National d'Histoire Naturelle, Paris [= MNHN]; Rijksmuseum van Natuurlijke



Figs. 9, 10. *Notoedres* spec. 9, *N. pseudomuris* Lavoipierre, 1968, male dorsum; 10, *N. alexfaini* Lavoipierre, 1968, male dorsum.

Historie, Leiden [= RMNH]; Institute for Medical Research, Kuala Lumpur, Malaysia [= IMR]; Institut de Médecine Tropicale 'Prince Léopold', Antwerp, Belgium [= IMTA]; Department of Aquatic Ecology, Catholic University, Nijmegen, The Netherlands [= DAEN].

***Notoedres pseudomuris* Lavoipierre, 1968**
(figs. 7, 9, 11)

Notoedres pseudomuris Lavoipierre, 1968: 316.

The female of this species was described by Lavoipierre (1968) from *Mus musculus homoourus* (Hodgson, 1845) (= *Mus formosanus* Kuroda) captured in Taiwan. For our study many specimens were available found on *Apodemus sylvaticus semotus* (Thomas, 1908) caught in Taiwan. Among these specimens were males and larvae which will be described.

Male. — Total length of figured specimen 154 μm and width 116 μm ; average of ten paratypes 146 (124–169) μm and 114 (96–126) μm respectively.

Dorsum (fig. 9). Dorsum divided into four shields, one on the anterior half and three comprising the posterior half (one central, two lateral). Some striation on the anterior part of the idiosoma. Sclerotinisation in all specimens weak. All dorsal setae small and fine.

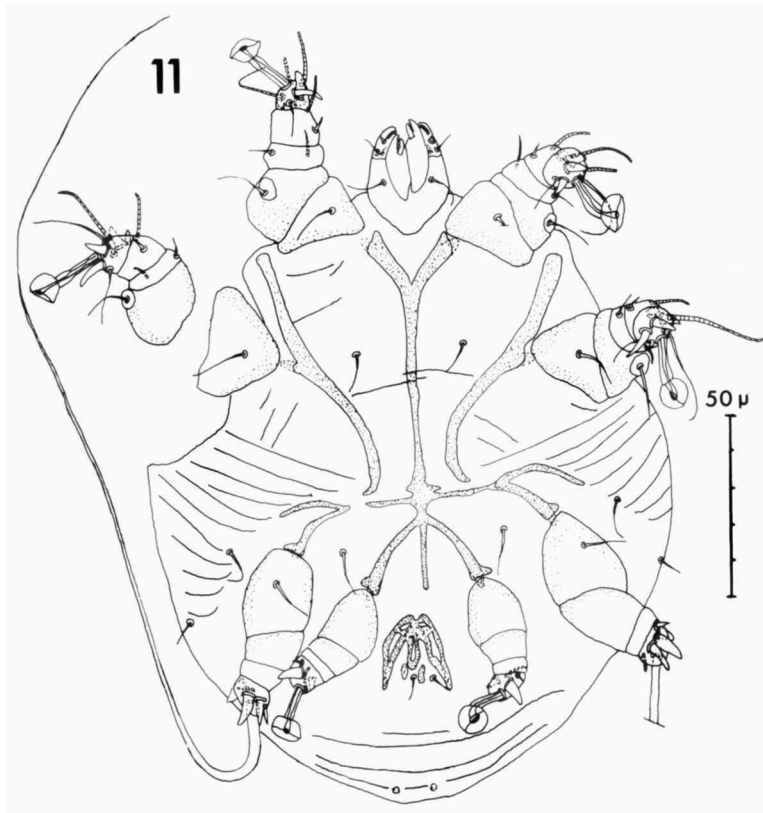


Fig. 11. *Notoedres pseudomuris* Lavoipierre, 1968, male venter.

Venter (fig. 11). Sternum long, reaching a well developed transverse sclerite. Epimera II almost reaching this sclerite. Conspicuous striations present between legs II en III. Measurements in Table I.

Larva (fig. 7). Length of figured specimen 137 μm and width 115 μm ; average of nine larvae 124 (108–139) μm and 106 (91–118) μm , respectively. Dorsum striated except for a small area around the anus. The striation is broken on the posterior half of the idiosoma. Anterior dorsal setae small, posterior setae longer and spinose with rounded tips. Measurements in Table II.

Eggs. — The average length of ten eggs was 129 (122–136) μm and the width 82 (75–92) μm .

Hosts and locality. — *Apodemus sylvaticus semotus* (Thomas, 1908) from Chuei-Feng, Formosa, coll. R.F. Kuntz, host in USNM, no. 334382 (figured specimens of ♂ and larva, 56 ♀, 13 ♂, 35 nymphs, 23 larvae). The mites were taken from the hair follicles in the tail. *Mus musculus commissarius*

TABLE II. Measurements of some setae in larvae of NOTOEDRES spp. (in μm).

	<i>N. pahangi</i> Lavoipierre, 1968		<i>N. pseudomuris</i> Lavoipierre, 1968		<i>N. jamesoni</i> Lavoipierre, 1964		<i>N. musculi</i> (Kramer, 1865)		<i>N. alexfaini</i> Lavoipierre, 1968		<i>N. rajamanickami</i> Lavoipierre, 1968	
	figured specimen average	range (n = 9)	figured specimen average	range (n = 8)	figured specimen average	range (n = 6)	figured specimen average	range (n = 10)	figured specimen average	range (n = 7)	figured specimen average	range (n = 6)
total body length	151 143 137 151		137 124 108 139		115 120 115 125		163 153 140 168		106 105 91 115		125 124 120 137	
body width	108 102 94 108		115 106 91 118		84 82 70 86		132 114 98 132		72 75 65 82		94 84 74 94	
sci	4 4 3 4		3 4 3 5		4 5 4 5		6 6 5 7		3 3 2 3		3 3 2 3	
sce	5 5 4 6		5 6 5 6		5 6 5 6		6 6 6 7		5 5 4 5		3 3 2 3	
d1	3 3 3 4		3 3 3 4		4 4 4 5		4 4 4 5		3 3 3		3 3 3	
d4	5 5 5		8 7 7 8		7 7 6 7		6 6 6 7		6 6 5 6		17 17 15 17	
d5	5 4 5 7		8 8 7 8		6 6 5 6		8 7 6 8		8 8 7 8		20 19 18 21	
h	4 4 3 4		3 3 3 4		4 4 3 4		5 5 5		2 3 2 3		2 3 2 3	
sh	5 5 4 5		4 5 4 6		7 7 5 7		7 7 6 8		3 3 3		8 8 7 8	
cx I	8 7 7 8		9 8 7 9		9 9 8 9		12 11 11 12		7 7 7		- 10 9 10	
cx III	8 7 6 8		10 9 8 10		10 9 8 10		11 12 11 13		7 7 7		11 10 10 11	
terminal seta of leg III	143 161 142 182		139 127 110 139		113 123 106 142		185 180 170 190		- 128 120 137		166 159 154 166	

	<i>N. cheiromeles</i> Fain, 1959		<i>N. dahanyi</i> spec. nov.		<i>N. ismaili</i> spec. novi		<i>N. dewitti</i> spec. novi		<i>N. tristis</i> Fain & Marschall, 1977	
	figured specimen average	range (n = 3)	figured specimen average	range (n = 7)	figured specimen average	range (n = 5)	figured specimen average	range (n = 5)	figured specimen average	range (n = 8)
total body length	86		118 108 101 118		98 101 98 103		82 85 82 96		166 157 144 166	
body width	55		94 80 74 94		72 72 70 72		55 60 55 65		110 109 101 125	
sci	3		4 4 3 5		41 39 36 45		35 35 31 37		29 30 29 35	
sce	2		4 4 3 5		22 23 22 25		16 15 13 16		19 19 17 20	
d1	-		4 4 3 4		12 12 11 13		3 3 3		16 13 12 16	
d4	3 3 3 4		8 9 7 10		31 28 24 31		19 18 16 20		16 18 16 19	
d5	8 8 8		10 10 9 12		26 25 20 29		16 19 16 22		10 11 9 12	
h	2		3 3 3		27 27 23 31		23 22 20 23		15 17 14 21	
sh	2 2 2		7 8 6 8		27 26 24 28		19 17 15 19		26 24 19 26	
cx I	5 5		- 7 7 8		33 31 26 35		19 19 18 22		15 14 13 16	
cx III	4 5 4 5		9 10 8 10		34 29 27 34		16 18 16 22		26 29 26 32	
terminal seta of leg III	113 100 86 113		110 116 108 127		77 81 77 84		58 58 55 62		175 181 166 190	

(Mearns, 1905) from Iloilo, Philippine Isl., September 1912, coll. C. Fox, host in USNM, no. 175766 (six ♀, one nymph, two larvae).

Deposition of specimens. — Figured specimens in Washington (USNM); other specimens in London (BM), Davis (SVM), Honolulu (BBMH), Columbus (ALC), Chicago (FMNH), Kuala Lumpur (IMR), Antwerp (IMTA), Nijmegen (DAEN).

Notoedres jamesoni Lavoipierre, 1964 (fig. 15)

Notoedres jamesoni Lavoipierre, 1964: 8.

The description of this species is based on a female taken from an unidentified rat, collected in Vietnam. During these investigations several females and larvae were found on *Rattus annandalei* (Bonhote, 1903) caught in Malaysia.

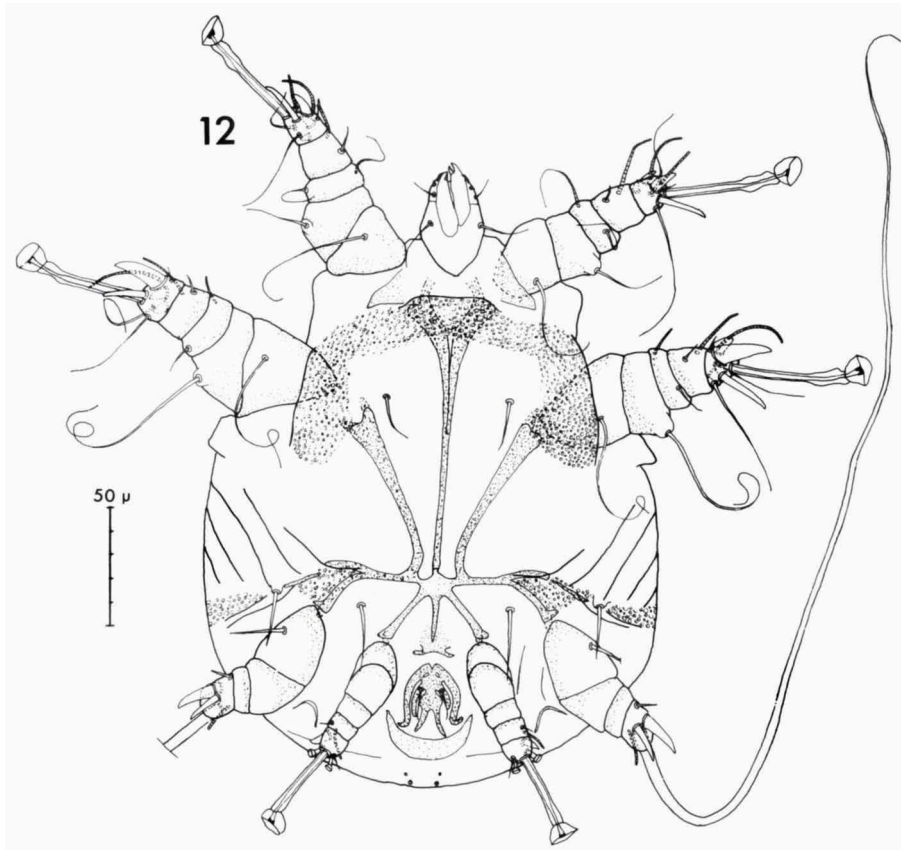


Fig. 12. *Notoedres alexfaini* Lavoipierre, 1968, male venter.

Larva (fig. 15). — Length of figured specimen 115 μm and width 84 μm ; average of six specimens 120 (115–125) μm and 82 (70–86) μm , respectively. Striations few, limited to the peripheral zone and encircling a large bare area. Anterior dorsal setae small, posterior setae longer and spinose with rounded tips. The *sh* setae distinctly longer than the *h* setae. Measurements in Tabel II.

Eggs. — The average length of 11 eggs was 136 (122–148) μm and the width 79 (68–87) μm .

Hosts and locality. — *Rattus annandalei* (Bonhote, 1903) from Subang Forest, Selangor, 7.v.1979, IMR, coll.no. 117 (22 ♀, five larvae); *Rattus tiomanicus jalorensis* (Miller, 1900) from Bukit Lanjan, Selangor, 7.v.1979, Medical Ecology, Kuala Lumpur, no. 110575 (one ♀); same host from Subang Forest, Selangor, 7.v.1979, IMR, coll.no. 121 (one ♀, one larva); *Rattus argentiventer* (Robinson & Kloss, 1916) from Ulu Jenderam, Selangor, 1.vi.1979, IMR, coll.no. 179 (two ♀).

Deposition of specimens. — Figured larva in London (BM); other specimens in Honolulu (BBMH), Washington (USNM), Kuala Lumpur (IMR), Leiden (RMNH), Antwerp (IMTA), Nijmegen (DAEN).

***Notoedres musculi* (Kraemer, 1865)**

(fig. 8)

Sarcoptes musculi Kraemer, 1865: 225.

Notoedres musculi Oudemans, 1926: 179.

N. musculi was briefly described by Kraemer (1865) from *Mus musculus* Linnaeus, 1758 trapped in Germany. Oudemans (1926) apparently overlooked the description of Kraemer and described the species under the same name from specimens of the same host species. Mites from *Apodemus agrarius mantchuricus* Thomas, 1898 have been compared with the type specimens of *Notoedres musculi* Oudemans, 1926, which the Rijksmuseum van Natuurlijke Historie, Leiden, kindly loaned to us. They proved conspecific. The larva of this species will be described here.

Larva (fig. 8). — Length of figured specimen 163 μm and width 132 μm , average of nine larvae 153 (140–168) μm long and 114 (98–132) μm wide. Striation of the dorsum complete, except for an area around the anus. In the central and posterior parts of the idiosoma the striation is wavelike, a characteristic, that distinguishes this larva from all other known larvae. All dorsal setae subequal in length and shape. Measurements in Table II.

Eggs. — The average length of ten eggs was 196 (185–207) μm and width 129 (121–136) μm .

Host and locality. — *Apodemus agrarius mantchuricus* Thomas, 1898 from Seoul, Korea, 30.v.1952, host in USNM, no. 297310 (figured larva, 54 ♀, one nymph, 18 larvae). The mites were taken from the tail.

Deposition of specimens. — Figured larva in Washington (USNM); females and larvae in London (BM), Columbus (ALC), Chicago (FMNH), Hamilton (RMLH), Hamburg (ZMH), Paris (MNHN), Prague (IPP), Leningrad (ZIAC), Leiden (RMNH), Kuala Lumpur (IMR), Antwerp (IMTA), Nijmegen (DAEN).

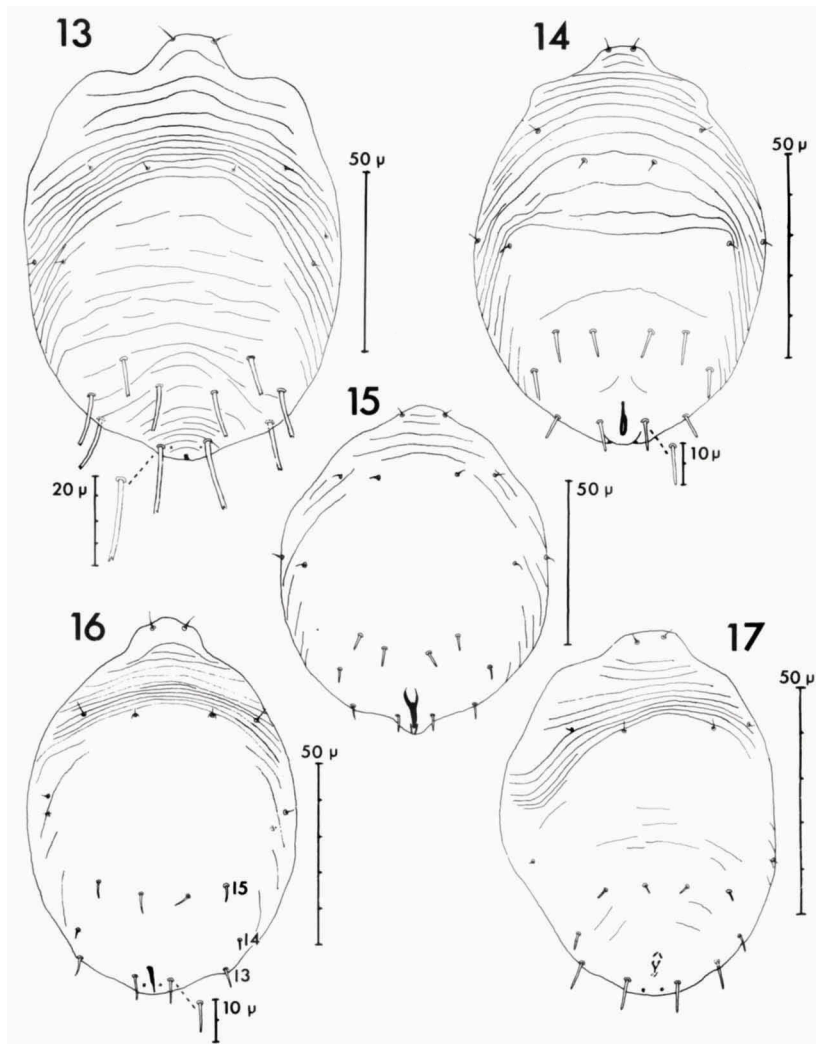
***Notoedres alexfaini* Lavoipierre, 1968**

(figs. 10, 12, 16)

Notoedres alexfaini Lavoipierre, 1968: 314 (in part).

Notoedres longisetosis Lavoipierre, 1968: 314 (in part).

The description of *Notoedres alexfaini* by Lavoipierre (1968) is based on



Figs. 13–17. *Notoedres* larvae. 13. *Notoedres rajamanickami* Lavoipierre, 1968, dorsum; 14. *Notoedres dohanyi* spec. nov., dorsum; 15. *Notoedres jamesoni* Lavoipierre, 1964, dorsum; 16. *Notoedres alexfaini* Lavoipierre, 1968, dorsum; 17. *Notoedres cheiromeles* Fain, 1959, dorsum.

five gravid females taken from the bat *Cheiromeles torquatus* Horsfield, 1824 caught in Singapore. On specimens of the same host species from Selangor, Malaysia and on *Cheiromeles torquatus jacobsoni* (Thomas, 1923) from Sumatra mites of this species have been collected during the present study. In this collection all stages are present. A large number of moulting stages allows us to give the life cycle. Protonymphs with short terminal setae on the tarsi of

legs III and IV (average length of terminal setae of legs III 76 (74–80) μm and of legs IV 76 (70–82) μm ; average length of the *cx III* setae 6 (5–7) μm , give rise to tritonymphs which exhibit a distinct sexual dimorphism. The female tritonymphs have long terminal setae (average length of terminal setae of legs III 286 (257–319) μm and of legs IV 386 (367–400) μm ; average length of *cx III* setae 25 (23–27) μm , the male tritonymphs have short terminal setae (average length of terminal setae of legs III 86 (75–96) μm and of legs IV 99 (86–111) μm ; average length of *cx III* setae 8 (7–8) μm . Tritonymphs forming females are equal in measurements and characteristics to *N. longisetosis* Lavoipierre, 1968 found on the same specimens of *Ch. torquatus* as the types of *N. alexfaini*. In his description Lavoipierre mistook them for females. Also he noted that in all of his three specimens the bursa copulatrix and even the opening of the duct were not visible. Unfortunately the type specimens of *N. alexfaini* and *N. longisetosis* are no longer available, thus we could not compare our specimens with the types. However, the good figures and the many measurements in Lavoipierre's description convinced us of the conspecificity of both nominal taxa. As first revisors of this species we select *N. alexfaini*, based on adults, as the valid taxon and we consider *N. longisetosis* a synonym of the latter. Male and larva will be described.

Male. — Total length of figured specimen 259 μm and width 192 μm ; average of ten specimens 289 (247–326) μm and 204 (178–233) μm , respectively. Among the measured males were five specimens taken from *Ch. torquatus jacobsoni* but no differences were noticed.

Dorsum (fig. 10). Surface divided in six shields which are partly overlapping. Most of the dorsal surface is sclerotized. Only parts of the anterolateral shields, the anterior parts of the antero-central shield and a small area around the anus are not sclerotized. These areas show some striation. The *sc e* setae are distinctly longer than the *sc i* setae.

Venter (fig. 12). Sternum long and reaching the transverse sclerite, as do the epimera III. The ventral surface shows some very unusual sclerotisations: directly posterior to the gnathosoma are two triangular flaps. Forming an arch from the beginning of the sternum to the bases of legs II, near the transverse sclerite and posterior to the genital region other sclerotisations are present. Ventral setae long and strong. Terminal setae of legs III much longer than the body. On the tarsi of legs IV two setae are transformed into small pedicels. Measurements in Table I.

Larva (fig. 16). — Length of figured specimen 106 μm and width 72 μm ; average of seven larvae 105 (91–115) μm and 75 (65–82) μm , respectively. Only a few striations on the dorsum, limited to the anterior and peripheral parts of the idiosoma. The anterior setae *sc i*, *d I* and *l I* very small, the *v i* and

sc e setae longer but fine. Posterior dorsal setae longer and spinose with rounded tips. Except for the characteristic short *l 4* setae all posterior setae are of subequal length. Measurements in Table II.

Eggs. — The average length of 12 eggs was 131 (122–137) μm and the width 78 (70–89) μm .

Hosts and locality. — *Cheiromeles torquatus* Horsfield, 1824 from Gombak Forest, Selangor, 4.v.1979, coll. Nadchatram (figured δ and larva, 17 f , nine δ , nine nymphs, six larvae); *Tadarida mops* (de Blainville, 1840) collected in the same tree knot-hole at the same time as *Cheiromeles torquatus* (one nymph); *Cheiromeles torquatus jacobsoni* (Thomas, 1923) from Sinabang, Simalur, Sumatra, July 1913, coll. E. Jacobson, host in RMNH, no. 1793 (five f , 23 δ , 69 nymphs).

Deposition of specimens. — Figured δ and larva in London (BM); other specimens in Leiden (RMNH), Washington (USNM), Honolulu (BBMH), Columbus (ALC), Chicago (FMNH), Hamilton (RMLH), David (SVM), Paris (MNHN), Hamburg (ZMH), Leningrad (ZIAC), Prague (IPP), Kuala Lumpur (IMR), Antwerp (IMTA), Nijmegen (DAEN).

***Notoedres rajamanickami* Lavoipierre, 1968**
(fig. 13)

Notoedres rajamanickami Lavoipierre, 1968: 315.

The description of this species is based on five females taken from *Cheiromeles torquatus* Horsfield, 1824 captured in Selangor, Malaysia. In this study, mites found on specimens of the same host species from Selangor and on *Cheiromeles torquatus jacobsoni* (Thomas, 1923) from Sumatra could be identified as *N. rajamanickami*. In addition to females, larvae and eggs were found.

Larva (fig. 13). — Length of figured specimen 125 μm and width 94 μm average of six larvae 124 (120–134) μm long and 84 (74–94) μm wide. Dorsum completely striated, striations being weak in the central and posterior parts with the exception of the anal region. Anterior dorsal setae very small and fine. The shape of the posterior dorsal setae is characteristic for this larva: long (15–20 μm) and furcate at the tips. On the ventral side the *h* setae are much smaller than the other ventral setae. Terminal setae of legs III distinctly longer than the body. Measurements in Table II.

Eggs. — The average length of ten eggs was 188 (180–197) μm and the width 87 (70–96) μm . One end of these eggs is more pointed.

Hosts and locality. — *Cheiromeles torquatus* Horsfield, 1824 from Gombak

Forest, Selangor, 4.v.1979, coll. Nadchatram (figured larva, four ♀, five larvae); *Cheiromeles torquatus jacobsoni* (Thomas, 1923) from Sinabang, Simalur, Sumatra, July 1913, coll. E. Jacobson, host in RMNH, no. 1793 (one ♀).

Deposition of specimens. — Figured larva in London (BM); other specimens in Kuala Lumpur (IMR), Antwerp (IMTA), Nijmegen (DAEN).

***Notoedres cheiromeles* Fain, 1959**

(fig. 17)

Notoedres cheiromeles Fain, 1959b: 151.

Female, tritonymph and egg of *N. cheiromeles* taken from *Cheiromeles torquatus* Horsfield, 1824 from Indonesia, are described by Fain (1959b). On specimens of the same host species from Selangor we found females and larvae of *N. cheiromeles*.

Larva (fig. 17). — Length of figured specimen 86 µm and width 55 µm. The striation on the dorsum is limited to the anterior part, with a few lines on the posterior part. Anterior dorsal setae small and fine, posterior setae spinose with rounded tips. The posterior dorsal setae show a striking difference in length, *d* 5 and *l* 3 being more than twice as long as the *d* 4 and *l* 5 setae. All ventral setae short. Measurements in Table II.

Hosts and locality. — *Cheiromeles torquatus* Horsfield, 1824 from Gombak Forest, Selangor, 4.v.1979, coll. Nadchatram (figured larva, two ♀, four larvae); *Cheiromeles torquatus jacobsoni* (Thomas, 1923) from Sinabang, Simalur, Sumatra, July 1913, coll. E. Jacobson, host in RMNH, no. 1793 (one ♀).

Deposition of specimens. — Figured larva in London (BM); other specimens in Leiden (RMNH), Kuala Lumpur (IMR), Antwerp (IMTA), Nijmegen (DAEN).

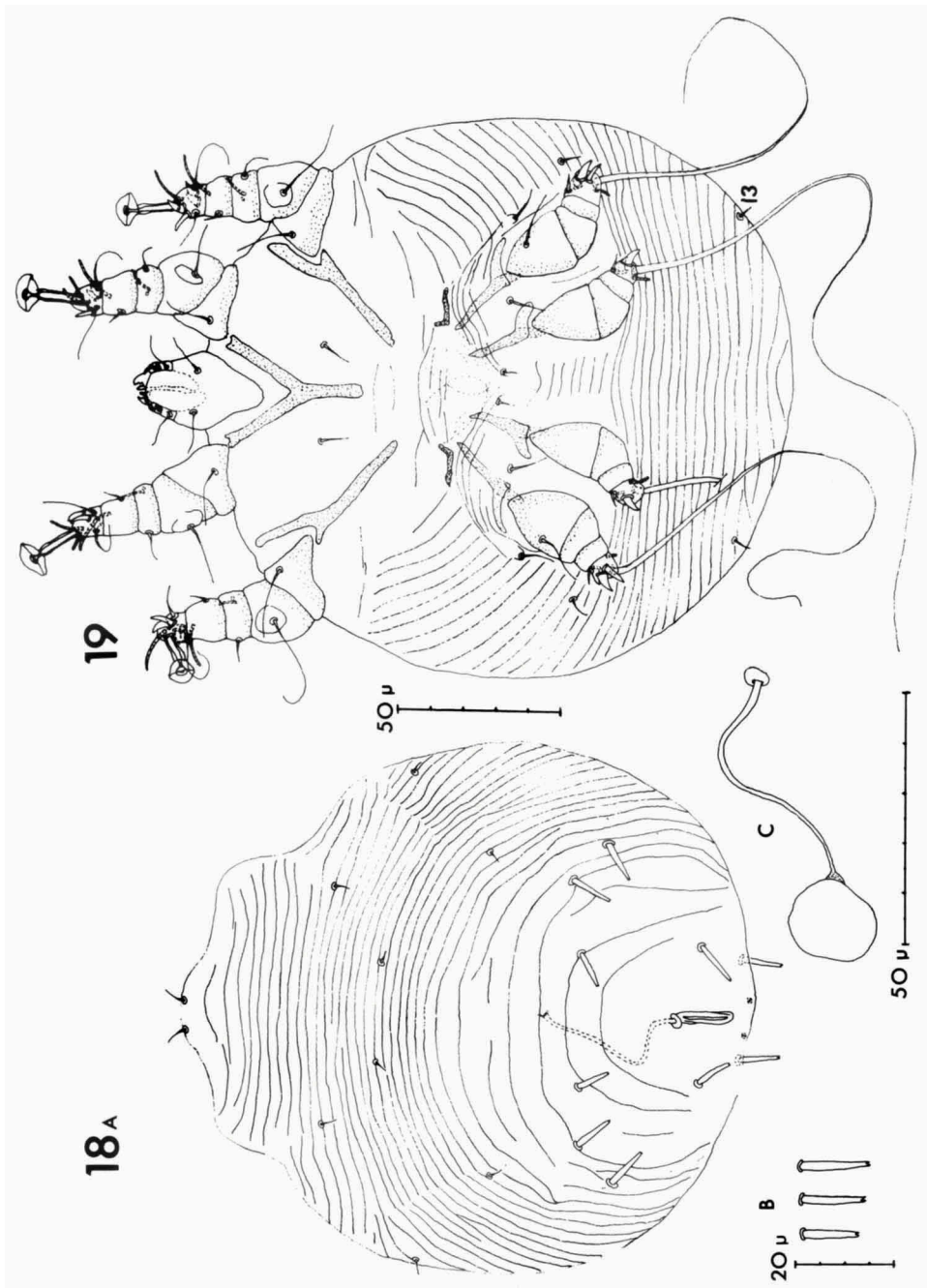
***Notoedres dohanyi* spec. nov.**

(figs. 14, 18, 19)

Notoedres dohanyi is a small species with a subglobular idiosoma resembling *N. tadaridae* Fain, 1959b. The female differs from *N. tadaridae* by the shape of the dorsal posterior setae and by the presence of the *g p* setae.

Female. — Holotype, total length 199 µm and width 165 µm; average of seven specimens 198 (196–199) µm and 172 (165–185) µm, respectively. Among the females measured were specimens from different hosts, but there were no differences in measurements.

Dorsum (fig. 18A). Dorsum completely striated, the striation being more



Figs. 18, 19. *Notoedres dohanyi* spec. nov. 18A–B, female (holotype); A, dorsum; B, some posterior dorsal setae; 18C, bursa copulatrix (paratype); 19, female (holotype), venter.

widely spaced in the anal region. Anterior dorsal setae small and fine, most posterior setae longer and spinose with furcate tips (fig. 18B). The *l 3* setae small without furcate tips. Duct of the bursa copulatrix long, without convolutions (fig. 18C, drawn from a paratype).

Venter (fig. 19). Sternum short, epimera III and IV almost straight. Posterior half of the idiosoma completely striated. The *sh* setae longer than the *h* setae, *gp* setae present. Genital apodemes large and hook-like. Terminal setae of legs III shorter; those of legs IV longer than the body. Measurements in Table I.

Larva (fig. 14). — Length of figured specimen 118 μm and width 94 μm ; average of seven specimens 108 (101–118) μm and 80 (74–94) μm , respectively. Among the measured larvae were specimens from two different host species. The dorsal striation is typical: the anterior half of the dorsum is completely covered with widely shaped striations, the posterior half shows striations on the lateral parts, thus leaving bare a large, almost square, area. Anterior dorsal setae small and fine, posterior setae longer and spinose with rounded tips. The *sh* setae almost twice as long as the *h* setae. Measurements in Table II.

Eggs. — The average length of 12 eggs was 142 (129–148) μm and the width 76 (68–80) μm .

The species is dedicated to Dr. Alexander L. Dohany, Head of the United States Army Medical Research Unit, Institute for Medical Research, Kuala Lumpur.

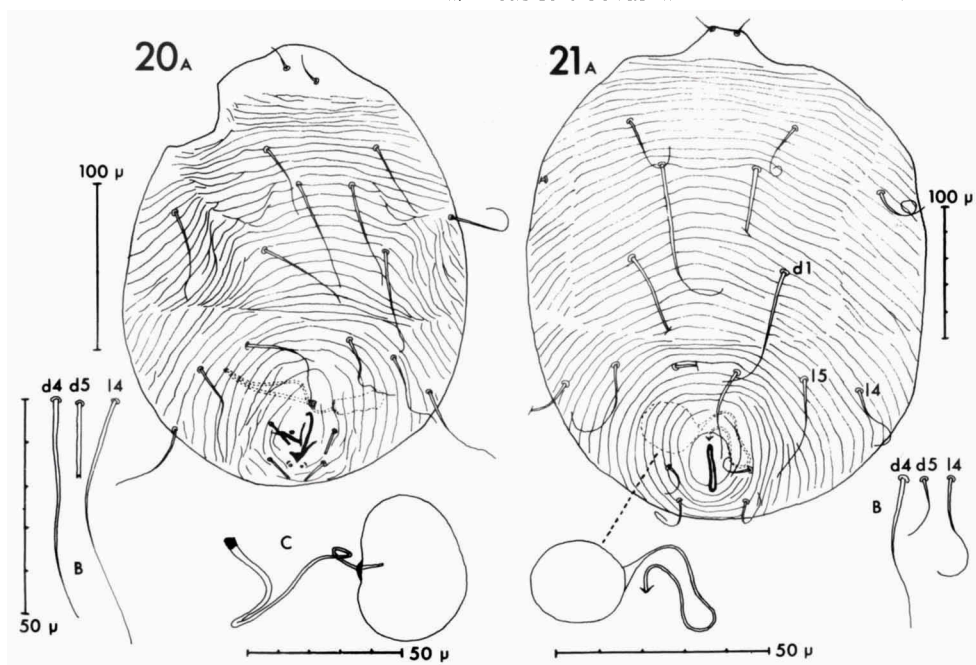
Hosts and locality. — *Tadarida mops* (de Blainville, 1840) from Gombak Forest, Selangor, 4.v.1979, IMR, no. 83 (holotype ♀, figured larva, four ♀, one nymph, four larvae); *Cheiromeles torquatus* Horsfield, 1824 collected in the same tree knot-hole at the same time as *Tadarida mops* (one ♀); *Tadarida plicata* (Buchanan, 1800) from Kuala Pilah, Negeri Sembilan, Malaysia, 9.v.1979, coll. Lukoschus (two ♀, three larvae).

Deposition of types. — Holotype ♀ (coll.no. 1980.9.22.24) and figured larva (coll.no. 1980.9.22.25) in London (BM); paratypes in Washington (USNM), Kuala Lumpur (IMR), Antwerp (IMTA), Nijmegen (DAEN).

***Notoedres ismaili* spec. nov.**

(figs. 20, 22, 24)

Notoedres ismaili resembles *N. tristis* Fain & Marshall, 1977 and *N. dewitti* spec. nov. The female can be distinguished from these species by the shape of the *d 5* and *a* setae and the very short *cx III* setae. The larva has characteristic *d 1* setae.



Figs. 20, 21. *Notoedres* spec. 20, *N. ismaili* spec. nov., A, B, female (holotype); A, dorsum; B, some posterior dorsal setae; C, bursa copulatrix (paratype); 21, *N. dewitti* spec. nov., female (holotype); A, dorsum; B, some posterior dorsal setae

Female. — Holotype, total length 278 μm and width 204 μm ; average of three paratypes 282 (259–310) μm and 226 (204–259) μm , respectively.

Dorsum (fig. 20A). Striation complete, discontinuous around the anus. The *d* 5 and *a* setae fine with furcate tips (fig. 20B). All other dorsal setae long and filiform, with no major differences in length. Duct of the bursa copulatrix long with one or two convolutions (fig. 20C, drawn from a paratype).

Venter (fig. 22). Sternum short, ending somewhat furcate but without hooks as in *N. dewitti*. Epimera III and IV long and slender, epimera III incurved, epimera IV almost straight. Posterior part of the idiosoma striated. Genital apodemes small. The *cx* III setae are very short (7 μm), the *sh* setae are longer than the *h* setae, *g p* setae absent. Terminal setae of legs III and IV unequal in length and both shorter than the body. Measurements in Table I.

Larva (fig. 24). — Length of figured specimen 98 μm and width 72 μm ; average of five paratypes 101 (98–103) μm and 72 (70–72) μm , respectively. On the dorsum striations encircle a large and almost bare area crossed only by two faint lines. The *d* 1 setae spinose with furcate tips. All other dorsal setae long and filiform. All ventral setae long, *sh* and *h* setae subequal in length. Terminal setae of legs III shorter than the body. Measurements in Table II.

Eggs. — The average length of 11 eggs was 156 (141–165) μm and the width 77 (58–83) μm .

The species is dedicated to Mr. Salleh bin Ismaili, Laboratory Technologist of the Division of Acarology, Institute for Medical Research, Kuala Lumpur.

Hosts and locality. — *Tadarida plicata* (Buchanan, 1800) from Kuala Pilah, Negeri Sembilan, 9.v.1979, coll. Lukoschus (holotype ♀, three ♀, four larvae); *Tadarida mops* (de Blainville, 1840) from Gombak Forest, Selangor, 4.v.1979, IMR, no. 83 (figured larva).

Deposition of types. — Holotype ♀ (coll.no. 1980.9.22.26) and figured larva (coll.no. 1980.9.22.27) in London (BM); other specimens in Kuala Lumpur (IMR), Antwerp (IMTA), Nijmegen (DAEN).

***Notoedres dewitti* spec. nov.**

(figs. 21, 23, 25)

Notoedres dewitti resembles *N. tristis* Fain & Marshall, 1977 and *N. ismaili* spec. nov. The female of this species is unique for the shape of its sternum. It differs from *N. tristis* in size and in the relative length of the posterior dorsal setae: the *l 3* setae in *N. dewitti* are not much smaller than the *l 4*, *l 5* and *d 4* setae. From *N. ismaili* it differs in the length of the *cx III* setae and in the shape of the *d 5* and *a* setae. The larva is characterized by its *d 1* setae.

Female. — Holotype, total length 209 μm and width 154 μm ; average of six paratypes 215 (194–235) μm and 171 (146–194) μm , respectively.

Dorsum (fig. 21A). Dorsal surface completely striated. Except for the *v i* setae, all setae long and filiform. The *sc i* and *d 1* setae are distinctly longer, the *d 5* and *a* setae distinctly shorter than the other dorsal setae. Duct of the bursa copulatrix long without convolutions.

Venter (fig. 23). Sternum ending in hooks pointing outward. Epimera III and IV short, at the top curved towards each other. Opisthosoma striated. Genital apodemes small but conspicuous. The *h* setae longer than the other ventral setae. No *g p* setae present. Terminal setae of legs III and IV subequal in length and shorter than the body. Measurements in Table I.

Larva (fig. 25). — Length of figured specimen 82 μm and width 55 μm ; average of five larvae 85 (82–96) μm and 60 (55–65) μm , respectively. Among the measured larvae were specimens taken from different host species but there were no differences in measurements. The anterior and lateral parts of the dorsum are striated leaving almost bare a large area in the center interrupted only by two broken lines. A very short *d 1*, contrasting with the other dorsal setae which are long and filiform, is characteristic. The *sc i* setae are very long. The *h* setae longer than the other ventral setae. Terminal setae of legs III

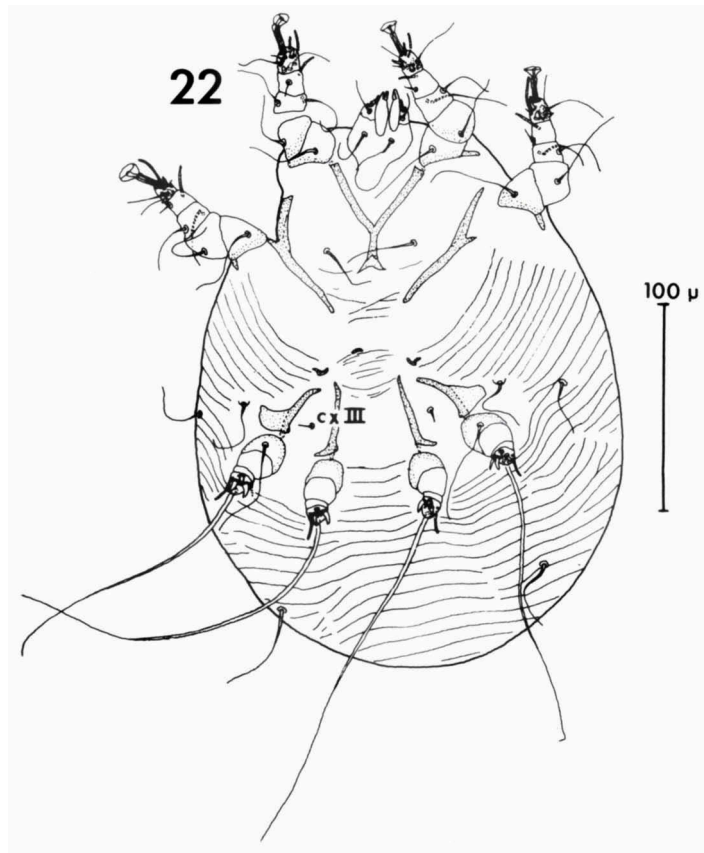


Fig. 22. *Notoedres ismaili* spec. nov., female (holotype), venter.

shorter than the body. Measurements in Table II.

The species is dedicated to Dr. G.F. de Witt, Director of the Institute for Medical Research in Kuala Lumpur.

Hosts and locality. — *Tadarida plicata* (Buchanan, 1800) from Kuala Pilah, Negeri Sembilan, 9.v.1979, coll. Lukoschus (holotype ♀, figured larva, eight ♀, four larvae); *Tadarida mops* (de Blainville, 1840) from Gombak Forest, Selangor on 4.v.1979, Institute for Medical Research, Kuala Lumpur no. 83 (three ♀, two larvae); *Tadarida jobensis* (Miller, 1902) from Mt. Hart, Kimberley Region, Australia, 14.ix.1976, Kimberley Expedition, no. 2704 (14 ♀, five larvae); *Cheiromeles torquatus jacobsoni* (Thomas, 1923) from Sinabang, Simalur, Sumatra, July 1913, coll. E. Jacobson, host in RMNH, no. 1793 (one ♀).

Deposition of types. — Holotype ♀ (coll.no. 1980.9.22.28) and figured lar-

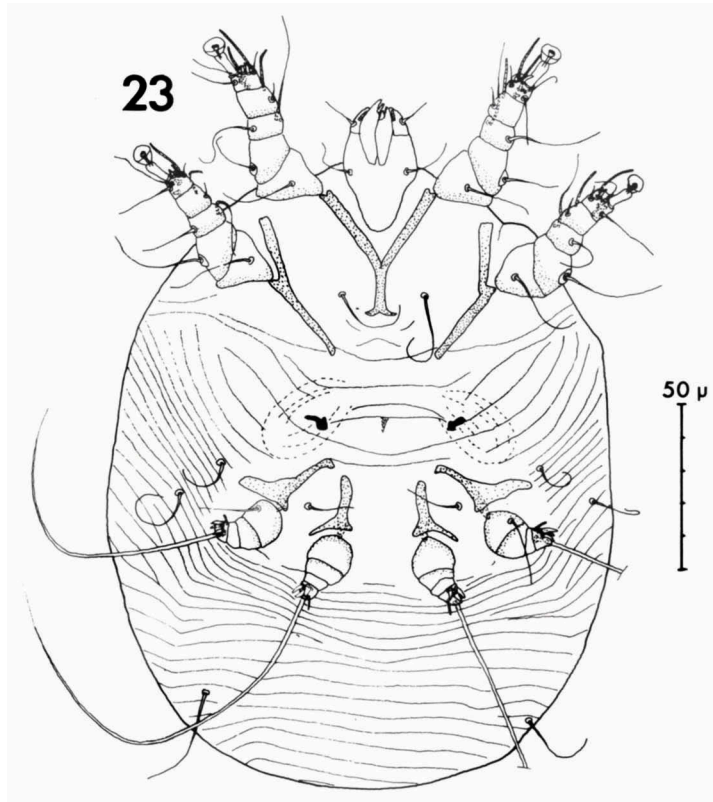


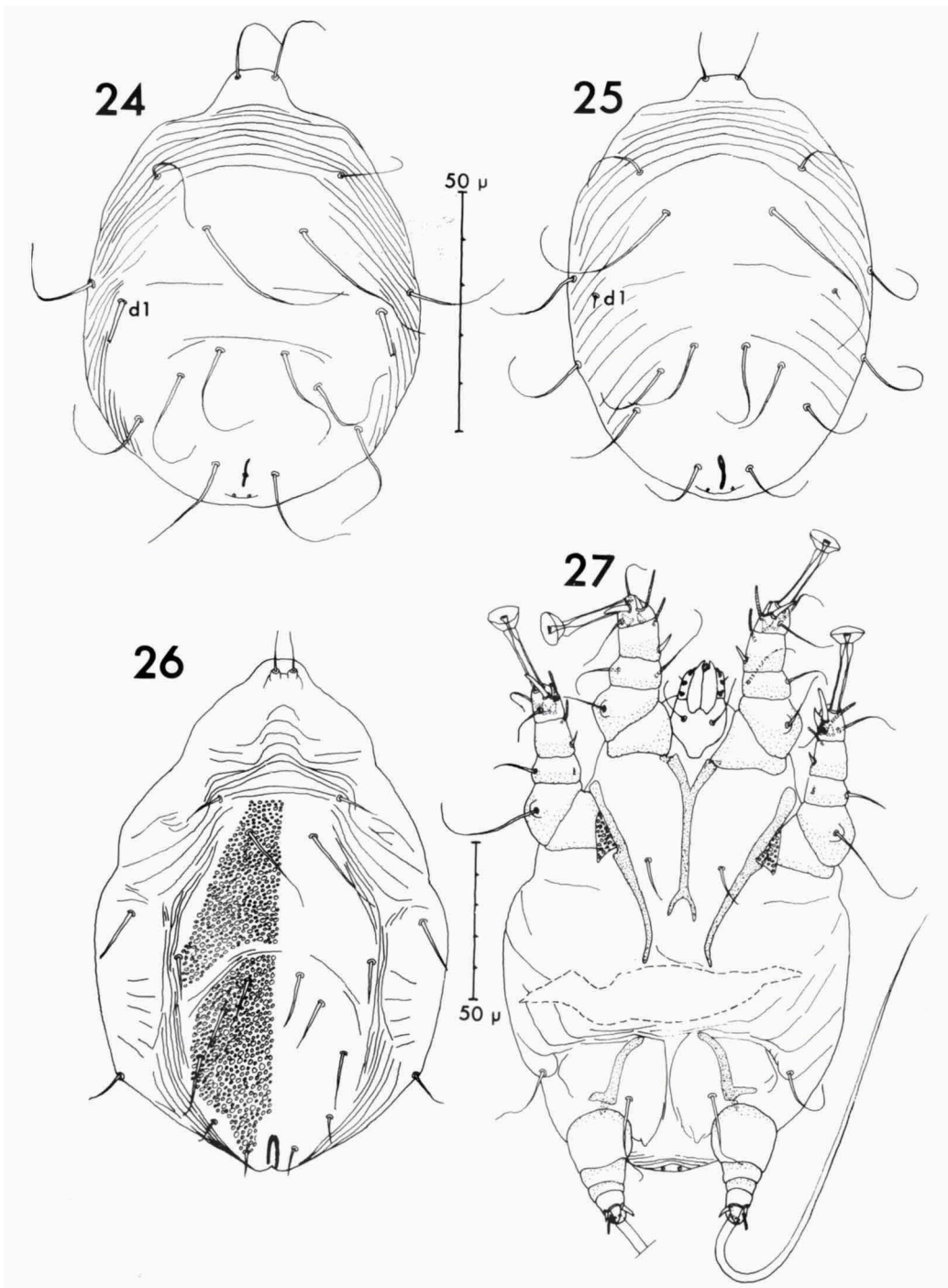
Fig. 23. *Notoedres dewitti* spec. nov., female (holotype), venter.

va (coll.no 1980.9.22.29) in London (BM); other specimens in Washington (USNM), Honolulu (BBMH), Leiden (RMNH), Kuala Lumpur (IMR), Antwerp (IMTA), Nijmegen (DEAN).

***Notoedres tristis* Fain & Marshall, 1977**
(figs. 26, 27)

Notoedres tristis Fain & Marshall, 1977: 37.

The description of *N. tristis* was based on one female taken from *Tadarida jobensis bregullae* Felten, 1964. In the present study several females and larvae have been found on *Tadarida jobensis* (Miller, 1902) from Australia. A few additions can be made to the description of the female by Fain & Marshall



Figs. 24–27. *Notoedres* larvae. 24, *Notoedres ismaili* spec. nov., dorsum; 25, *Notoedres dewitti* spec. nov., dorsum; 26, 27, *Notoedres tristis* Fain & Marshall, 1977; 26, dorsum; 27, venter.

(1977). The *sh* setae are long and filiform, the *sh* setae in the holotype are probably broken. Furthermore the structure of the sternum in our specimens differs slightly from that in the description. The sternum ends in a inverted T, the main part of the sternum forming the axis of this T.

Larva. — Length of figured specimen 166 μm and width 110 μm ; average of eight specimens 157 (144–166) μm and 109 (101–125) μm , respectively.

Dorsum (fig. 26). In the central and posterior part of the idiosoma there are two sclerotized areas excluding the anus. Around these areas a very conspicuous striation is present. The dorsal setae are long and strong, the *d 5* and *l 3* setae being distinctly smaller than the other ones.

Venter (fig. 27). Sternum long, ending forked. Epimera II very long. On the base of legs II there is a pair of triangular shaped sclerotized flaps. The *sh* setae much longer than the *h* setae. Terminal setae of legs III longer than the body. Measurements in Table II.

Eggs. — The average length of ten eggs was 157 (243–272) μm and the width 115 (97–134) μm .

Host and locality. — *Tadarida jobensis* (Miller, 1902) from Mt. Hart, Kimberley Region, Australia, 14.ix.1976, Kimberley Expedition, no. 2623, 2678, 2680, 2711, 2723 (11 ♀, 24 larvae).

Deposition of specimens. — Figured larva in Washington (USNM); other specimens in Honolulu (BBMH), London (BM), Chicago (FMNH), Leiden (RMNH), Kuala Lumpur (IMR), Antwerp (IMTA), Nijmegen (DAEN).

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