A New Species and an Annotated World List of the Sucking Louse Genus *Neohaematopinus* (Anoplura: Polyplacidae)

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ABSTRACT A new species of sucking louse, *Neohaematopinus sundasciuri*, collected from the tree squirrel, *Sundasciurus juvencus*, is described from Palawan Island, Philippines. An updated world list of the genus *Neohaematopinus* is presented; this documents descriptive citations, known hosts, and geographical distributions with interpretive annotations for each of the 32 species now included in the genus. The geographical distributions of *Neohaematopinus sciuri* and *N. sciurinus* are discussed.

KEY WORDS Insecta, *Neohaematopinus*, new species, world list

KIM & ADLER (1982) defined the closely related polyplacid sucking louse genera, *Johnsonpthirus* Benoit, *Linognathoides* Cummings, and *Neohaematopinus* Mjöberg, to include 5, 9, and 26 species, respectively. Chin (1985) has since described two additional species of *Neohaematopinus* from the People's Republic of China and Kim (1986) has described a further species of *Linognathoides* from North America. Two species originally assigned to *Neohaematopinus* were omitted from the Kim & Adler (1982) analysis because material was not available for comparative study; these are *N. baibacinae* Blagoveshtchensky from the U.S.S.R. and *N. menetensis* Blagoveshtchensky from the People's Republic of China. Except for two species, all of the known lice from the three genera mentioned above are parasites of sciurid rodents (the two exceptions are associated with New World wood rats, which are cricetid rodents). *Johnsonpthirus* occurs on African tree squirrels (tribe Funambulini), whereas *Linognathoides* parasitizes Holarctic ground squirrels (Marmotini) and African ground squirrels (Xerini). *Neohaematopinus* has a wider host range and is known to parasitize numerous species of squirrels (Callosciurini, Petauristini, Sciurini, Tamiasciurini) and a few species of wood rats. *Neohaematopinus* occurs almost exclusively in the Holarctic and Oriental regions, although a few deviations from this geographical distribution are known. First, *N. sciurinus* (Mjöberg) and *N. semifasciatus* Ferris extend partially into the Neotropical region. Second, *N. sciurinus* and the closely related *N. sciuri* Jancke have reportedly been introduced to various parts of the world (Europe, Malaysia, South Africa); the geographical distributions of these two species of lice will be addressed later in this paper.

The ancestral callosciurine squirrels historically dispersed from mainland southeast Asia eastwards into the Indonesian and Philippines archipelagos. However, they did not fully colonize these islands and native species of squirrels are not known in these archipelagos further east than Sulawesi or further north than the southern Philippines (Traub 1972, Durden & Traub 1990). To date, no sucking lice have been described from callosciurines in Sulawesi or the Philippines although they would be expected to parasitize these animals there.

In this paper, a new species of *Neohaematopinus* is described from a tree squirrel endemic to Palawan Island in the Philippines. Descriptive format and terminology follows Kim (1986), Kim & Ludwig (1978) and Durden (1987, 1990). Following the descriptive portion of this paper, an updated, annotated world list of the genus *Neohaematopinus* is presented.

Neohaematopinus sundasciuri Durden, new species
(Fig. 1–8)

Male. As in Fig. 1. Holotype length 1.29 mm; range for series (n = 10), 1.14–1.29; mean, 1.21. Head, thorax, and abdomen well sclerotized.

Head almost as wide as long with blunt anterior apex; 4 DMHS (dorsal marginal head setae), 1 DPHS (dorsal principal head seta), and 1 DAcHS (dorsal accessory head seta) on lateral lobe on each side of head; 2 SHS (sutural head setae), 1 SpAtHS (supraantennal head seta), 2 DPaHS (dorsal preantennal head setae), 1 VPaHS (ventral preantennal head seta), 2 OrS (oral setae), 4 ApHS (apical head setae), and 1 VPHS (ventral principal head seta) on each side; DPHS long (extending to thoracic

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spiracle) and displaced laterally. *Antennae* 5-segmented with basal segment much larger than 2nd segment and slightly wider than long; 3rd segment prolonged antero-apically and with 2 short spiniform setae at apex.

Thorax broader than long; thoracic sternal plate (Fig. 2) curving anteriorly to broad apex and produced into 2 lateral projections posteriorly; mesothoracic spiracle moderate in size (0.017 mm diameter); DPTS (dorsal principal thoracic setae) long (0.145 mm), extending to 3rd abdominal tergite. Legs with subtriangular coxae; forelegs small with small acuminate claw; midlegs and hindlegs moderately large, each with slender claw.

Abdomen about as wide as thorax, with 1 plate per segment dorsally on segments 2–7 and 2 plates per segment ventrally on segments 3–6; 1st row of TeAS (tergal abdominal setae) with 5 setae, 2nd row with 7 setae, 3rd row with 13 setae, rows 4–8 with 9–14 setae each; 3rd abdominal tergite expanded distally with characteristic arrangement of 5 setae on each side; 1 DLAS (dorsal lateral abdominal seta) on each side on segments 3–7; 1 VLAS (ventral lateral abdominal seta) on each side on segments 2–7. Paratergites (Fig. 3) present on segments 2–8: plate I with 1 short seta and 1 long, curved seta; plates II–V each with one seta of moderate length and 1 long seta; plate VI with 2 long setae; plate VII with 1 short seta and 2 long setae; plates II–IV subtriangular and plate VII subrectangular; plates II–V each with both posterior angles developed into points; plates II–VII each with spiracle.

Genitalia (Fig. 4) with distinct subgenital plate with 2 anterior lateral lacunae and 1 posterior medial lacuna—anterior lacunae with 1 seta each and medial lacuna with 2 setae; basal apodeme slightly longer than parameres; parameres angled inwards basally; pseudopenis extending well beyond apices of parameres and expanded apically.

Female. As in Fig. 5. Allotype length 1.58 mm; range for series (n = 9), 1.45–1.59; mean, 1.52. Head, thorax, and abdomen as in male unless indicated otherwise.

Head with 3 DMHS and 3 OrS on each side in most specimens.

Antennae with 3rd segment unmodified.

Thorax with sternal plate (Fig. 6) similar to that of male.

Abdomen wider than thorax with 1 plate per segment dorsally on segments 3–8 and 1 plate per segment ventrally on segments 3–7; 9 rows of TeAS, 1st row with 5 setae, rows 2–8 with 7–8 setae each, row 9 with 4 setae; 1 row of DCAS (dorsal central abdominal setae), each consisting of 5–9 setae present between each row of TeAS between tergites 4–9; 7 rows of StAS each with 6–8 setae; 1 row of VCAS (ventral central abdominal setae), each consisting of 7–8 setae present between each row of StAS between sternites 3–7; 7th sternite broad with setae of characteristic lengths; 1 DLAS on each side of segments 3 and 4 and 2 DLAS on each side of segments 5–7; 2 VLAS on each side of segments 2 and 3 and 1 VLAS on each side of segments 4–6. Paratergites (Fig. 7) similar to those of male except for lengths of setae on plates II–V: plate II with 1 short seta and 1 seta of moderate length, plates III–V each with 2 setae of nearly equal lengths.

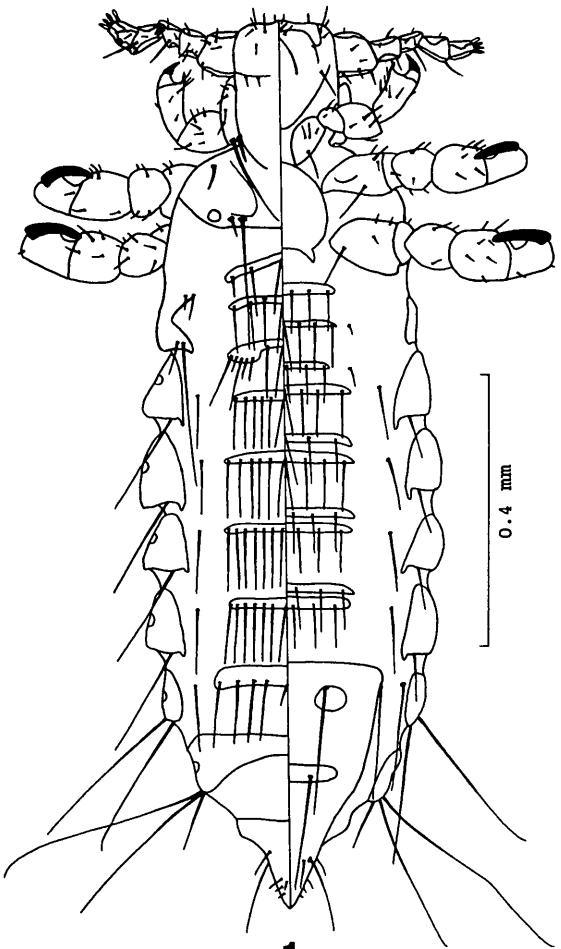
Genitalia (Fig. 8) with well sclerotized subtriangular subgenital plate; gonopods VIII each with 3 setae of progressively greater lengths from medial to lateral aspects; gonopods IX each with 1 short, stout seta; vulvar fimbriae distinct.

Type Material. ♂ HOLOTYPE, ♀ ALLOTYPE, 9 ♂♂, and 8 ♀♀ PARATYPES: PHILIPPINES: Palawan Island, Sitio Malabusog, Tinitian Barrio, Roxas, 15-17-VI-1984, ex 2 *Sundasciurus juvencus* (Thomas) (Rodentia: Sciuridae) individuals (accession numbers of hosts: UMMZ 161448 and UMMZ 161449), A. C. Alcala. Holotype and Allotype deposited in the University of Michigan Museum of Zoology (UMMZ), Ann Arbor (Catalog numbers, BMOC 84-1600-006 and BMOC 84-1600-005, respectively); Paratypes deposited in the UMMZ, BMNH, USNM, and Philippines National Collection (Los Baños).

Remarks. This species is named for the type host genus. *Neohaematopinus sundasciuri* is morphologically similar to *N. callosciuri, N. sciuri,* and *N. sciurinus*. Unlike *N. sundasciuri,* however, both *N. callosciuri* and *N. sciurinus* have basal antennal segments that are prolonged posteroapically and bear a spiniform seta. The lengths of the paratergal setae and the arrangements of the rows of abdominal setae serve to differentiate *N. sciuri* from *N. sundasciuri*.

Neohaematopinus sundasciuri can be identified using a combination of the following characters: (1) Paratergal plate of 2nd abdominal segment with 1 short and 1 long seta; (2) Male with central abdominal setae all borne on sternites or tergites; (3) Female with rows of free central abdominal setae alternating with rows of setae borne on sternites and tergites; (4) Basal antennal segment not prolonged posteroapically and without a spiniform seta; (5) The shape and setation of the female subgenital plate and gonopods; (6) The shape of the male genitalia.

Sundasciurus juvencus, the type host for *N. sundasciuri,* is a tree squirrel endemic to Palawan Island in the Philippines (Heaney 1979, Honacki et al. 1982). Because most Anoplura are highly host specific (Kim 1985), this louse is probably also confined zoogeographically to that island. Interestingly, although no sucking lice have previously been described from any Philippine squirrels, Ferris (1923) cited a specimen that he designated to be *N. sciurinus* collected from *S. juvencus* in Puerto Princesa on Palawan Island. This specimen was stated by Ferris to be in the U. S. National Collection (an accession number was not given), but I have been unable to locate it there. If this specimen is found in the future, it will be of great interest to reassess its identity.



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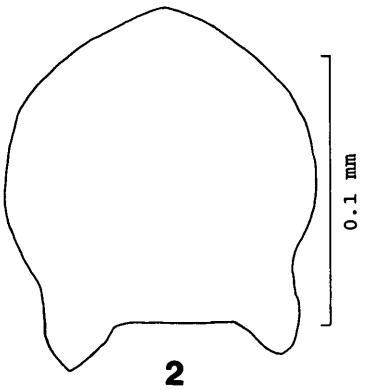

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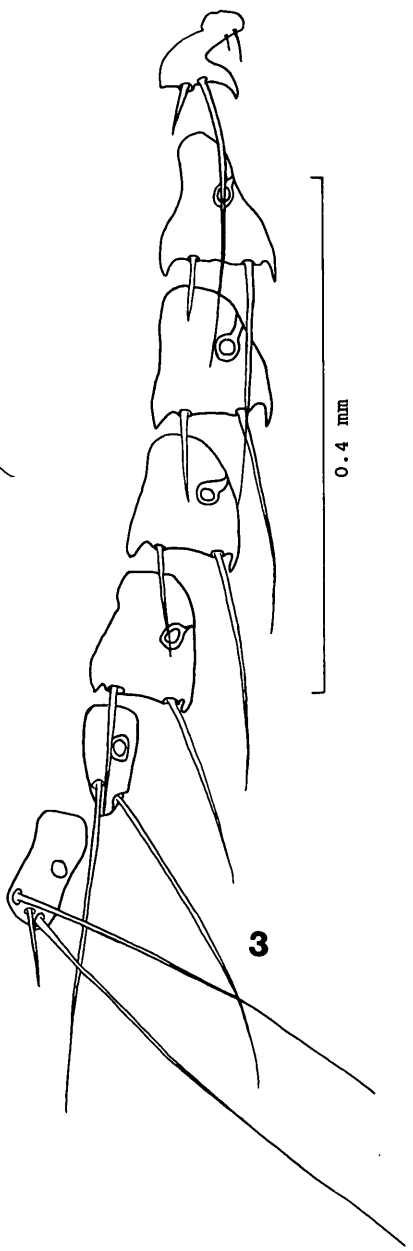

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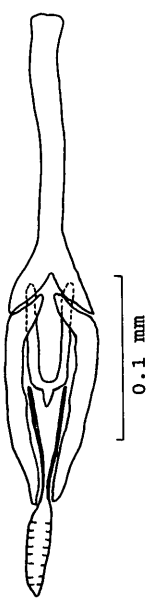

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An Annotated World List of the Sucking Louse Genus *Neohaematopinus*

(Mammal names follow Honacki et al. 1982; * denotes a host association that is considered to be accidental.)

N. apressus Johnson, 1972 (Pacif. Insects 14: 389–392). Type Host: *Tamiops rodolphei* (Milne-Edwards) (as *Tamiops rodolphei rodolphei*). Known Distribution: Laos. Remarks: Chin (1985) proposed that *N. appressus* is a synonym of *N. chinensis*.

N. baibacinae Blagoveshtchensky, 1965 (Entomol. Review, Wash. 44: 90–91). Type Host: *Marmota baibacina* Kastschenko. Known Distribution: USSR: Kazakhstan. Remarks: This louse was originally placed in the genus *Neohaematopinus* but because of the host and geographical distributions outlined by Kim & Adler (1982), it almost certainly should be reassigned to *Linognathoides*. The original description and drawings allude to similarities with *Linognathoides palaearctus* Olsoufiev. When type material becomes available for study, this issue can be resolved.

N. batuanae Ferris, 1923 (Stanford Univ. Pubs., Univ. Ser., Biol. Sci. 2: 261). Type Host: *Petaurista petaurista* (Pallas) (as *Petaurista batuana*). Known Distribution: Indonesia: Batu Islands. Remarks: In his original description, Ferris (1923) documented the type locality as "Batu Islands, Malaysia." The Batu Islands lie off the western coast of Sumatra and currently belong to Indonesia.

N. callosciuri Johnson, 1959 (Proc. U.S. Natl. Mus. 110: 581–583). Type Host: *Callosciurus finlaysoni* (Horsfield). Other Hosts: *Callosciurus caniceps* (Gray), *C. erythraeus* (Pallas), *C. nigrovittatus* (Horsfield), *C. notatus* (Boddaert), *C. prevosti* (Desmarest), *C. pygerythrus* (I. Geoffroy), *Glyphotes simus* Thomas, *Lariscus insignis* (F. Cuvier), *Sundasciurus tenuis* (Horsfield), *Nycticebus coucang* (Boddaert)*. Known Distribution: Much of mainland Southeast Asia including parts of the People's Republic of China; also, Borneo and Taiwan.

N. capitaneus Johnson, 1959 (Proc. U.S. Natl. Mus. 110: 587–589). Type Host: *Hylopetes phayrei* (Blyth). Known Distribution: Thailand.

N. ceylonicus Ferris, 1951 (Mem. Pacif. Coast Entomol. Soc. 1: 190–191). Type Host: *Funambulus palmarum* (Linnaeus). Known Distribution: Sri Lanka.

N. chinensis Blagoveshtchensky, 1972 (Entomol. Review, Wash. 51: 188). Type Host: *Tamiops swinhoei* (Milne-Edwards). Other Host: *Dremomys rufigenis* (Blanford). Known Distribution: People's Republic of China, Vietnam.

N. citellinus Ferris, 1942 (Microentomology 7: 85–86). Type Host: *Spermophilus tereticaudus* Baird. Other Hosts: *Spermophilus variegatus* (Erxleben), *Ammospermophilus harrisii* (Audubon & Bachman), *A. leucurus* (Merriam), *Cynomys gunnisoni* (Baird). Known Distribution: Western North America including Mexico.

N. cognatus Johnson, 1959 (Proc. U.S. Natl. Mus. 110: 583–585). Type Host: *Menetes berdmorei* (Blyth). Other Hosts: *Dremomys everetti* (Thomas), *Dremomys* sp., *Exilisciurus whiteheadi* (Thomas), *Sundasciurus jentinki* (Thomas). Known Distribution: Sabah, Thailand.

N. echinatus (Neumann, 1910) (Archiv. de Parasitol. 13: 517–521). Type Host: *Funambulus palmarum* (as *Sciurus palmarum*). Other Hosts: *Funambulus pennanti* Wroughton, *F. tristriatus* (Waterhouse), *Scotophilus kuhli* Leach*. Known Distribution: India, Pakistan.

N. elbeli Johnson, 1959 (Proc. U.S. Natl. Mus. 110: 592–594). Type Host: *Dremomys rufigenis*. Known Distribution: Peninsular Malaysia, People's Republic of China, Thailand.

N. griseicolus Ferris, 1923 (Stanford Univ. Pubs., Univ. Ser., Biol. Sci. 2: 248). Type Host: *Sciurus griseus* Ord. Known Distribution: Western Mexico and western United States.

N. inornatus (Kellogg & Ferris, 1915) (Stanford Univ. Pubs., Univ. Ser., no number, 25–27). Type Host: *Neotoma cinerea* (Ord) (as *Neotoma cinerea occidentalis*). Known Distribution: Western North America.

N. kinabalensis Johnson, 1959 (Proc. U.S. Natl. Mus. 110: 589–592). Type Host: *Hylopetes lepidus* (Horsfield) (as *Hylopetes sagitta harrisoni*). Known Distribution: Sabah, Thailand.

N. menetensis Blagoveshtchensky, 1972 (Entomol. Review, Wash. 51: 188–189). Type Host: *Menetes berdmorei*. Known Distribution: People's Republic of China.

N. neotomae Ferris, 1942 (Microentomology 7: 84–85). Type Host: *Neotoma albigula* Hartley. Other Hosts: *Neotoma fuscipes* Baird, *N. lepida* Thomas, *N. mexicana* Baird, *N. micropus* Baird, *Hodomys alleni* (Merriam), *Dipodomys ordii* Woodhouse*. Known Distribution: Mexico and southwestern United States.

N. pacificus (Kellogg & Ferris, 1915) (Stanford Univ. Pubs., Univ. Ser., no number, 38–40). Type Host: *Tamias townsendii* Bachman (as *Eutamias townsendi ocrogenys*). Other Hosts: *Tamias alpinus* Merriam, *T. amoenus* J. A. Allen, *T. dorsalis* Baird, *T. merriami* J. A. Allen, *T. quadri-*

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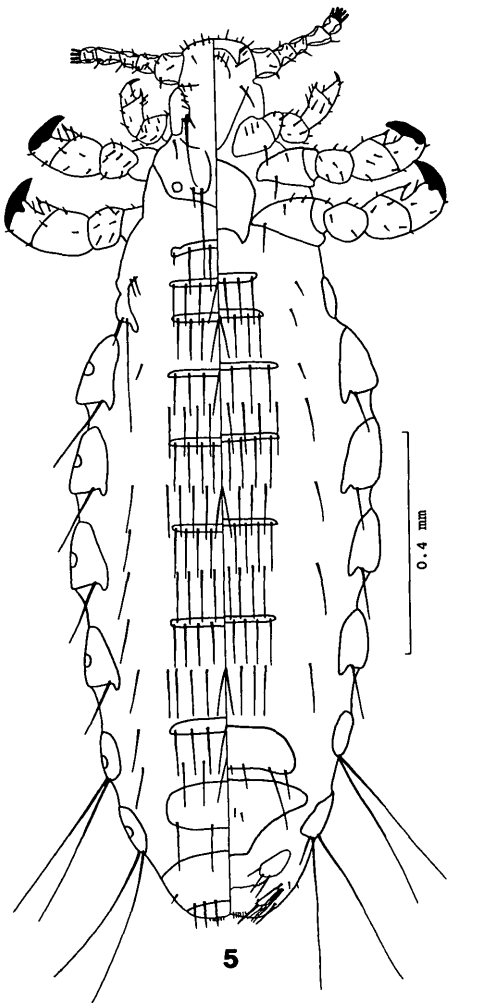
Fig. 1–4. *Neohaematopinus sundasciuri* Durden, n. sp., male. (1) Entire. Dorsal features left of midline, ventral features right of midline. (2) Thoracic sternal plate. (3) Paratergal plates. (4) Genitalia.



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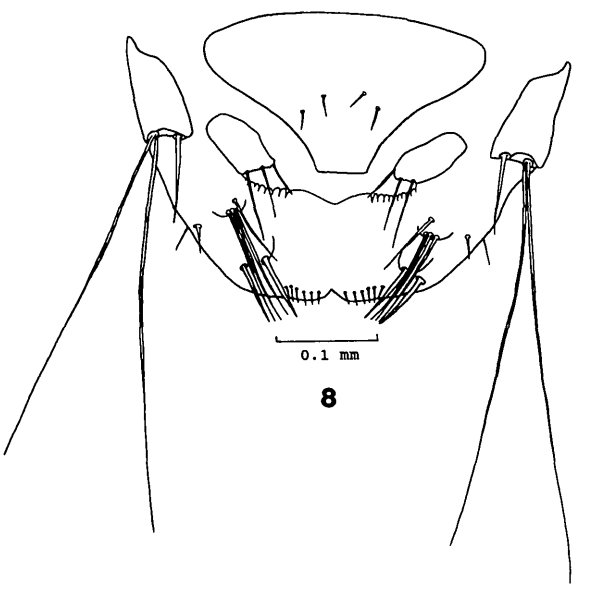

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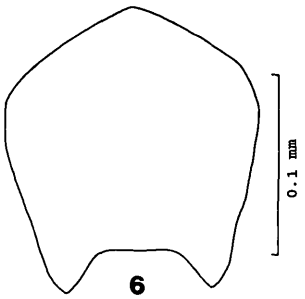

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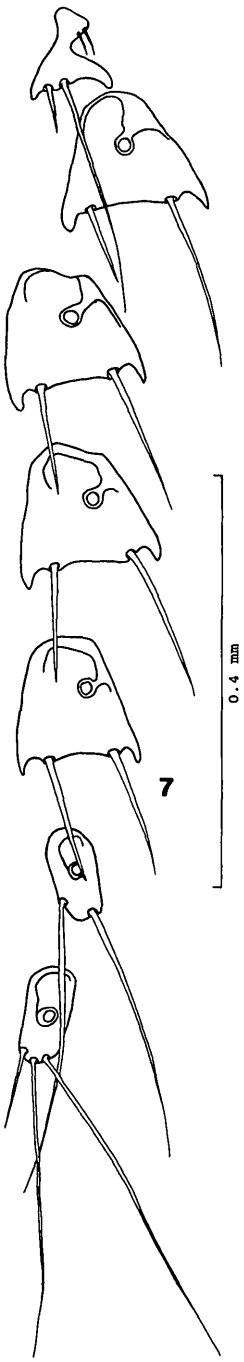

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vittatus (Say), *T. speciosus* Merriam. Known Distribution: Western North America.

N. pallidus Johnson, 1964 (Misc. Publ. Entomol. Soc. Am. 4: 80–81). Type Host: *Petaurista elegans* (Müller) (as *Petaurista taylori*). Other Host: *Petaurista petaurista* (Pallas). Known Distribution: Peninsular Malaysia, Thailand.

N. pansus Johnson, 1964 (Misc. Publ. Entomol. Soc. Am. 4: 79). Type Host: *Petaurillus hosei* (Thomas). Known Distribution: Sabah.

N. petauristae Ferris, 1923 (Stanford Univ. Pubs., Univ. Ser., Biol. Sci. 2: 258–261). Type Host: *Petaurista petaurista* (as *Petaurista inornata*). Other Hosts: *Petaurista alborufus* (Milne-Edwards), *P. elegans*. Known Distribution: Kashmir, People's Republic of China, Taiwan, Thailand.

N. pteromydis Blagoveshtchensky, 1965 (Entomol. Review, Wash. 44: 91). Type Host: *Pteromys volans* (Linnaeus). Known Distribution: Mongolia, USSR: RSFSR (Maritime Territory).

N. qadrii Khan & Khanum, 1980 (Pak. J. Zool. 12: 71–75). Type Host: *Funambulus pennanti*. Known Distribution: Pakistan.

N. robustus Johnson, 1964 (Misc. Publ. Entomol. Soc. Am. 4: 80). Type Host: *Petaurista elegans* (as *Petaurista elegans punctatus*). Known Distribution: peninsular Malaysia.

N. rupestis Chin, 1985 (Entomotaxonomia 7: 42–44). Type Host: *Sciurotamias forresti* (Thomas) (as *Rupestis* [sic] *forresti*). Known Distribution: People's Republic of China: Yunnan.

N. sciuri Jancke, 1932 (Zeitschr. f. Parasitenk. 4: 241). Type Host: *Sciurus vulgaris* Linnaeus. Other Hosts: *Sciurus aureogaster* F. Cuvier, *S. carolinensis* Gmelin, *S. niger* Linnaeus*, *Callosciurus caniceps**, *Callosciurus finlaysoni**. Known Distribution: Europe, North America including Mexico, possibly Malaysia. Remarks: This louse was originally described from the European red squirrel, *S. vulgaris*, in Germany but it also parasitizes the North American grey squirrel, *S. carolinensis*. Before this louse was described, European specimens were identified as *N. sciurinus*. However, this latter species is North American and I have yet to locate any true *N. sciurinus* from European collections. Although the majority of European workers have correctly switched to the name *N. sciuri* (e.g., Séguy 1944, George 1956, van den Broek 1977), some continue to use *N. sciurinus* for these lice (e.g., Sleeman 1986). Similarly, *N. sciurinus* has been reported from North American grey squirrels that were introduced to South Africa (Davis 1951). However, these African specimens almost certainly were *N. sciuri*. Finally, the occurrence of *N. sciuri* on *Callosciurus* squirrels in Malaysia as reported by Kim & Adler (1982) suggests a disjunct geographical distribution for this louse. *N. sciuri* may have been introduced to Malaysian squirrel populations, but examination of Malaysian specimens labeled as *N. sciuri* in the U.S. National Collecion revealed them to actually represent *N. callosciuri* (most cases), *N. elbeli* (1 specimen), or *Hoplopleura pectinata* Cummings (1 specimen). Before descriptions of Southeast Asian *Neohaematopinus* by Johnson (1959, 1964), these lice would have keyed to *N. sciuri* or *N. sciurinus*. This makes it doubtful that *N. sciuri* (or *N. sciurinus*) is an established ectoparasite of callosciurine squirrels in Malaysia or elsewhere in Southeast Asia.

N. sciurinus (Mjöberg, 1910) (Arkiv för Zool. 6: 161–164). Type Host: *Sciurus niger* (as *Sciurus niger rufiventer*). Other Hosts: *Sciurus aestuans* Linnaeus, *S. alleni* Nelson, *S. aureogaster, S. carolinensis**, *S. colliaei* Richardson, *S. deppei* Peters, *S. oculatus* Peters, *Tamiasciurus hudsonicus* (Erxleben)*. Known Distribution: North and Central America. Records from Europe, South Africa, South America, and Southeast Asia are suspect. Remarks: Like the previous species, this louse has been reported from many parts of the world. However, except for North and Central American citations, these may represent misidentifications. Johnson (1959) showed that the many records of *N. sciurinus* cited by Ferris (1923) from Southeast Asia actually referred to either *N. callosciuri* or *N. cognatus*, both of which she described in her 1959 paper. Also, Johnson (1972) stated that the South American specimens listed by Ferris (1923) as *N. sciurinus* are actually *N. semifasciatus* and that this latter species is the only *Neohaematopinus* that occurs in South America. As outlined above, European specimens documented as *N. sciurinus* almost certainly are *N. sciuri*.

N. sciuropteri (Osborn, 1891) (U.S. Dep. Agric., Div. Entomol. Bull. 7: 23–24). Type Host: *Glaucomys volans* (Linnaeus) (as *Sciuropterus volucella*). Other Host: *Glaucomys sabrinus* (Shaw). Known Distribution: North America.

N. semifasciatus Ferris, 1916 (Psyche 23: 100). Type Host: *Tamiasciurus douglasii* (Bachman) (as *Sciurus douglasi albolimbatus*). Other Hosts: *Tamiasciurus hudsonicus, Sciurus gilvigularis* Wagner, *S. granatensis* Humboldt, *S. variegatoides* Ogilby. Known Distribution: North America to northern South America.

N. setosus Chin, 1985 (Entomotaxonomia 7: 44–45). Type Host: *Dremomys pernyi* (Milne-Edwards). Known Distribution: People's Republic of China: Guizhou, Yunnan.

N. spilosomae Stojanovich and Pratt, 1961 (J. Par-

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Fig. 5–8. *Neohaematopinus sundasciuri* Durden, n. sp., female. (5) Entire. Dorsal features left of midline, ventral features right of midline. (6) Thoracic sternal plate. (7) Paratergal plates. (8) Genitalia.

asitol. 47: 312). Type Host: *Spermophilus spilosoma* Bennett (as *Citellus spilosoma*). Known Distribution: North America from the Great Plains to Mexico.

N. sundasciuri Durden (current paper). Type Host: *Sundasciurus juvencus*. Known Distribution: Philippines: Palawan Island.

N. syriacus Ferris, 1923 (Stanford Univ. Pubs., Univ. Ser., Biol. Sci. 2: 250). Type Host: *Sciurus anomalus* Gmelin (as *Sciurus syriacus*). Known Distribution: Syria, Turkey.

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