

THE GENUS *POLYPLAX* (ANOPLURA: POLYPLACIDAE) IN
SULAWESI, INDONESIA, WITH THE
DESCRIPTION OF A NEW SPECIES

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Abstract. — Three species of sucking lice assignable to the genus *Polyplax* are documented from Sulawesi, Indonesia. *Polyplax wallacei*, new species, is described from a series of females collected from three species of sympatric murid rodents from primary lowland rain forest in North Sulawesi. *Polyplax eropepli* (Ewing) is redescribed from the original type material from the Celebes soft-furred rat, *Eropeplus canus*, from montane forest in Central Sulawesi; adults of both sexes are illustrated. *Polyplax spinulosa* (Burmeister) is recorded from two species of commensal rats in North Sulawesi.

Sulawesi (Celebes) is one of the principal islands in the Indonesian archipelago and is situated between Wallace's and Lydekker's zoogeographical lines. Excluding bats, 97% of the mammal species that occur naturally on Sulawesi are endemic (Musser, 1987). Few of these mammal species have been processed for ectoparasites and, consequently, knowledge of their sucking lice (Anoplura) is poor. At present count, 36 species of endemic murids are known from Sulawesi (Musser, 1987) and only *Polyplax eropepli* (Ewing), redescribed here, and *P. wallacei*, new species, are known from this potential host group. At least some of these murid species surely must be parasitized by additional undescribed species of *Polyplax* (and *Hoplopleura*) sucking lice.

With regard to the commensal murids of Sulawesi, none of which are native to the island (Durdén, 1986; Musser, 1987), *Polyplax spinulosa* (Burmeister) is reported here from two species of *Rattus*. Further collecting from this commensal host group probably will show *P. spinulosa* to infest also one or more of the other three commensal *Rattus* species now on Sulawesi, and,

possibly, *Polyplax serrata* (Burmeister) will be recorded from the house mouse, *Mus musculus castaneus* Waterhouse, there. Another commensal mammal now inhabiting Sulawesi, the house shrew, *Suncus murinus* (L.), supports an assemblage of *Polyplax* spp. lice over its range in southern Asia and it seems likely that one or more of these also parasitize it in Sulawesi.

For more than 50 years, *P. eropepli* has been the only sucking louse documented from any endemic mammal in Sulawesi. Two additional *Polyplax* species were identified from a collection of mammal ectoparasites made by the author in North Sulawesi in 1985. Ectoparasites were collected mainly by intensive visual pelage searches of anesthetized animals but a few hosts were subjected to ectoparasite extractions by skin digestion techniques (Cook, 1954). One of these lice was *P. spinulosa*, which was taken only from commensal rats, a host group that this species parasitizes on an almost global basis. The second *Polyplax* species collected was taken only from sympatric, endemic, murids; it represents a new species and a description of it follows. Morphological ter-

minology designated by Kim (1966) and by Kim and Ludwig (1978) has been followed for the descriptions.

The three species of *Polyplax* reported here are easily separated. *Polyplax wallacei*, new species, possesses a distinct thoracic sternal plate with central and lateral anterior projections. It has very stout hindleg claws. Although *P. spinulosa* and *P. eropepli* both have similarly shield-shaped thoracic sternal plates, they are easily separated by the longer paratergal setae and shorter DPHS (dorsal principal head setae) of *P. eropepli*. Also, *P. spinulosa* has hindleg claws of intermediate size, while those of *P. eropepli* are narrow.

***Polyplax wallacei* Durden,
NEW SPECIES**

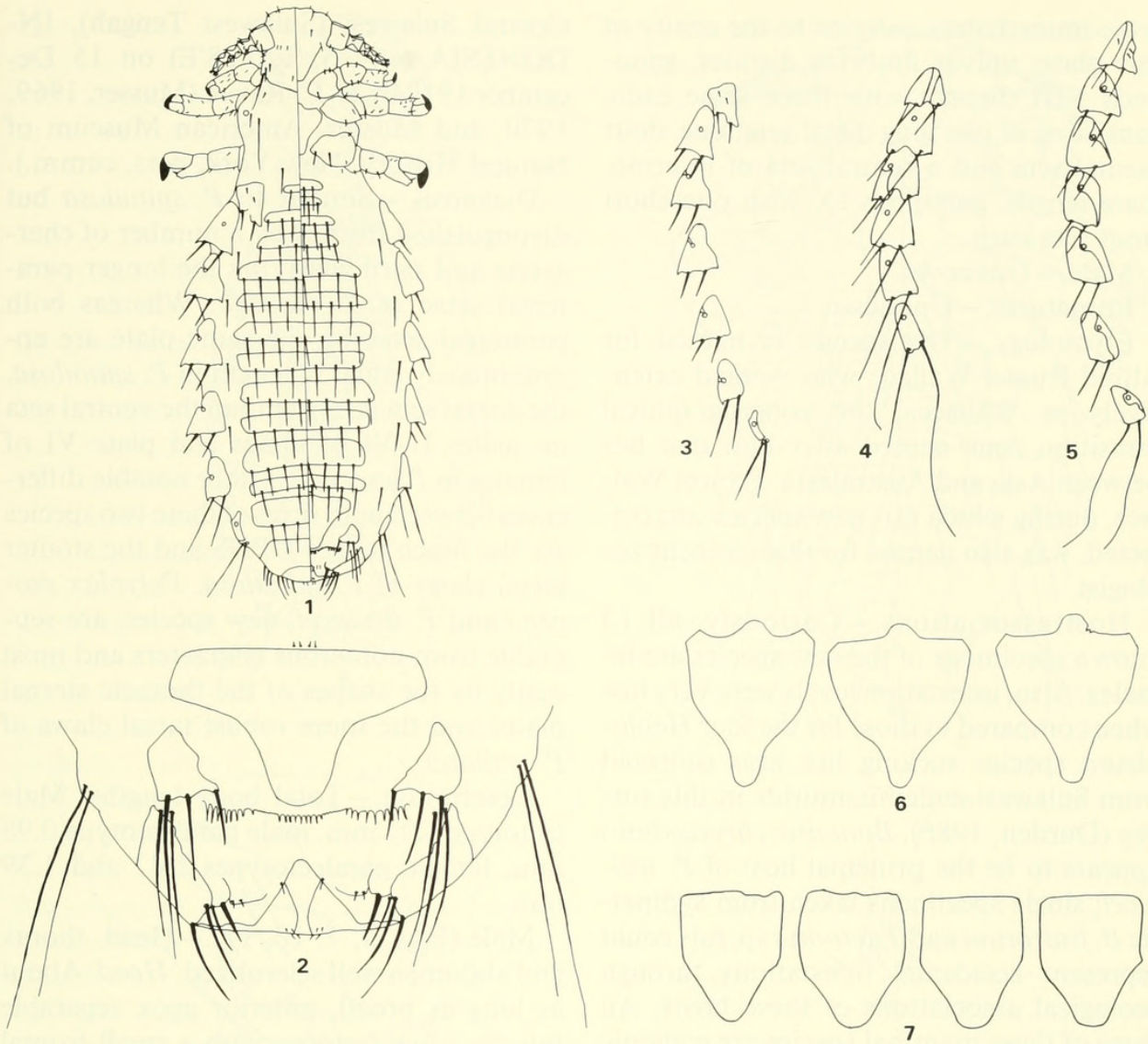
Type data.—Holotype ♀ from adult ♀ *Bunomys chrysocomus* (Hoffman) (LAD No. 69), Dumoga-Bone National Park, North Sulawesi (Sulawesi Utara), INDONESIA (0°34'N, 123°53'E) at c. 230 m in primary forest, 26 February 1985, L. A. Durden. Twelve ♀ paratypes all from the same locality and by the same collector, but with various dates in February 1985 and host identities as follows: 3 additional specimens from the same host individual as for holotype; 2 from adult ♂ *B. chrysocomus* (LAD No. 24); 2 from adult ♂ *B. chrysocomus* (LAD No. 32) (there is also a single third-instar *Polyplax* sp. nymph from this host that is very likely assignable to *P. wallacei*); 2 from adult ♀ *B. chrysocomus* (LAD No. 51), 1 from adult ♀ *Bunomys fratrorum* (Thomas) (LAD No. 43); 1 from adult ♀ *B. fratrorum* (LAD No. 53); and 1 from adult ♀ *Taeromys* sp. (LAD No. 73). The holotype and one paratype will be deposited in the U.S. National Museum of Natural History, Washington, D.C. (USNM); two paratypes will be deposited in both the British Museum (Natural History), London, England, and the Museum Zoologicum Bogoriense, Indonesia. The remaining seven paratypes (and the *Polyplax* sp. nymph), most of which are not

in perfect condition, are in the author's reference collection.

Diagnosis.—Similar to *P. spinulosa* but distinguished from it most easily by the shape of the thoracic sternal plate which has anterior projections in *P. wallacei* and by the hindleg claws which are very stout in *P. wallacei*. In life, *P. wallacei* is more barrel-shaped than *P. spinulosa* (dorsoventral flattening was accentuated with a blunt probe to prevent skewing of specimens during slide-mounting). The thoracic sternal plate of ♀ *P. cutchicus* Mishra and Kaul from India is partially similar to that of ♀ *P. wallacei* but in the former species the lateral anterior projections are less developed and the plate does not taper posteriorly to a rounded point; there are numerous other differences between these two species.

Description.—Total body lengths: Female holotype 1.13 mm, \bar{x} = 1.19 mm (n = 13, range 1.13–1.31 mm).

Female (Figs. 1, 2, 3, 6).—Head, thorax and abdomen well sclerotized. *Head*: About as long as wide with anterior apex broadly rounded; 2 DMHS (dorsal marginal head setae) on each side; DPHS just extending to thoracic spiracle; DAChS (dorsal accessory head setae) much larger than DMHS numbering 2 on each side, both medial to DPHS; DPoCHS (dorsal posterior central head setae) and VPHS (ventral principal head setae) distinct; antennae 5-segmented with the basal segment much larger than the second segment, slightly wider than long. *Thorax*: Slightly broader than long; thoracic sternal plate (Fig. 6) very distinct with central anterior apex prolonged and with less well developed lateral anterior projections, tapering to an evenly rounded posterior apex; mesothoracic spiracle fairly small (0.017 mm in diameter); DPTS (dorsal principal thoracic setae) moderate in length (0.105 mm) just extending beyond the insertions for the first TeAS (tergal abdominal setae); DMsS (dorsal mesothoracic setae) well developed. *Legs*: With subtriangular coxae; forelegs small with acuminate claws; hind-



Figs. 1-7. 1, *Polyplax wallacei*, female. 2, *P. wallacei*, female genitalia. 3, *P. wallacei*, female paratergites. 4, *Polyplax eropepli*, male paratergites. 5, *P. eropepli*, female paratergites. 6, *P. wallacei*, female thoracic sternal plates showing variation (the plate to the left represents the most commonly encountered shape). 7, *P. eropepli*, thoracic sternal plates. Females on left, males on right.

legs larger than midlegs, both with strong pointed claws and those on the hindlegs being particularly robust. *Abdomen*: Wider than thorax with two plates per segment dorsally and ventrally; 12 rows of TeAS, each with 4-8 setae; segments one and two with one seta on each side and tenth row with two setae on each side; one DLAS (dorsal lateral abdominal seta) on each side of segments 3-6; abdominal sternites equally well sclerotized as tergites; 12 rows of StAS (sternal abdominal setae) each with 4-8 setae; first two rows with a total of five (four

in three specimens) and four (three in one specimen) setae, respectively; one VLAS (ventral lateral abdominal seta) on each side of segments 3-7. Paratergites (Fig. 3) present on segments 2-8; plates II-VI subtriangular; plates I-V each with two short apical setae; plates VI and VII each with two longer apical setae; dorsal angles of paratergites I-III produced into points; paratergites II-VII each with spiracles; paratergite I slightly displaced medially. *Genitalia* (Fig. 2): With subgenital plate triangular and with its middle apex extended posteriorly; four small

setae immediately anterior to the center of this plate; vulvar fimbriae distinct; gonopods VIII distinct with three setae each, consisting of one long distal seta, one short medial seta and a central seta of intermediate length; gonopods IX with one short stout seta each.

Male.—Unknown.

Immatures.—Unknown.

Etymology.—The species is named for Alfred Russel Wallace who worked extensively in Wallacea, the zoogeographical transition zone named after him that lies between Asia and Australasia. Project Wallace, during which this new species was collected, was also named for this eminent zoologist.

Host associations.—Curiously, all 13 known specimens of the new species are females. Also, infestation levels were very low when compared to those for the four *Hoplopleura* species sucking lice also collected from Sulawesi-endemic murids in this survey (Durden, 1986). *Bunomys chrysocomus* appears to be the principal host of *P. wallacei*; single specimens taken from sympatric *B. fratorum* and *Taeromys* sp. rats could represent accidental infestations through ecological associations of these hosts. All three of these mammal species are endemic to Sulawesi.

Polyplax eroepepli (Ewing)

Eremophthirius eroepepli Ewing, 1935: 209.

Polyplax erioepepli Ewing [sic]: Ferris, 1951: 207.

Polyplax eroepepli (Ewing): Johnson, 1958: 47. Lectotype designated.

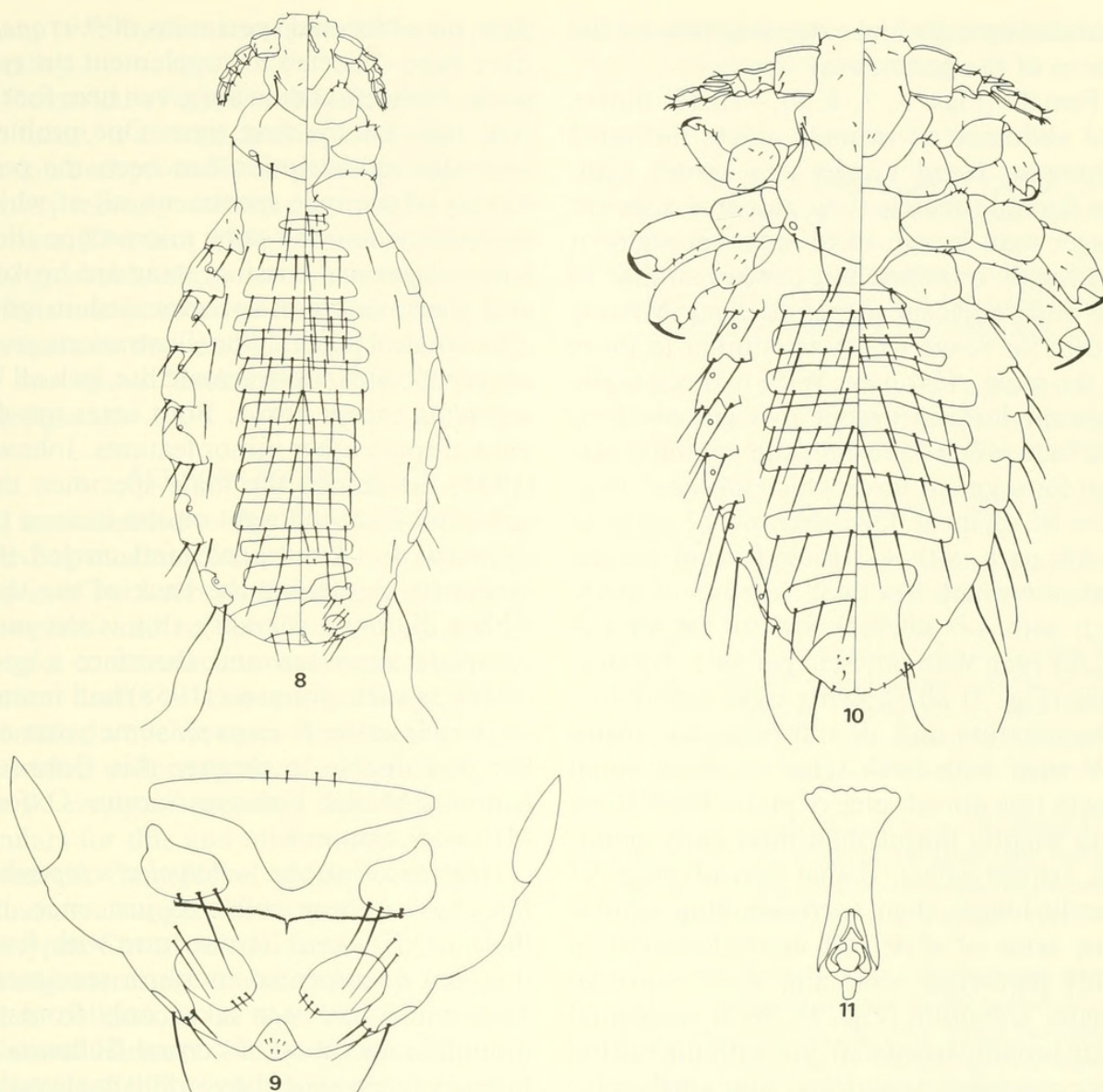
Type data.—Lectotype ♂ and 3 paralectotypes (1 ♂, 2 ♀) on one microscope slide (USNM type no. 44906) from young adult ♀ *Eroepplus canus* Miller and Hollister (Celebes soft-furred rat) pelt (USNM 219711) presumably removed by H. E. Ewing. The host specimen was collected from tropical montane rain forest (mossy, primary forest) at an elevation of c. 1800 m at Rano Rano,

Central Sulawesi (Sulawesi Tengah), INDONESIA (1°30'S, 120°28'E) on 15 December 1917 by H. C. Raven (Musser, 1969, 1970, and Musser, American Museum of Natural History, New York, pers. comm.).

Diagnosis.—Similar to *P. spinulosa* but distinguished from it by a number of characters and particularly by the longer paratergal setae of *P. eroepepli*. Whereas both paratergal setae on the same plate are approximately equal in length in *P. spinulosa*, the dorsal seta is longer than the ventral seta on plates II–VI of males and plate VI of females in *P. eroepepli*. Other notable differences between both sexes of these two species are the much longer DPHS and the stouter tarsal claws of *P. spinulosa*. *Polyplax eroepepli* and *P. wallacei*, new species, are separable from numerous characters and most easily by the shapes of the thoracic sternal plates and the more robust tarsal claws of *P. wallacei*.

Description.—Total body lengths: Male lectotype 1.03 mm, male paralectotype 0.98 mm, female paralectotypes 1.42 and 1.39 mm.

Male (Figs. 4, 7, 10, 11).—Head, thorax and abdomen well sclerotized. *Head*: About as long as broad, anterior apex separable into four low festoons with a small frontal tubercle on the dorsal, central festoon; DPHS fairly short, not quite reaching second leg coxa; 2 DACHS on each side with the medial seta short and the other seta about half the length of the DPHS; DPoCHS and VPHS distinct; antennae 5-segmented with strong sexual dimorphism, with the basal segment much larger than the second segment, about as wide as long; third segment highly modified with a long straight apical process situated at its posterodistal corner and about twice the length of the segment proper—see Ewing (1935) for further description including a detailed drawing of this segment. *Thorax*: Broader than long; thoracic sternal plate (Fig. 7) similar to that of *P. spinulosa* with posterolateral angles produced into a blunt point and lateral margins



Figs. 8–11. *Polyplax eropepli*. 8, Female. 9, Female genitalia. 10, Male. 11, Male genitalia.

almost parallel but with the anterior edge less rounded than in *P. spinulosa*; mesothoracic spiracle fairly small (0.019 mm in diameter); DPTS moderate in length (0.124 mm), not quite extending to the first abdominal tergite; DMsS distinct. *Legs*: With subtriangular coxae; forelegs smaller than other legs, each with a narrow acuminate claw. *Abdomen*: Wider than thorax, with one broad plate per segment dorsally and ventrally except for the venter of segment three which has two narrower plates; 7 rows of TeAS and StAS, each with 6–8 setae. Paratergites (Fig. 4) present on segments 2

to 8; plates I–VI subtriangular; plate I with 2 short setae of equal length; plates II–VI with dorsal seta longer than ventral seta, particularly so in plates V and VI; setae on plate VII broken; paratergites showing differential sclerotization especially marked on plate III; dorsal angles of plates II–V showing some degree of development into points; plates II–VII each with spiracles. *Genitalia* (Fig. 11): With basal apodeme broadening anteriorly and extending to the sixth abdominal segment; parameres very short and curved, each articulating distally with base of pseudopenis; pseudopenis broadly

rounded apically and extending beyond the apices of the parameres.

Female (Figs. 5, 7, 8, 9).—Head, thorax and abdomen as in male unless indicated otherwise. *Head*: Longer than broad, without frontal tubercle; first antennal segment longer than broad; third antennal segment not highly modified but instead similar to the other adjacent segments. *Legs*: Missing except for coxae which are similar to those of the male. *Abdomen*: With two plates per segment dorsally (except for segments three and four which have one) and ventrally (except for segment three which has one); sternites of segment four narrow; 12 rows of TeAS, each with 4–7 setae (except for the first row which has two); 13 rows of StAS, each with 4–7 setae; 6 rows of DLAS and VLAS each with one seta per side. Paratergites (Fig. 5) all showing clear differential sclerotization and all subtriangular; plates I–V each with both setae of about equal length (the dorsal setae of plates I and II are very slightly longer than their corresponding ventral setae); dorsal seta of plate VI clearly longer than corresponding ventral seta; setae of plate VII much longer than other paratergal setae and about equal in length. *Genitalia* (Fig. 9): With subgenital plate broadly triangular and with the medial apex extended posteriorly; four small setae immediately anterior to this plate; vulvar fimbriae distinct; gonopods VIII with three setae each, with broken lateral setae, long central setae and shorter medial setae; gonopods IX with two short setae each, with the lateral setae longer than the medial setae.

Immatures.—Unknown.

Remarks.—In his original description of *P. eropepli*, Ewing (1935) relied heavily on characters of the third antennal segment of the male, and the only drawing he gave was of this structure. Although this segment is highly modified and probably characteristic, by current standards (Kim, 1966; Kim and Ludwig, 1978; Weisser and Kim, 1973) the original description is inadequate. To

date, no additional specimens of *P. eropepli* have been collected to supplement the type series. Collection data are given here for the type host for the first time. One problem with this redescription has been the poor quality of the type specimens, all of which are mounted on the same microscope slide. Appendages are missing, setae are broken, and specimens are not mounted in good dorsoventral aspect. The illustrations given are composites. Both female lice lack all leg segments except coxae. Both sexes are devoid of some other minor features. Johnson (1958) designated the male specimen that is second from the right on the slide as the lectotype for *P. eropepli* (and circled this specimen by etching the back of the slide with a diamond marker); this is the most complete specimen and therefore a good choice as such. Johnson (1958) had intended to redescribe *P. eropepli* some years ago but was unable to arrange this (Johnson, National Marine Fisheries Service, Oxford, MD, pers. comm.).

Host associations.—*Polyplax eropepli* is rare, having been collected just once, but the host, *E. canus*, is also rare with fewer than ten documented museum specimens. This murid has been taken only from the mountainous areas of central Sulawesi in primary forest at or above 1800 m elevation (Musser, 1970, 1987). Ferris (1951) mistakenly listed the type host of *P. eropepli* as *Eriopeplus incanus*, which he stated to be *Cricetulus longicaudatus* (Johnson, 1958). Ewing (1935) presented the type host information correctly in his original description.

Polyplax spinulosa (Burmeister)

Sulawesi collecting records.—Two ♀ from adult ♀ *Rattus argentiventer* (Robinson and Kloss) (the ricefield rat) on 8 February 1985, L. A. Durden, Toraut Base Camp (0°34'N, 123°54'E), Sulawesi Utara, INDONESIA; 1 ♀ from adult ♂ *Rattus exulans* (Peale) (the Polynesian rat) on 12 February 1985 by the same collector at the same locality; 1 ♀, 1 ♂ from adult ♂ *R. argentiventer* on 13 Feb-

ruary 1985 by the same collector at the same locality.

Remarks.—*Polyplax spinulosa*, the spiny rat louse, is almost cosmopolitan in distribution and probably invaded Sulawesi relatively recently with its commensal rat colonizers (Durden, 1986). Further collecting will probably show that *P. spinulosa* also infests one or more of the other three commensal rats now on Sulawesi [*R. rattus* (L.), *R. norvegicus* (Berkenhout) and *R. nitidus* (Hodgson)].

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mittee for Research and Exploration of the National Geographic Society.

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