

**HOPLOPLEURA INTERMEDIA KELLOGG AND FERRIS AND  
ITS ALLIES, WITH THE DESCRIPTION OF A NEW SPECIES**

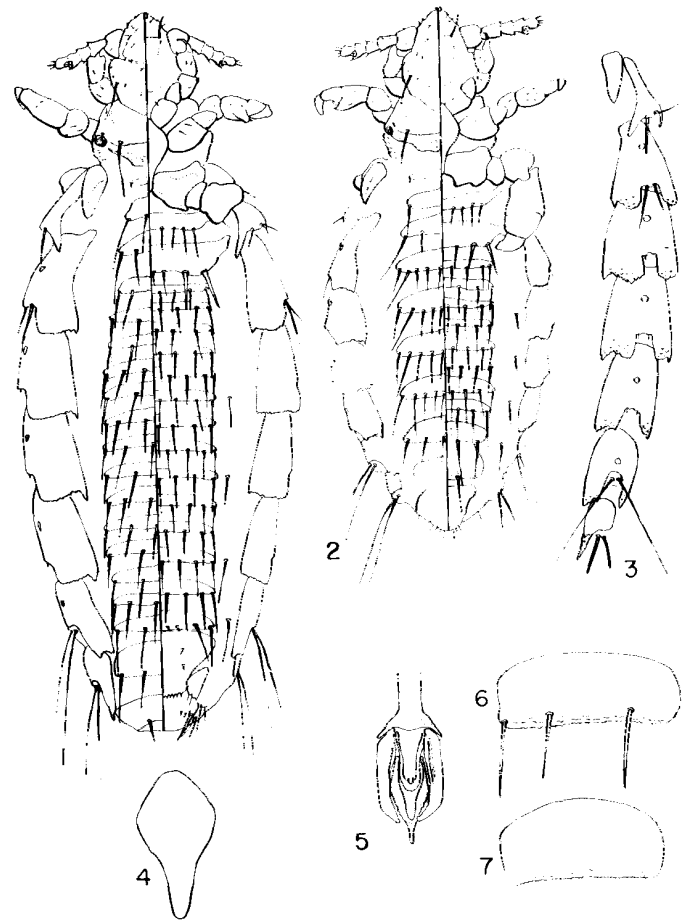
(ANOPLURA: HOPLOPLEURIDAE)

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**ABSTRACT**—The species of sucking lice related to *Hoplopleura intermedia* Kellogg and Ferris are discussed on the basis of a study of both adult and nymphal morphology. The first-instar nymph of *Hoplopleura inexpectans* Johnson is illustrated and described, and *Hoplopleura ismailiae*, new species, from Sudanese *Mastomys natalensis ismailiae* is described.

During the past decade the study of nymphal instars of *Hoplopleura* Enderlein has been used increasingly to solve problems of relationships of species in that genus (Cook and Beer, 1959; Kim, 1965; Johnson, 1972, and in press). Following Cook and Beer's pioneering work on North American *Hoplopleura* species, Kim's and Kim's and Emerson's (1968) papers have provided descriptions and figures of many *Hoplopleura* nymphs, thus laying the groundwork for their use in deciding intraspecific relationships.

Johnson (1960), using only adults, split the African species *Hoplopleura intermedia* Kellogg and Ferris (see Ferris, 1921, 1951) into three species: *Hoplopleura inexpectans* Johnson, from *Praomys jacksoni*; *Hoplopleura zelotomydis* Johnson, from *Zelotomys hildgardae*; and *intermedia* from *Mastomys natalensis*; and described a fourth related species, *Hoplopleura captiosa* Johnson, from *Mus musculus*. In that paper, *intermedia* and allies were considered close to *Hoplopleura hesperomydis* (Osborn) from North American *Peromyscus* species. However, Kim (1965) investigated the setation of the head of *Hoplopleura* and found that the presence or absence of the accessory dorsal head seta (ADHS of Kim) is of considerable taxonomic importance. This small seta, which lies medial to the principal dorsal head seta (PDHS), at the posterolateral angle of the head, is missing in *hesperomydis* and allies, but always present in *intermedia* and allies. (Johnson (1960, Fig. 31) incorrectly shows this seta to be missing in *inexpectans*.) A comparison of the nymphs of the two groups, as pictured and described by Cook and Beer (1959), Kim (1965, 1966), Wegner (1966), Kim and Emerson (1968) and Johnson (in press) offers convincing evidence that *hesperomydis*-like species are not particularly related to *intermedia*-like species. As is true of *hesperomydis* and allies, nymphal characters are sometimes superior for identification of *intermedia*-group species. In fact, Kim (1966), using nymphal morphology, found that paratypes of *captiosa* J., from Thai *Mus cervicolor* constituted a new species, *Hoplopleura johnsonae* Kim.



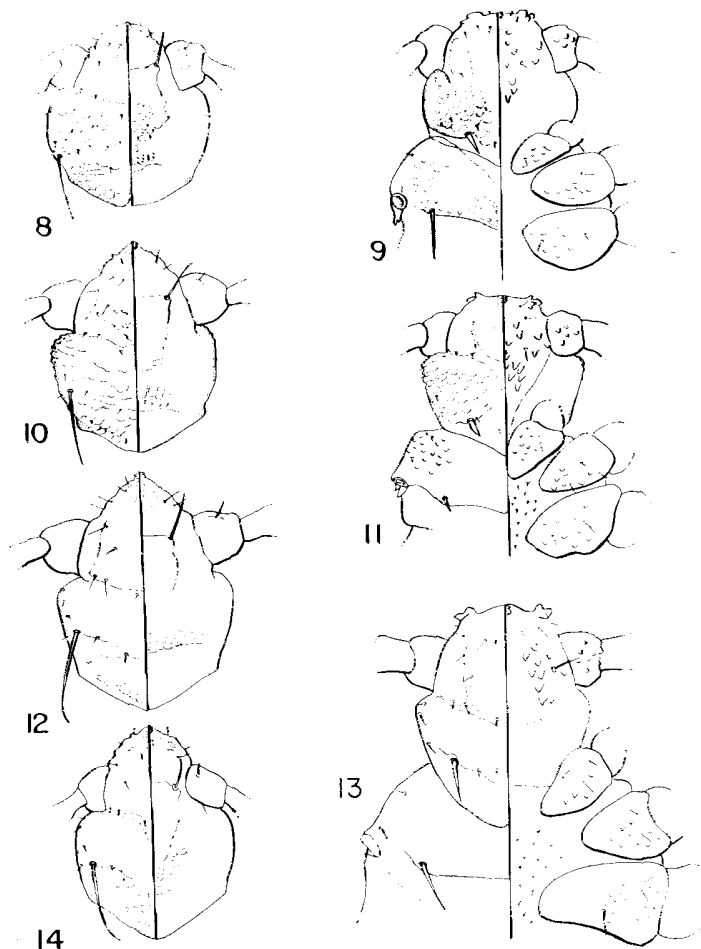
Figs. 1-6, *Hoplopleura ismailiae*, n. sp.: 1, holotype, distal part of third leg omitted; 2, allotype; 3, female, paratergal plates, Melut, Dentemmas; 4, holotype, thoracic sternal plate; 5, allotype, aedeagus; 6, holotype, tergal plate of eighth abdominal segment. Fig. 7, *H. intermedia* K. and F., tergal plate of eighth abdominal segment, female, Sudan, host undetermined, no. HH-13038.

This paper includes remarks on adults and nymphs of the *intermedia* group, a description and figures of the first-instar nymph of *inexpectans*, and the description of a new species. All the setae of the legs, antennae, and anterior part of the head are not drawn in on the figures. The holotype and allotype of the new species are deposited in the collections of the U.S. National Museum, Washington, D.C.

#### CHARACTERIZATION OF *H. intermedia* K. AND F. AND ITS ALLIES

**Adults.**—The accessory dorsal head seta is present and the four small lateral occipital setae (MHIS, or marginal head setae of Kim (1965)) are present, with the anterior one placed posterior to the postantennal angle. Sensoria of antennal segments four and five are large and contiguous. According to the species, the head is variously rugose, smooth, or reticulate dorsally (figs. 8, 10, 12, 14). The seta medial to the mesothoracic spiracle is usually long, never extremely short or minute. The thoracic sternal plate is longer than broad, and extended posteriorly into a narrowed process (fig. 4). Its shape is of limited taxonomic value in this group. There are well developed tergal and sternal abdominal plates; on a typical segment the female has three plates both dorsally and ventrally, and the male has two plates ventrally and one plate dorsally. The sternal plate of the second segment and first plate of the third segment are extended laterally to approach the corresponding paratergal plates. That of the third segment has a lateral group of two enlarged, apical setae on either side. According to the species, abdominal setae are swordshaped to varying degree or are long, thin, and flexible (figs. 16-19). There are no setae laterally off the tergal plates but four or more ventrolateral setae occur on segments 4-7, and sometimes on segment 8. The penultimate abdominal tergal plate bears 0-4 apical setae, depending on sex and species (figs. 6, 7). Paratergal plates III-VI each have two apical lobes which are roughly quadrate, and VII-VIII have a varying number of apical lobes depending on the species and sex. Shape of the aedeagus (fig. 5) apparently is of extremely limited taxonomic value in this group, although size varies according to the species.

**Nymphs.**—Like other *Hoplopleura*, all stages have thornlike tubercles ventrally on the head, antennae, and legs (fig. 15). Relative lengths of the principal dorsal head seta and the dorsal mesothoracic seta vary according to the species (figs. 9, 11, 13). Especially in second and third instar nymphs there may be a sclerotized denticulate extension on the posterior margin of the mesothoracic spiracle (macrotubercle of Kim and Emerson, 1968). The abdominal and thoracic venter is spiculated and the abdomen is scaly or reticulate dorsally. There is always a pair of small setae anteroventrally on the abdomen, and occasionally aberrant single setae posterior to these. Second and third instars have six pairs of paratergal plates which are scaly, variously shaped according to the species, and in some species the apex is drawn out into a long, heavily scaled lobe (figs. 20-22). Incipient nonfunctional spiracles are present on the paratergal plates. The first instar lacks any indication of paratergal plates. All instars have a single terminal abdominal seta on each side. In some species the terminal seta is set on a narrow, cylindrical prolongation of the integument, especially in the later instars. The anal lobe is extended and often apically bifurcate.



Figs. 8-9, *Hoplopleura inexpectans* J., heads, Angola ex *Rattus morio jacksoni*: 8, male; 9, third-instar nymph. Figs. 10-11, *H. intermedia* K. and F., heads: 10, male, data as Fig. 7; 11, third-instar nymph, Tanganyika ex *Mastomys natalensis microdon*. Figs. 12-13, *H. ismailiae*, n. sp., heads: 12, allotype; 13, third-instar nymph. Fig. 14, *H. captiosa* J., head, male paratype, Egypt ex *Mus musculus* no. HH-21984.

*Hoplopleura inexpectans* Johnson, first-instar nymph  
(Fig. 15)

**Description.**—Lateral occipital head margins straight, slightly convergent posteriorly, inner sutural head seta (ISHS of Kim, 1965) stouter than outer sutural head seta (OSHS). Principal dorsal head seta stout, as large as dorsal mesothoracic seta. Mesothoracic spiracle borne on blunt lateral prolongation, lacking macrotubercle. Lateral margins of abdomen wrinkled, lacking spicules and scales, dorsum covered with vaguely indicated "plate" which is split anteroposteriorly on median line. Terminal abdominal setae set on very small protuberances, anal lobe apically bifurcate, bearing small lateral seta on each side.

**Length.**—0.25–0.35 mm.

**Material examined.**—28 first-instar, ten second-instar, and six third-instar nymphs, with associated adults, from *Rattus morio jacksoni*, Angola.

*Hoplopleura ismailiae*, n. sp.  
(Figs. 1–6, 12, 13, 18, 22, 23)

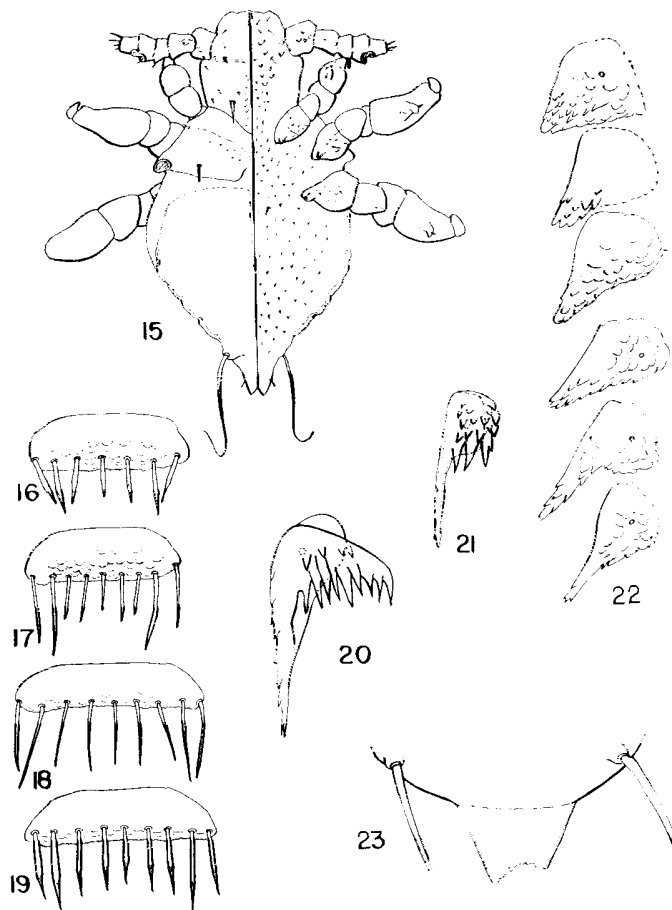
**Type data.**—Female holotype, male allotype, three female paratypes and one third-instar nymph (female) ex *Mastomys natalensis ismailiae*, Sudan: Upper Nile Province, Khor Adar, Paloich, 14 April 1960, Hoogstraal, Heyneman, and Gabor collectors. One female paratype as above but HH13097–13101. One female paratype ex *M. n. ismailiae*, Upper Nile Province, Melut, 31 March 1960, HH13014. One female paratype as above but 2 April 1960, HH13035. One female paratype as above but 4 April 1960, HH13046–48. One female paratype, ex *M. n. ismailiae*, Upper Nile Province, Demtemma, Melut, 5 April 1960.

**Lengths.**—Female: holotype, 1.35 mm, paratypes, 1.25–1.3 mm, plus one general telescoped paratype of 1.0 mm. Male: 1.0 mm.

**Diagnosis.**—Separable from *intermedia*, *zelotomydis* and *inexpectans* by a combination of the following: male with apical setae of paratergal plate III both longer than the apical lobes; both sexes with two long apical setae on plate VII; both apical setae of plates IV–VI inserted on margin; head lacking dorsal rugosities or strong reticulation and with postantennal (occipital) margins straight and slightly convergent posteriorly (fig. 12). Female further separable from *intermedia* by having at least one seta on the tergal plate of abdominal segment 8 (compare figs. 6, 7). Closest to *captiosa* and *johnsonae*. Separable from both these species by lacking swordshaped setae on the abdomen (compare figs. 18, 19), and further from female *johnsonae*, according to the original description of that species, by having the apical setae of paratergal plate III of unequal lengths. Third-instar nymph differing from that of *captiosa* by having paratergal plates 3–6 produced apically into narrowed scaly processes (fig. 22) and from *johnsonae*, *intermedia* (fig. 21) and *inexpectans* by lacking marked apical processes on plates 1–2.

**Description.**—A member of the *intermedia* group. Only characters distinguishing *ismailiae* from other *intermedia*-group species are discussed.

**Female (fig. 1):** Head (fig. 12, male), postantennal angles rounded, lateral occipital margins straight, converging posteriorly, dorsum smooth except for slight reticulations and rugosities posterior to principal and accessory dorsal setae. Dorsal setae other than principal one all small, thin, but not minute.



Figs. 15, 16, 20, *Hoplopleura inexpectans* J., data as Figs. 8–9: 15, first-instar nymph; 16, male, tergal plate of abdominal segment five; 20, third-instar nymph, third paratergal plate, dorsal view. Figs. 17, 21, *H. intermedia* K. and F.: 17, male, tergal plate of abdominal segment five, data as Fig. 7; 21, third-instar nymph, third paratergal plate, dorsal view, data as Fig. 11. Figs. 18, 22, 23, *H. ismailiae*, n. sp.: 18, allotype, tergal plate of abdominal segment five; 22, third-instar nymph, paratergal plates; 23, third-instar nymph, terminus of abdomen, anal lobe broken apically. Fig. 19, *H. captiosa* J., male, tergal plate of abdominal segment five, data as Fig. 14.

*Thorax*.—Sternal plate as in fig. 4. *Abdomen*. Especially dorsally, setae of abdominal plates long, thin, flexible (fig. 18, male). Tergal plate of segment 1 present, indistinct, one seta at each posterolateral angle; both setae small in holotype and all but one paratype; remaining paratype with seta long on one side. Paratergal plates (fig. 3), III with two apical setae of unequal length, both extending beyond apical lobes; pairs of apical setae on plates IV–VI marginal, small, thin, of equal length (one paratype has one abnormally large apical seta on plate IV, one side); plate VII with two long apical setae; plates III–VI with usual quadrate apical lobes; plate VII with both apical lobes quadrate, ventral one narrower; plate VIII with one dorsoapical lobe, this narrow, rounded to acute apically, usually about length of plate proper but in two paratypes it is considerably shorter. Genital seta of ninth segment long not bladellike.

*Male* (fig. 2): *Head* (fig. 12), *thorax*, and *abdomen* as female except in usual sexually dimorphic characters and as follows: paratergal plate III with one apical seta extending beyond apical lobes, second seta not visible in only available specimen; plate VII with one acute dorsoapical lobe; ventral lobe merely indicated; plate VIII lacking apical lobes. Aedeagus (fig. 5) as in related species.

*Third-instar nymph* (figs. 13, 22, 23): nymphal skin broken and fragmented by emerging female within. Head (fig. 13) with dorsal setae not minute, principal dorsal seta equal in length to that of thoracic dorsum. Head not reticulate or rugose. Paratergal plates (fig. 22) with increasingly pronounced apical prolongations as they progress posteriorly. First plate lacking a prolongation; none of scales on plates extremely long. Terminal abdominal setae (fig. 23) not set on a pronounced protuberance. Anal segment apically broken off.

The host relationships of *H. ismailiae*, n. sp., are of particular interest since *intermedia* was taken from the type host of *ismailiae* and very near the type locality (Upper Nile Province, Boing Doro from *M. n. ismailiae*, and Melut, from an undetermined host). It is possible that *intermedia* and *ismailiae* are geographical replacements of one another, but we lack information on this. *H. intermedia* has a broad geographical range, occurring on subspecies of *Mastomys natalensis* from South Africa to the Sudan. Morphological differences between *intermedia* and *ismailiae* are as great as between any of the other species of the *intermedia* group, arguing against the idea that they might be subspecies.

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