

**TWO NEW *BUCERONIRMUS* (MALLOPHAGA: PHILOPTERIDAE)
FROM *RHYTICEROS UNDULATUS* AND *R. PLICATUS*
(HORN BILLS)¹**

By **Robert E. Elbel**²

Abstract: Descriptions and illustrations are given for 2 new species, *Buceronirmus deignani* from *Rhyticeros undulatus* and *R. plicatus subruficollis* of the Oriental region and *B. thompsoni* from *R. plicatus* of the Australian region. Ectoparasite evidence indicates that *R. p. subruficollis* should be specifically distinct from *R. plicatus*, as well as from *R. undulatus*.

In discussing the taxonomic status of *Rhyticeros plicatus subruficollis*, Elbel (1969) mentioned *Buceronirmus* new species 1 and *Buceronirmus* new species 2 both of which are described here in advance of a revision of the Hornbill ischnoceran Mallophaga. Study material was loaned by British Museum (Natural History) (BMNH), Smithsonian Institution (USNM), Bishop Museum (BISHOP), and Austrian Institut für Parasitologie (AIP). For fresh material H. G. Deignan and Dr G. E. Watson, both USNM, identified hosts collected in Thailand and A. C. Ziegler, BISHOP, identified hosts collected in Irian. I obtained dried material from museum skins at BISHOP, USNM, American Museum of Natural History (AMNH), Field Museum of Natural History (FMNH), University of Michigan Museum of Zoology (MMZ), and the collection of Dr Boonsong Lekagul (BL), Bangkok, Thailand. Nomenclature of the hosts is that of Deignan (1963) and Sanft (1960) for subspecies not discussed by Deignan.

Buceronirmus deignani Elbel, new species FIG. 1, 3, 4

Type host: *Rhyticeros u. undulatus* (Shaw).

♂. Forehead with long medial extension of marginal carina. Antennae filiform. Abdominal tergite II divided medially; remainder complete. Sternal plates II-VI complete as for *B. thompsoni*, n. sp. (FIG. 7). Tergocentral setae: II-VII range 6-8, normally 6 on II and VII, 8 on III-VI; VIII range 8-10, normally 8. Pleural setae each side: IV-V dorsally 1; VI-VII dorsally 2-3, normally 2, ventrally 0-1, normally 0. Sternal setae: II-IV range 10-14, normally 12; V-VI range 8-12, normally 10; VII range 8-12, normally 8. Normal chaetotaxy of terminal segments as in FIG. 1; posterior margin with 8-12 ventral setae, normally 10. Genitalia as in FIG. 3; endomeres with paired sclerites on inner margins long and anterior medial projection long.

♀. Similar to ♂ except as follows. Abdominal tergites II-VII divided medially; VIII complete. Sternal plate II complete; III-VII circular in shape as for *B. thompsoni*, n. sp. (FIG. 8). Normal chaetotaxy of terminal segments as in FIG. 4; spermathecal sclerite nearly rectangular in shape (FIG. 4a); vulval margin with 20-26 short setae and 6-8 spines; postvulval sclerite long with inner margin straight; IX-XI with 10-14 sternal setae each side.

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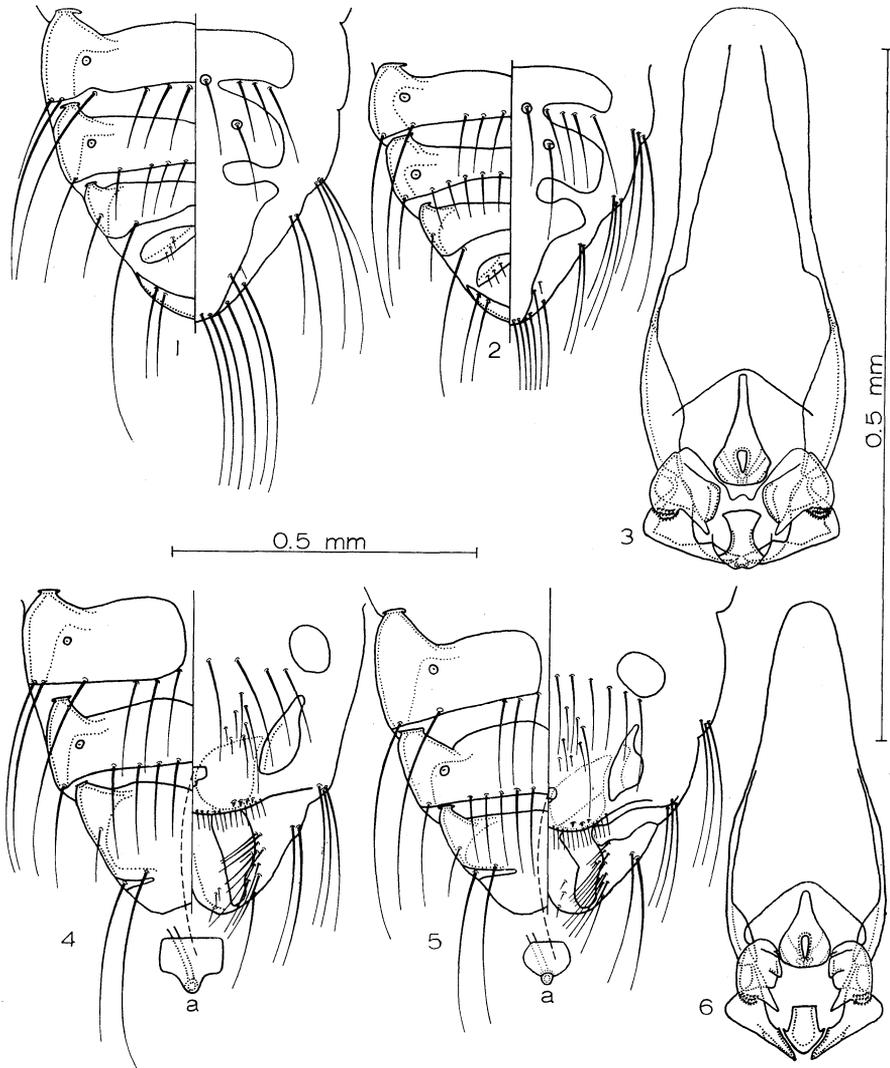


FIG. 1-6. 1, 3, 4. *Buceronirmus deignani*, n. sp.: 1, ♂ terminalia; 3, ♂ genitalia, ventral view; 4, ♀ terminalia; a, spermathecal sclerite. 2, 5, 6. *B. thompsoni*, n. sp.: 2, ♂ terminalia; 5, ♀ terminalia; a, spermathecal sclerite; 6, ♂ genitalia, ventral view. FIG. 1, 2, 4, 5, drawn to same scale; 3, 6, drawn to same scale.

Dimensions (in mm): Head width, ♂ 0.42-0.48, ♀ 0.44-0.51; head length, ♂ 0.60-0.66, ♀ 0.60-0.68; pterothorax width, ♂ 0.40-0.46, ♀ 0.41-0.55; abdomen width, ♂ 0.52-0.63, ♀ 0.56-0.65; total length, ♂ 2.12-2.48, ♀ 2.32-2.68.

Holotype ♂ (USNM), ex *Rhyticeros u. undulatus*, USNM skin, BURMA: Tenasserim, Talok Krang, 14.II.1904, W. L. Abbott. Paratypes: 34 ♂♂, 45 ♀♀ (in AIP, AMNH, BISHOP, BMNH, FMNH, USNM, and collections of K. C. Emerson and R. E. Elbel):

4 ♂♂, 4 ♀♀, same data as holotype; 8 ♂♂, 7 ♀♀, MALAYSIA: Malacca, Meinertzhagen 15512; 1 ♀, MMZ skins, Malacca, 1875, Beal & Steere; 1 ♂, 1 ♀, THAILAND: Phatthalung, Muang, Ban Na, 7.II.1955, B. Lekagul; 6 ♂♂, 10 ♀♀, same locality, 9.III.1963, W. Songprakob & W. Suwan Laong; 12 ♂♂, 20 ♀♀, Trang, Muang, Lamo, 5.III.1963, W. Songprakob & W. Suwan Laong; 1 ♂, 1 ♀, BL skin, Chon Buri, Siracha, Nong Ko, 2.VIII.1953, B. Lekagul; 1 ♂, BL skin, Ranong, Bang Non, 12.VI.1957, B. Lekagul & K. Thonglongya; 1 ♂, AUSTRIA, Vienna Zoo; 1 ♀, USNM skins, EAST SUMATRA: Rupat Strait, 1906, W. L. Abbott.

OTHER SPECIMENS: 5 ♂♂, 5 ♀♀, ex *R. u. ticehursti* Deignan, BURMA: Meinertzhagen 10860; 1 ♀, FMNH skin, Tenasserim, Tavoy River, 5.II.1918, I. L. Hopwood; 4 ♂♂, 6 ♀♀, FMNH skin, LAOS: Pak Song, 18.XII.1931, J. Delacour; 1 ♂, 1 ♀, MMZ skin, INDIA: Assam, Manipur, 27.X.1950, W. Koelz; 11 ♂♂, 10 ♀♀, ex *R. u. aequabilis* Sanft, BORNEO: Meinertzhagen 10895; 40 ♂♂, 35 ♀♀, ex *R. plicatus subruficollis* (Blyth), THAILAND: Ranong, Kapoe, Thungkha, I-II.1963, W. Songprakob & W. Suwan Laong; 4 ♂♂, USNM skins, MERGUI ARCHIPELAGO: Domel I.1904, W. L. Abbott. Specimens in BISHOP, BMNH, FMNH, USNM, and collections of K. C. Emerson and R. E. Elbel.

This species is named in memory of H. G. Deignan, USNM, for his constant support of mallophagan taxonomy as contributory evidence to the taxonomy of the host birds. For the paratype from Austria (in AIP), Ziegler (1971) stated that Dr Elbel would describe the species as *Buceronirmus orientalis*. The name *orientalis* thereby became a *nomen nudum*.

***Buceronirmus thompsoni* Elbel, new species** FIG. 2, 5-8

Type host: *Rhyticeros plicatus ruficollis* (Vieillot).

♂. Normal chaetotaxy as in FIG. 7. Forehead with long medial extension of marginal carina. Antennae filiform. Abdominal tergite II divided medially; remainder complete. Sternal plates II-VI complete. Tergoventral setae: II-VII range 6-8; VIII range 8-10. Pleural setae each side: II ventrally 0-1; III ventrally 1-2; IV-VIII ventrally 2-4; VI-VII dorsally 1. Sternal setae: II-VII range 8-16. Terminal segments as in FIG. 2; posterior margin with 8-12 ventral setae, normally 10. Genitalia as in FIG. 6; endomeres with paired sclerites on inner margins short and anterior medial projection short.

♀. Normal chaetotaxy as in FIG. 8. Similar to ♂ except as follows. Abdominal tergites II-VII divided medially; VIII complete. Sternal plate II complete; III-VII circular in shape. Terminal segments as in FIG. 5; spermathecal sclerite nearly circular in shape (FIG. 5a); vulval margin with 22-28 short setae and 6-10 spines; postvulval sclerite long with inner margin curved; IX-XI with 9-13 sternal setae each side.

Dimensions (in mm): Head width, ♂ 0.42-0.45, ♀ 0.44-0.47; head length, ♂ 0.55-0.60, ♀ 0.59-0.62; pterothorax width, ♂ 0.37-0.42, ♀ 0.41-0.44; abdomen width, ♂ 0.48-0.58, ♀ 0.56-0.65; total length, ♂ 1.80-2.02, ♀ 2.05-2.32.

Holotype ♂ (BISHOP 10,657), ex *Rhyticeros plicatus ruficollis*, NEW GUINEA: IRIAN: Vogelkop, Kebar Valley, Senopi, I.1962, L. & S. Quate and R. Versteegh; paratypes: 23 ♂♂, 7 ♀♀ (in BISHOP, USNM, and collections of K. C. Emerson and R. E. Elbel):

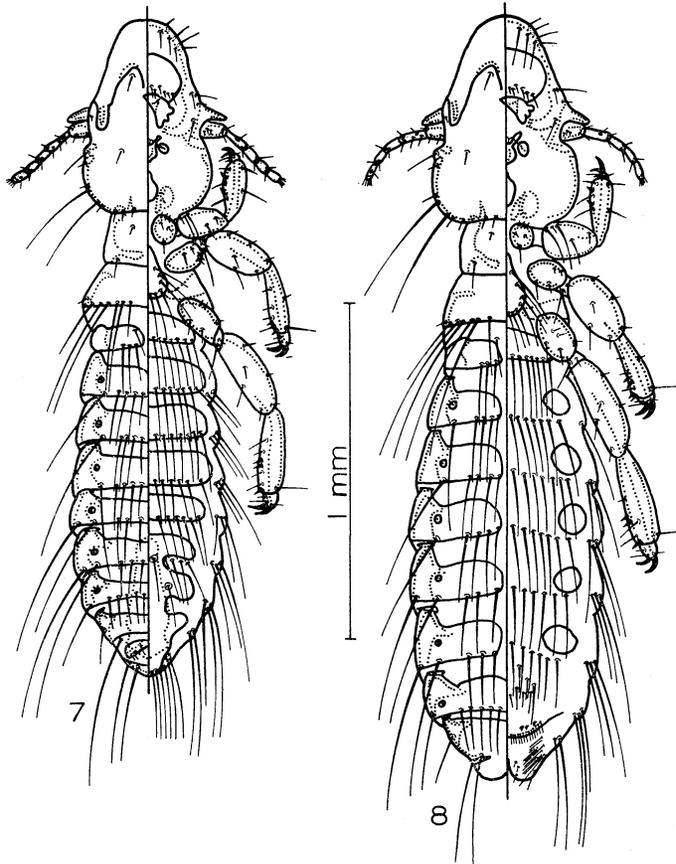


FIG. 7-8. *Buceronirmus thompsoni*, n. sp.: 7, ♂; 8, ♀. Drawn to same scale.

21 ♂♂, 7 ♀♀, same data as holotype; 2 ♂♂, BISHOP skins, Geelvink Baai, 1962-1963, L. P. Richards & M. C. Thompson.

OTHER SPECIMENS: 6 ♂♂, 7 ♀♀, ex *R. p. jungei* Mayr, AMNH skins, NEW GUINEA: IRIAN: Idenburg River, II-III.1939, Archibold, Rand & Richardson; 4 ♂♂, 6 ♀♀, AMNH skin, Japen I, A. A. Bruijn; 1 ♂, 4 ♀♀, ex *R. p. dampieri* Mayr, BISMARCK ARCHIPELAGO: New Britain I, 8.XII.1962, H. Clissold; 1 ♂, AMNH skins, New Britain I, 1932, W. F. Coultas; 5 ♂♂, 1 ♀, AMNH skin, New Britain I, 31.XII.1958; 2 ♂♂, 4 ♀♀, AMNH skins, New Ireland I; 3 ♂♂, ex *R. p. harterti* Mayr, AMNH skin, SOLOMON IS: Bougainville, 2.V.1904, A. S. Meek; 9 ♂♂, 15 ♀♀, AMNH skins, Buka, Fauro, and Shortland, 1927-1928, Whitney; 1 ♂, ex *R. p. mendanae* Hartert, AMNH skins, Ysabel, VI.1901, A. S. Meek; 29 ♂♂, 32 ♀♀, AMNH skins, Choiseul and Guadalcanal, 1927, Whitney; 17 ♂♂, 22 ♀♀, ex *R. p.* subsp., NEW GUINEA, Meinertzhagen

13376; 1 ♀, BISHOP skins, NEW GUINEA, Flood brothers. Specimens in AMNH, BISHOP, BMNH, FMNH, USNM, and collections of K. C. Emerson and R. E. Elbel.

This species is named for Dr M. C. Thompson, Southwestern College, Winfield, Kansas, in appreciation for help in brushing BISHOP skins and checking host data.

DISCUSSION: Both species resemble *Buceronirmus longicuneatus* Hopkins in the long medial extension of the marginal carina. *B. deignani* resembles most closely *B. thompsoni* which is slightly smaller than *B. deignani* in all measurements except abdominal width of female. On the abdominal segments *B. deignani* lacks pleural setae on III which are present on the ventral margin of *B. thompsoni* (FIG. 7, 8), and on IV–VII more pleural setae are present on the ventral than dorsal margins of *B. thompsoni*, but the opposite is true for *B. deignani*. The male genitalia have endomeres with the paired sclerites on the inner margins and the anterior medial projection each longer in *B. deignani* (FIG. 3) than in *B. thompsoni* (FIG. 6). The female spermathecal sclerite is nearly rectangular in shape in *B. deignani* (FIG. 4a) but smaller and more circular in shape in *B. thompsoni* (FIG. 5a); the female postvulval sclerite is long in both species but the inner margin is straight in *B. deignani* (FIG. 4) and curved in *B. thompsoni* (FIG. 5). Because these sclerites are difficult to see in some specimens, females can be differentiated more easily by the pleural setae.

AVIPARASITOLOGICAL RELATIONS: Deignan (1963) did not follow Sanft (1960) in considering *Rhyticeros undulatus ticehursti* and *R. plicatus subruficollis* as synonyms of *R. u. undulatus*. Elbel (1969) stated that *Chapinia boonsongi* Elbel was found on both subspecies of *R. undulatus* and *Chapinia hirta* (Rudow) was found on all subspecies of *R. plicatus*; the *Chapinia* were so different that they were placed in different species-groups. Elbel suggested that the birds had been separated for a considerable length of time. He also suggested that speciation in the *Buceronirmus* indicated that the Australian forms of *R. plicatus* had become isolated from the Oriental *R. p. subruficollis* which thus should be specifically distinct. Since Mallophaga are confined to the host bird, the lice become isolated when the birds become isolated and, with time, speciation might occur in both host and Mallophaga. In each of these examples the suggestion that *R. p. subruficollis* should be specifically distinct is based on a single genus of Mallophaga, *Chapinia* in the 1st case and *Buceronirmus* in the 2nd. According to Clay (1957), the evidence of host relationship provided by one genus of Mallophaga is less convincing than if more genera were involved. Maa (1969) showed that subspecies of *R. plicatus* served as breeding hosts of *Icosta dioxyrhina* (Speiser) in the Australian region but that *Icosta bucerotina* Maa bred on *R. p. subruficollis* in the Oriental region. He suggested that geographical replacement in *Icosta* perhaps was correlated either with the possibility that evolutionary deviation in the hippoboscids was higher than in the birds or that ecological factors favored the flies more than the birds. Perhaps critical ornithological work will show that the taxonomic characters in combination with the ectoparasite evidence should warrant specific separation of *R. p. subruficollis* from the Australian subspecies of *R. plicatus*.

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LITERATURE CITED

- Clay, T.** 1957. The Mallophaga of birds. p. 120-58. *In: First symposium on host specificity among parasites of vertebrates.* I. U. B. S. and Univ. Neuchâtel, Neuchâtel.
- Deignan, H. G.** 1963. Checklist of the birds of Thailand. *U. S. Natl. Mus. Bull.* 226: x + 263 p.
- Elbel, R. E.** 1969. The taxonomic position of the Hornbill *Rhyticeros plicatus subruficollis* (Blyth) as indicated by the Mallophaga. *Condor* **71**: 434-35.
- Maa, T. C.** 1969. Studies in Hippoboscidae (Diptera) Part 2. *Pacif. Ins. Monogr.* **20**: 1-312.
- Sanft, K.** 1960. Bucerotidae (Aves: Upupae). *Das Tierreich* **76**: 1-176.
- Ziegler, H.** 1971. Die Federlingssammlung (Mallophaga) des parasitologischen Institutes der Tierärztlichen Hochschule in Wien. *Ann. Naturhist. Mus. Wien* **75**: 553-64.