MALLOPHAGAN PARASITES FROM INDIAN BIRDS—PART V.  
SPECIES BELONGING TO THE GENUS IBIDOCUS CUMMINGS, 1916 (ISCHNOCERA)  
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With 20 Text-figures  

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I. INTRODUCTION  
Species of the genus Ibidocus Cummings, 1916 are normally parasitic on members of the avian family Threskiornithidae, but recently Carrker (1947) has also reported two subspecies from as many subspecies of Aramus scolopaceus (Gmelin) (Aramidae).  

In the Indian and Ceylonese subregions and Burma five hosts of Ibidocus occur—a spoonbill and four ibises. Ischnocera parasites of the Spoonbill, Platalea I. cyanocolla L., the Black-Headed Ibis, Threskiornis melanocephalus (Latham) and the Glossy Ibis, Plegadis f. falcinellus (Lin.), have long been known; only the Black Ibis, Plegadis falcinellus (Leinmeck) and Davison's Black Ibis, Plegadis davisoni (Hume), remained to be examined. A good series of Ibidocus from P. papilloso has proved to belong to a new species. Only one female was available from P. davisoni (slide no. 4905, Meinertzhagen collection, British Museum (Nat. Hist.)); this differs from the species described in this paper, and is nearest to Ibidococus demelli sp. n. It is undoubtedly a new species but it has not been considered judicious to describe it on the basis of the single female but to wait until a good series consisting of both sexes is available.  

In the most recent check-list of the Mallophaga of the World (Hopkins and Clay, 1923) 23 species are included in this genus, of which 18 are considered to be valid. In 1947 the genus was reviewed by Carricker who, besides describing five new Neotropical forms, also included a key and short notes on the known species. The following valid species were not included by Carricker: acutusus (Neumann), 1922
delusus (Giebel), 1874
robustus (Quadt, 1935)
tetricusus (Neumann), 1922

Of those robustus (Quadt) was described from India (without host), clausus (Giebel) from Thraemorinae melanocephala and acutusus (Neumann) and tetricusus (Neumann) from Ethiopian flies.

An examination of authentic material from Thraemorinae melanocephala, Pseudula f. fulvinocla, Pseudula papillata and Pseudula I. leucorhoa has shown that each fly has its own distinct I. bidocusus species. An robustus (Quadt) was described from a female and its true host not known, it is intended to determine the host, if possible, and decide the status of this species.

Furthermore, no adequate descriptions or figures for the identification of claususus (Giebel), boesemania (Nitzsch) and platelatea (Denny), from T. melanocephala, P. f. fulvinocla and P. I. leucorhoa respectively, are available. Opportunity is now taken to provide these; keys for both the sexes have also been devised. Only I. demelli sp. n., from P. papillata, has been described in detail; for the remaining species only the more important characters have been given.

ACKNOWLEDGMENTS

I am indebted to Dr. Theresa Clay of the British Museum (Nat. Hist.) who with her customary kindness lent the material required for this study, gave much valuable advice and permission to quote from unpublished work, and to Professor E. B. Lai of this department for encouragement and continued interest in my work.

II. THE GENUS I. bidocusus, 1916


Type species: Philopterus platelatea Denny, 1845.

The genus I. bidocusus is readily recognised by the characters of the pre-antennal region of the head. The dorsal anterior plate is in the form of two separate plates, the posterior margin of each of which is produced as a heavily sclerotised, thickened point over the pre-antennal suture. The plates are either with or without oblique, parallel thickening apically. Other characters of secondary importance are the mandibles, the outermost, spine-like setae on each side of the posterior margin of the pterothorax; the tergal plates on the abdominal segment II (apparent first abdominal segment) of which the anterior margin is variously modified, and the heavily sclerotised and pigmented prominent sternite thecomb; and the chaetotaxy of sternum II which consists of only two minute setae, located in the middle of the segment.

Carricker (1947) observed that the three species from the Platulinae: platelatea (Denny), 1842, I. bidocusus Cummings, 1916 and thraemorinae Eichler, 1943 (= sp. carrickeri, Carricker, 1947), form a homogeneous group which differs from the other group comprised by the remaining species from the ibises. The characters, according to Carricker, which set the three species apart are the pterothoracic structure and male genitalia, the latter considered to be extremely complex.

This study, even though it is based on fewer species than Carricker’s—one spoonbill I. bidocusus and three from ibises—leaves no doubt that the first differs considerably from species from the latter hosts, but the distinguishing characters do not agree with those proposed by Carricker. The striking differences are, in the male, in the arrangement of the tergites on the terminal abdominal segment XI and, in the female, in the relation of the sternal thickening on abdominal segment VII to the genital plate and the characters of the lateral sclerites which reinforce the vulva on each side.

From the accounts and figures of I. bidocusus Cummings (1916 : 565) and thraemorinae Eichler (1943 : 5 and Carricker, 1947 : 118) it is evident that these species too possess the aforesaid diagnostic characters, in common with platelatea (Denny). These characters have proved to be valuable key characters for separating species of I. bidocusus from the spoonbills (subfamily Plataleinae) from those on the ibises (subfamily Thraemorinae).

III. THE SPECIES OF I. bidocusus

(1) I. bidocusus demelli sp. n. (Figs. 1-4, 8, 12, 13, 17)

Type host: Pseudula papillata (Temminck).

Material examined.—Five males and six females from the Black ibis, Pseudula papillata from U.P., India, and one male and one female from the same host, slide no. 4904 in the Meinertzhagen collection, British Museum (Nat. Hist.), from North India.

Type material.—Holotype male and allotype female, slide no. 616, from Pseudula papillata (Temminck); the types and paratypes collected by the author have been presented to the British Museum (Nat. Hist.).

Male.—General characters and shape of head as shown is figure 1; breadth at temples greater than total length; C.I. 0.98:1.11 (Tables IV and VII). The divided dorsal anterior plate without oblique, parallel thickening apically. Setae in pre-antennal region long, with the exception of preocular and prosternal setae which are short; 4 long and 2 short marginal temporal setae; mandibles characteristic, as admirably described for platelatea by Cummings (1916 : 664).

Preprothoracix with slightly divergent sides; prosternum divided in the middle, but joined to a median plate; 2 spine each side on posterior margin, the outer placed below the level of the prothoracic spinules.

Prehumeracix large, with strongly divergent sides; prothoracic completely divided in the middle. Mesosternum without setae. Setae present on postero-lateral and postero-dorsal margins, those on the latter extending to the mid-line; total number of setae each side varies between 14-22; the first spin-seta on the lateral margins well apart from the second, long setae; those 2 setae extremely close to one another in bipinnate (Nitzsch); the laterally

**TRANS. R. ENT. SOC. LOND. 110. PT. 14 (DECEMBER 1968).**
placed setae widely separated compared to those on posterior margin, which are somewhat closely set; the 2 median setae long and stout, unlike pleurocerci. Mesosternum always with 2 short, hyaline setae; metasternum normally with 2 long setae, but 1 specimen had 3 each side.

![Diagram](image)

**Fig. 1-3.** *Hiodon detersi* sp. n.: (1) Male head; (2) terminal segments of male abdomen; (3) male genitalia.

Abdomen rounded. Tergal plates on segments II-VIII typical; triangular and widely separated; those on segments IX-X differ in shape, but also widely separated. Tergal plates on segment I have weakly sclerotized setae associated with their anterior margins which in all probability represent the feebly sclerotized anterior margin of the tergal plate but could well be an independent sclerotization. Anterior margin of tergites on segments III-VIII also feebly sclerotized but, unlike pleurocerci, the characteristic feebly sclerotized bar which separates a narrow anterior strip from the tergite proper not visible in unstained specimens; in all probability it is present, since it is delineable in a female stained with carbolic fuchsin, but long treatment with potash has destroyed its identity.

Terminal segment XI differs greatly from that in *pleurocerci*; it is emarginate, each lobe being broadly rounded. Tergites thereon in the form of triangular plates, not covering the greater part of the segment as in *detersi*. A large number of setae present on posterosilateral and posterior margins so that the 3 anal setae cannot be delineated.

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Part V. Species belonging to the genus *Hiodon* Cummings, 1916

Sternal plates on segment II in the form of laterally placed, heavily sclerotized and pigmented transverse sclerites extending to lateral margins of segment each side, and slightly dorsocentrally also; sternite on segment III-VI laterally placed circular or elliptical plates, while those on segment VII are large triangular plates each with a blunt apex, unlike *denses* in which this particular sternal thickening is in the form of a median, heavily sclerotized and pigmented plate.

Number of setae on dorsum far greater than in *denses*; segment II with 2 anterior tergo-coxal setae and 2 or more rows in middle of segment but posterior to the tergal plate only 1 row tends to be retained; segment III like II in arrangement of setae, but without the 2 tergo-coxal setae; segments IV-VII with only 1 continuous row of a fairly large number of setae.

Postspiracular setae begin from segment III; as the row of tergal setae extends on each side well below the tergites, the postspiracular setae in segment IV and thereafter cannot be distinguished; segment VII also bear, like VIII, the typical seta lying each side in the pocket of the integument (Clay, 1955).

Sternal chaetotaxy with variation shown in Table II; chaetotaxy of sternum II-VI very similar to *denses*; the 2 setae on sternum II minute, those on others long; sternum VII with 6 or 7 setae and the lateral edge of sternum IX normally with 3, occasionally only 2, spine-like setae.

Shape of posterior segments of abdomen, their chaetotaxy and genital plate as shown in fig. 2. A large number of setae, approximately 13, present on genital region each side of genital plate.

Male genitalia as shown in figs. 3 and 17; *parasites* do not reach to end of mesosome and the 3 mesosomal components differ from corresponding sclerites of *denses*; a typical "median" sclerite present (fig. 3, m); unlike *pleurocerci* there is no sclerite connecting the basal plate with the mesosome.

![Diagram](image)

**Figs. 4-7.** Heads of female species of *Hiodon*: (4) *denses* sp. n.; (5) *pleurocerci* (Davis); (6) *bispinatus* (Nitzsch); (7) *denses* (Giebel).
Female.—General characters of head and thorax similar to male, but slightly larger in size (fig. 4, tables V and VII).

Dorsal marginal pterothoracic setae vary between 19-23. Mesosternum with 2 short and metasternum with 2 long setae (fig. 8). Articulation of pterothoracic legs is alike in denselli sp. n. and cloaera (figs. 8 and 11). Second episternum, the sclerite to which the cornual base articulates (Clay, unpublished manuscript), flat and leaf-like, while the third episternum is hammer-shaped; these sclerites differ from the corresponding sclerites in basinea and phales (figs. 10 and 9), while in both denselli sp. n. and cloaera the episternum is hammer-shaped with a winged proximal end (figs. 8 and 11).

Abdomen oval. Tergal plates on segment II as in male (fig. 8); those on segments III-VII also as in male but with a heavily sclerotized bar demarcating a narrow strip anteriorly from the tergite proper. Stermites in segments II-VII as in male; the inner margin of the large, triangular sternites on segment VII not joined to the genital plate, as in phales. Number of setae on dorsum far greater than in denselli; arrangement of setae on segments II-III as in male but the number in each row greater; segments IV-VIII also with more than 1 row of setae in middle of segment, though laterally, posterior to the tergal plate, only 1 row tends to be retained. Termina abdominal segments (IX-XI) with either 3 or 4 long setae each side on dorsolateral margin and 4 terminal setae (only 1 specimen out of 7 had only 2 setae), not placed on the tergites, 2 or more of which always extend beyond posterior margin of abdomen. In denselli there are only 2 tergal setae placed similarly, and normally not reaching posterior margin of abdomen, occasionally reaching it, but never extending beyond it. Postterminal setae difficult to distinguish from tergal setae, but probably begin from segment III.

Sternal chaetotaxy with variation shown in Table III; normally 3, occasionally 2, 4 or 5 long invaginated directed setae present each side of last sternite (fig. 12).

Chaetotaxy of segments II-III as in figure 8, and of posterior segments and genital region as in figure 12. Genital plate broadly rectangular; sclerites supporting the vulva on the sides elongated, more or less oval, and characteristic to thickened, differing from the structures supporting the vulva laterally in phales (cf. figs. 12 and 20).

Number of setae on margin of vulva between 18-20 (mostly 17-20), fewer than in denselli; the short thorn-like setae on ventral surface of vulva also fewer than in the latter species.

A characteristic, butterfly-shaped postvulval sclerite, with oblique thickening and another sclerite present each side in this region (fig. 13).

Body measurements of types (in mm.) as in Table I.

The species has been named in honour of Professor R. Dennell of the Zoological Laboratories, University of Manchester.
Part V. Species belonging to the genus Ibdicetus Cummins, 1916

narrow anterior part demarcated from the tegument proper by a heavily sclerotised and pigmented bar; this bar appears as an intertergal selerite each side, but careful examination reveals (as true relation with the tergal plates.)

(4) The dorsal abdominal chaetotaxy, which is very sparse. Segment II has 2 anterior tergocentral setae and only 1 posterior row in the middle of the segment consisting of 11–16 setae. The chaetotaxy of the middle region of other segments is as follows: III, 6–13; IV, 6–9; V, 5–7; VI, 2–6; VII–VIII, 2–3. (Besides the row of setae, segments IV–VI have 1 seta each side posterior to the tergal plate but even though these setae are separated by a gap from the innermost setae of the tergal row they do not lie in the postepisternal position (Clay, 1986). Segment VII usually bears in this position 2 setae, occasionally 1 seta, each side, while on segment VIII the normal number is 2, though occasionally there may be 1 or 2. These setae have been referred to as postepisternal setae in this communication.) Postepisternal setae begin from segment IV or V, rarely from VI also. Variation of central chaetotaxy shown in Table II; it is slightly different from that of desmoduloid sp. n., for instance sternum VII normally with 4 long setae, occasionally 3 or 3 but never more; in desmoduloid sp. n. the number varies between 6–8. (Sternum IX normally with 2, occasionally 1, rarely 3, spine-like setae on the lateral edge.)

(5) The sternal thickening on segment VII, which is in the form of a median plate (fig. 18), prominent in the middle due to heavy sclerotization and pigmentation.

(6) The characters of the male genitalia (fig. 16). The mesosome is distinctly shorter than the parameres; the mesosomal components and the median selerite are of different shape and size.

**Female.**—(1) As for male (fig. 7).

(2) As for male (fig. 11). (Dorsal marginal pleurothoracic setae vary between 17–22. Metatergal setae 2; 3 specimens, however, had 2 setae on one and 1 on the other side.)

| Table II. — Sternal chaetotaxy of males of species of Ibdicetus |
|------------------|------------------|
| **desmoduloid sp. n.** | **clavatus** | **plastidion** |
| **Each side** | **Total** | **Each side** | **Total** | **Each side** | **Total** |
| II | 3–6 | 7–12 | 4–7 | 9–14 | 2–3 | 6–6 |
| IV | 4–6 | 8–12 | 4–6 | 8–12 | 2–4 | 5–7 |
| V | 3–6 | 7–11 | 3–5 | 8–9 | (7, 8) | (12) |
| VI | 3–5 | 7–10 | 3–5 | 8–9 | (7, 8) | (12) |
| VII | 3–4 | 6–8 | 3–4 | 6–8 | (1, 2) | (3) |
| VIII | 1 | 2 | 1 | 2 | 1 | 2 |

* One specimen had a long seta on one side, near the margin of the segment.
† Exceptional specimens, in which the number did not fall in the normal range of variation.
B. K. Tandon on mallophagan parasites from Indian Birds.

(3) Same as for male for segment III (fig. 11).

(4) The dorsal abdominal chaetotaxy, which is sparse. (Segment II with 2 anterior tergocephral setae, in the middle of this segment, and also of segment III there may be either 1 or 2 rows of setae; segments IV-VIII with only 1 continuous row of setae; number of setae on segment VIII considerably less.) Postspiracular setae begin from segment IV or V, occasionally present on segment III but on one side only. Terminal segments (IX-XI) always 2 tergocephral setae (fig. 18); denneli sp. n. normally with 4, and in both these species the setae are not placed on the tegulae, unlike binacatus (Nitzsch).

Fig. 15.—I. clausus (Giebel); sternal thickening on segment VII of male abdomen.

Fig. 16-17.—Dorsal parts of male genitalia of Hbidococcus species (drewn to same scale): (16) clausus (Giebel); (17) denneli sp. n.

Sternal chaetotaxy, with variation, shown in Table III. (On each side of the last sternite there are normally 2 occasionally 1 or 2, long invaginately directed setae.)

(5) The number of setae on the margin of the vulva, which varies between 22-28 (usually 24-27), is more than in denneli sp. n., and so are the horn-like setae on the ventral surface of the vulva.

(6) The shape of the postovaireal sclerites in the genital region (fig. 14).

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* Number of specimens examined.

Hbidococcus robustus Quadri, 1935

It has not been possible to identify this species with certainty as the original description and figures are deficient in certain specific characters and might apply to more than one species. The species was erected on the basis of a single female collected from an unidentified water-bird. Hopkins and Clay (1932) considered either T. melanocephala (Latham), P. falcinellus (Linn.) or P. f. major (Temminck and Schlegel) to be the likely hosts, but Hbidococcus from these hosts are distinct and differ greatly from robustus as figured by Quadri. Its greatest resemblance is to I. clausus parasitizing T. melanocephala and I. denneli parasitizing P. papillosa (Temminck), and one of these is undoubtedly its true host; it appears to resemble clausus in the sparse abdominal chaetotaxy more than denneli. A request was made to Dr. M. A. H. Quadri for the loan of the type-slide, for comparing the holotype with authentic material from these hosts. The slide, however, was not forthcoming and the conclusion that has been lost is inescapable.

In the absence of the type material and as the original description and figure appear to resemble more closely clausus than any other species from Indian hosts, it has been decided to make I. robustus (Quadri) a synonym of I. clausus (Giebel) (syn. n.).

(3) Hbidococcus binacatus (Nitzsch), 1866 (Figs. 6, 10, 19-21)

Type host: Phyladis f. falcinellus (Linn.).

Of the four species considered here this is the only form in which the anterior one-third (approximately) of the dorsal anterior plate has oblique, parallel thickening.

Material examined.—Eight males and two females from Phyladis f. falcinellus (L.) from Egypt, from the Meinertzhagen collection, British Museum (Nat. Hist.), slide no. 7999; and two males and one female from P. f. falcinellus (L.) from Bechuanaland, from F. Zarqut collection, British Museum (Nat. Hist.), slide no. 457.
### Table IV.—Breadth (in mm.) of head at temples of males of species of Hbidococcus with number of specimens

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### Table V.—Breadth (in mm.) of head at temples of females of species of Hbidococcus with number of specimens

| Species       | Count | 0-87 | 0-88 | 0-89 | 0-90 | 0-91 | 0-92 | 0-93 | 0-94 | 0-95 | 0-96 | 0-97 | 0-98 | 0-99 | 1-00 | 1-01 | 1-02 | 1-03 | 1-04 | 1-05 |
|---------------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| baiiimata     | 3     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| clausus      | 18    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| dunedelli sp. | 6     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| platoideae   | 13    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| baiiimata     | 10    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| clausus      | 18    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| dunedelli sp. | 6     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| platoideae   | 12    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

### Table VI.—Cephalic index of males of species of Hbidococcus with number of specimens

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### Table VII.—Cephalic index of females of species of Hbidococcus with number of specimens

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Head longer than wide; the pre-anterior region elongated and slightly longer than the post-anterior region. Consequently, the dorsal anterior plate is proportionately longer (fig. 6). Width across the temple given in Tables IV and V. C.I. 0-89-0-95 in the male and 0-90 and 0-95 in the two females (Tables VI and VII).

Prothorax as in dunedelli sp. n., with slight differences in the shape of internal sclerites. Pterothorax different from dunedelli sp. n.; dorsal marginal setae not extending to mid-line (fig. 10), varying between 0-11 each side in the 3 sexes. The first short and the second long setae on the lateral margins close together, unlike the other 2 species. Mesocorium devoid of setae; metasternum with 4-8 setae in the male and the three females had 3+3, 3+3 and 2+2 setae.

General characters of abdomen as in dunedelli sp. n., with slight differences in the shape of the tergites, sternites and the dorsal and ventral chaetotaxy.
In the key to the species of *Ibidoeus*, Carriker (1947) has separated this from the remaining species on the character of the pleurites. Unfortunately it has not been possible to study this character because in potash-treated specimens the pleurites are hardly visible, even after staining with carbol-fuchsin.

Abdominal segment II characteristic: anterior margin of tergal plates thickened, the thickening extending into the pterothorax where it fuses with the pleuronum; a small sclerite present at about the middle of the segment each side, the sclerites of the 2 sides either separate or fused (fig. 10). The 2 anterior tergocentral setae on segment II either present on or off these sclerites. In the female, segments III and VI-VIII also bear a median sclerite; that on segment III faint and inconspicuous while those on VI-VIII are heavily sclerotized, pigmented and prominent. (All the females, apparently, do not possess the median sclerites in segments VII-VIII; one, out of 3 examined, lacked these although fully mature. Figure 21 has been drawn from this particular specimen and the median thickening have been included to indicate their position when present.) Medially the sternum thickening on segment II is bent towards the posterior end of the body (fig. 10); sternites on segments III-VI longitudinally elliptical, laterally placed plates. Segments II-III without postspinal setae.

**Male.**—Abdominal chaetotaxy of segments II-III and posterior segments of abdomen as in figures 10 and 19. Number of setae on terga VII and VIII varies, either 3 + 3, 3 + 2 or 3 + 2 setae on the former, and either 1 + 1, 1 + 2 or 2 + 2 setae on the latter. Segment IX has 1 marginal seta, shown on the dorsal side in figure 19, and generally 3-5 long setae on the lateral edge of the sternum—rarely 2 or even as many as 6-7. The 3 setae on the postercocentral margin of the terminal segment are probably the anal setae.

Genital plate and male genitalia as in figures 19 and 20. The genitalia differ from those of *I. leucoroides* n. and *I. caesus* in the shape of the parameres, which are not pointed at the tips, and in possessing a median sclerite which joins the basal plate with the mesoosome.

**Female.**—Shape of posterior segments of abdomen, their chaetotaxy and the genital region as in figure 21. The 3 dorsal setae near the outer margin, each side of segments IX-XI, present in *I. leucoroides* n. and in *I. caesus* are absent; only 1 seta present in this position, which is ventrolateral rather than dorsal; the 2 tergocentral setae on these segments placed on the tergites, unlike *I. leucoroides* n. and *I. caesus*.

Sternite on terminal segments long; 3-5 long, inwardly directed setae present on its outer margin and 4-6 stout setae on its postercocentral margin (fig. 21). Margin of vulva set with 2 rows of setae, a proximal row of 8-12 and a slightly distal row of 14-16 comparatively longer setae. No postvulval sclerite, similar to those present in the 2 previous species, present in the genital region.

(4) **Ibidoeus platisea** (Denny, 1842). (Figs. 5, 9, 22-26)

**Type host:** *Pitulosa* L. *leucoroides* L.

This species differs considerably from the three previous ones and forms a distinct, separable group with *flavus* and *theroanerous*.

The character which distinguishes it (and probably the group to which it belongs) from species parasitic on fishes are, in the male, the arrangement of the tergal plates in the terminal abdominal segment and, in the female, the inner margin of the sternite on segment VII, which is joined to the genital plate, and the shape and thickening of the sclerites which support the vulva laterally. Another character, but not as striking, is the sternal chaetotaxy of segments III and IV; these segments have in both the sexes both short and long setae, the former being always more numerous than the latter which are never more than two. In species parasitic on fishes these segments normally have long setae only.

**Material examined.**—Three males and four females from Rajputana, India (slide no. 10691, Meintertagen collection, British Museum (Nat. Hist.)); and one male and four females (slide no. 2814, Meintertagen collection) from Holland, from *Pitulosa* L. *leucoroides* Linn., five males and four females (slide no. 17022, Meintertagen collection) from Sudan from *P. l. major* (Temminck and Schlegel), and three males and two females from U.P., India, from *P. l. leucoroides* L. (slide no. 619, British Museum (Nat. Hist.).

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**Figures 22-26.**—(22) terminal segments of male abdomen; (23) male genitalia, distal part only; (24) sclerite "X", as it appears in normally retracted genitalia inside abdomen; (25) terminal segments of female abdomen, dorsal (only antennifer of setae on segment VIII shown); (26) female genital region.
Male.—Shape of the head characteristic, being much wider than long on account of the short pre-antennal region and the posterior region, the latter with well rounded temple (Table IV). C.I. 1:21-1:31 (Table VI). Mandibles as admirably described by Cummings (1916).

Proboscis as in denselli, p., with only minor differences in the shape of the various internal sclerites (fig. 9). Pereothorax also as in denselli, 2 sclerites, a large and a small, present between prostomum and pleurothorax on each side (fig. 9); these are absent in the other 2 species. Dorsal marginal setae extend to the mid-line of the divided pleurothorax and vary from 17 to 33 each side, 2 to 3 median setae, always short and not crossing posterior margin of pleurothorax; the first short, spine-like and the second long seta on the lateral margin always well separated. Mesosternum always with 1 seta each side; metasternum with 3–3 or 3 + 2 setae. Both second and third episterna flat and leaf-like; the third with the recurved sclerite, which is probably homologous with the handle part of the hammer-shaped third episternum of denselli.

Abdomen round. Tergal plates on segment II of characteristic shape (fig. 9), the anterior thickened margin extending a little into the pereothorax as a slender bar. Tergites on segments III-VIII as in denselli. Tergal plates on segments IX and X widely separated by the very typical anterior, semicircular tergite on segment XI; 2 more plates present on the latter segment, each side, placed as shown in figure 22. Sternales on segment II heavily sclerotised and pigmented; those on segments III-VI in the form of transversely elliptical, lateral plates; on segment VII in the form of a median plate, with a small lobe at each end.

Chactotaxy of abdominal segments II-III as shown in figure 9. Postepitocerite setae begin from segment IV. Tergal chactotaxy of segment XI as in figure 22. Sternal chactotaxy given in Table II. Sternum VII normally with 6–8 long setae, only 1 specimen had 4; sternum IX normally with 3, occasionally 2, spine-like setae on each side.

Shape of posterior segments, their chactotaxy, genital plate and genital region as shown in figure 22. Male genitalia as shown in figure 23.

In their resting state in the abdomen, the components of the genitalia appear twisted and the structures, consequently, hard to interpret. The complicated nature attributed to them, by *iberoamericanus* (= *njojnu*) (Carriker, 1947) was due to their being retracted and tucked in because figure 2 (Carriker, 1947: 120) represents a specimen in which the parameters almost certainly and the mesosome, in all probability, are twisted. In platelae also the distal parts are difficult to compare with the corresponding sclerites of other species unless the genitalia are extruded, when they can be interpreted satisfactorily.

The genitalia appear to differ from those of *forsus* as figured by Cummings (1916: 608) in the shape of the parameters and the mesosome and possibly also the sclerite "X"; they cannot be compared with Carriker's figure of the genitalia of *iberoamericanus*. In dissected, unmounted genitalia stained with carboll-fuchsin, the sclerite called "X" by Cummings (1916: 609) is seen to lie on the ventral side opposite to the flat, plate-like distal portion of the basal plate and appears somewhat as shown in figure 23. In the natural state, however, when retracted inside the abdomen, the appearance becomes different owing to its being folded so that the structures which are distal in figure 23 come to be proximal in position, somewhat as shown in figure 24.

Females.—General characters of head and thorax similar to male; with access to the regions given in Table V. C.I. 1:20-1:35 (Table VII). Pereothorax with 16–21 dorsal marginal setae each side; 2 median setae are long and cross the posterior pereothoracic margin into the abdomen. Mesosternum with 1 seta each side (1 in 6 only); metasternum with either 3 + 3, 2 + 3 or 2 + 2 setae.

Abdomen oviparous; tergites on segment II differ only slightly from the male; terminal segments with tergal plates continuous across the segment differing in shape from the other 3 species. Some females show an irregularly sclerotised patch on the tergum, between the tergal plates on segment VIII and the terminal segments (fig. 25). Sternales on segments II and IV-VI as in male; on segment III as circular plates; inner margin of sternite VII, each side, joined to central, ventral portion of genital plate (fig. 26).

Number of setae on sternum slightly greater than in male; 2 tergocentral setae on terminal segments, not placed on the tergites. Number of setae on sternum VII varies between 2–5 each side. The long inwardly directed setae on the last sternum, present in the preceding species, absent.

Genital region as in figure 26. Central portion of genital plate, which is globular in shape and ventral in position, more heavily sclerotised and pigmented than surrounding dorsal region. Lateroventral sclerites which reinforce the valves on the sides differ markedly in shape and manner of their thickening from lateral sclerites of the 3 foregoing species (cf. figures 15 and 21 with figure 26). A small subventral sclerite present in this region. Margin of vulva set with 10–16 setae.

### IV. Key to the Indian Species of *Ibodesmus*

#### Males

1. Anterior tergal plate on terminal segment of abdomen in the form of a semicircular, heavily sclerotised tergite (fig. 23) **platelae**
   - Tergites on terminal abdominal segment (XI) not as above, but as triangular plates (fig. 2) **2**
2. Dorsal anterior plates with oblique, parallel thickensings apically (similar to figure 6). (Male genitalia as shown in figure 20; parameters stout at the tips; basal plate connected with the mesosome by a median sclerite) **bignatus**
   - Dorsal anterior plates without oblique thickensings apically (fig. 1). (Parameters bluntly pointed at the tips; basal plate not connected with the mesosome) **3**
3. Sternal thickening on abdominal segment VII is the form of a median plate (fig. 15). (Dorsal abdominal chactotaxy sparse; male genitalia as shown in figure 16) **clausus**
   - Sternal thickening on abdominal segment VII in the form of lateral plates (fig. 2). (Dorsal abdominal chactotaxy dense; male genitalia as shown in figures 3 and 17) **demelli** sp. n.

#### Females

1. Inner margin of each lateral sternal plate on abdominal segment VII joined to the central, globular portion of the genital plate (fig. 26) **platelae**
   - Inner margins of sternal plates on abdominal segment VII not joined to the genital plate, but sternites as separate, triangular plates (fig. 19) **2**
2. Dorsal anterior plates with oblique, parallel thickensings apically (fig. 6). (Terminal abdominal segments without 3 dorsal, marginal setae each side, figure 21) **bignatus**
   - Dorsal anterior plates without oblique, parallel thickensings apically (fig. 4). (Terminal abdominal segments with 3 dorsal, marginal setae) **demelli** sp. n.
setae each side, figure 12) 3.

3 Genital region with small thickening in the form of 2 separate, rectangular sclerites and additional sclerites each side (fig. 14). Number of setae on margin of vulva 23–29. (Abdominal segments IV–VIII with 1 row of tergal setae) clausus.

- Genital region with small thickening in the form of a butterfly-shaped sclerite and additional sclerites each side (fig. 13). Number of setae on margin of vulva 15–21. (Abdominal segments IV–VIII with more than 1 row of tergal setae) dennelli sp. n.

V. SUMMARY

Four species of *Ilocoecus* occurring on Indian ibises (family Threskiornithidae) have been reported. Of these, *dennelli* sp. n. from *Pandion haliaetus* has been described in full and the remaining three, *clausus* (Giebel), *strepturus* (Nitzsch) and *platolepis* (Denny), have been redescribed. In addition one species, *Ilocoecus rubicoides* Qadri, was described without host and has here been placed as a synonym of *I. clausus* (Giebel). Some remarks on differences between *platolepis*, a parasite of the spoonbill (subfamily Plataleinae), and the remaining species, all from ibises (subfamily Threskiornithinae), are included. A key to these species is given.

VI. REFERENCES


