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TWO NEW SPECIES OF *IBIDOECUS* CUMMINGS, 1916 (MALLOPHAGA : ISCHNOCERA).

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INTRODUCTION.

IBIDOECUS species in the Mallophaga collections of the British Museum (Natural History) are under study with the object of devising a key for their identification. Our study has revealed the *Ibidoecus* from *Nipponia nippon*, the Japanese crested ibis and *Carphibis spinicollis*, the straw-necked ibis, to be new species and these are described below.

Family **Philopteridae.**

Genus IBIDOECUS Cummings, 1916.

Ibidoecus meinertzhageni n. sp. (figs. 1–3 and 5–7).

Host: *Nipponia nippon* (Temminck).

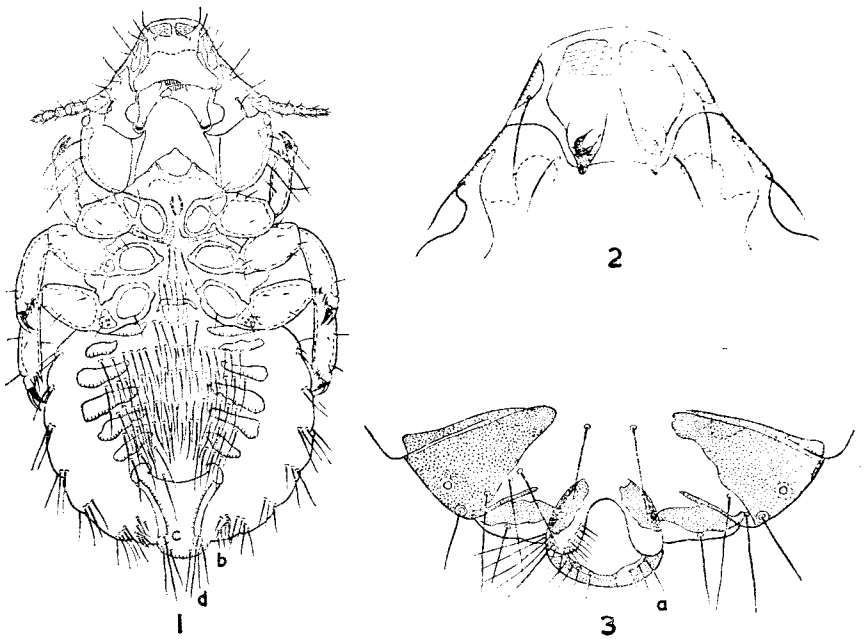
Male. General characters as shown in figs. 1–3 and 5. Head wider than long. Posteriorly the dorsal anterior plates are relatively narrow and more pointed (fig. 2). Ventral anterior plates have oblique, parallel thickenings. Hypopharynx (indistinct) apparently much reduced. Temporal carina fairly prominent, falls short of the preantennal nodus. Head chaetotaxy normal (see Clay, 1951) and its important features are: most setæ longer than their homologues in other species of the group; compare fig. 4 of the head of *I. threskiornis* Bedford with fig. 5 of the new species; dorsal sub-marginal seta long, postnodal seta moderately long or long, pre-antennal and anterior dorsal setæ moderately long, pre-conal seta short; alveolus of anterior seta 2 marginal (or outer) relative to that of anterior seta 3; ocular seta short, on lens; postemporal seta short; five (not four) long marginal temporal setæ as the first is also as long as second to fifth, and only sixth is spiniform (one specimen had one long additional temporal seta between fourth and fifth.)

Pro- and ptero-notum divided medially. Three posterior pronotal setæ, outer, middle and inner; outer is spiniform, slightly anterior and associated with the spiracle and is the one not delineated elsewhere in *Ibidoecus*; the middle was broken but is apparently moderately long or long; inner seta is long. Prosternum unhardened, without setæ. A narrow metasternal plate present. Dorsal pteronotal marginal setæ extend to the midline; the first (or anterior most) is spiniform, and set apart from the second, trichobothrium-like, moderately long seta; the second is relatively ventral to the first and third setæ.

There are nine apparent segments in the abdomen which have been interpreted thus: apparent I as composite 1 + II, but designated as II; two to seven, the spiracle bearing segments, as III–VIII; apparent eight

as IX and X fused, is less prominent. Apparent nine flanked by IX + X and projects only slightly beyond the margins of the latter; it is bilobed and as the anal opening is associated with it; apparent nine has been interpreted as XI (fig. 3).

Figs. 1–3.

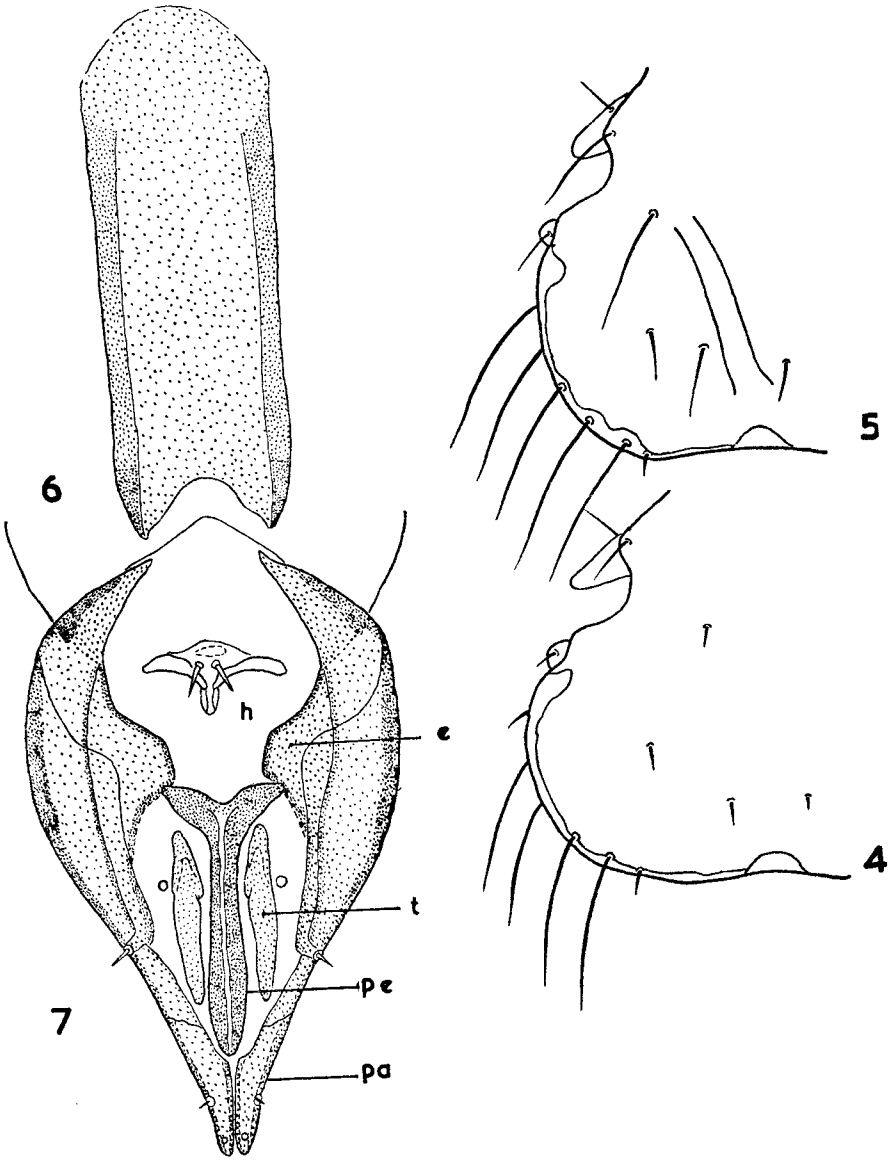


Ibidoecus meinertzhageni n. sp. Male. 1, *Holotype*, ventral view, hypopharynx omitted, only ventral marginal temporal setæ shown. 2, Head, pre-antennal region, dorsal view; transverse thickenings are on ventral anterior plates. 3, Terminalia, dorsal view, paratype; postero-lateral setæ on XI omitted on right-hand side.

Tergal thickening II–XI as lateral tergites. Inner margins of II broader than those of III–VIII which are pointed; posterior margins of lateral tergites VIII not indented; IX + X characteristic; XI irregular (and not triangular) in shape and wide apart medianly. Sternal thickening II–VII as transverse, lateral plates; II narrow, heavily sclerotized, characteristic; III–VII triangular, those of V–VI being the largest. Following sternites VII is the median sub-genital plate (see Clay, 1956), to each anterior corner of which a somewhat rounded sternite, possibly of VIII, is associated (fig. 1). Ano-genital opening dorsal in position (fig. 3). A dorso-terminal arc-shaped sclerite is present ventral and posterior to the opening; hence this portion of the abdomen is more like the species of the *plateleae* group. External genitalia as shown in figs. 6, 7.

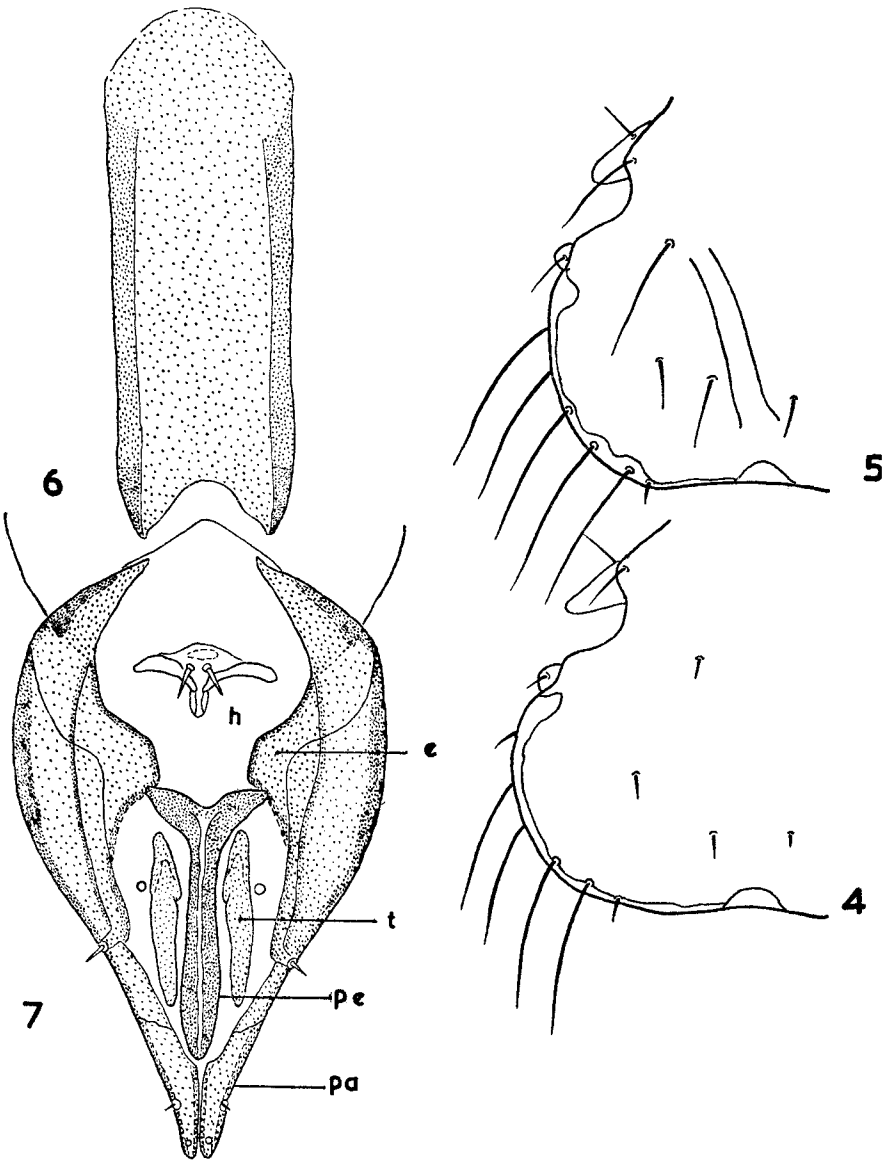
Chaetotaxy (of *holotype*, given first, and of *paratype*). Pteronotal, 34, 32. Tergal. II, anterior tergocentral 2 and posterior tergal 22, 19; (terga III–VIII have only the posterior tergal row in which a gap enables separation

Figs. 4–7.



Male. 4, 5. Heads, post-antennal region, dorsal view. 4, *Ibidoecus threskiornis* Bedford, 5, *I. meinertzhageni* n. sp. Compare homologous setæ, specially postemporal and first marginal temporal setæ. 6, 7, *I. meinertzhageni* n. sp., external genitalia. 6, Basal apodeme. 7, Posterior sclerotized area; e, endomere; h, hypomere; pa, paramere; pe, penis; t, telomere. (See Clay, 1956).

Figs. 4–7.



Male. 4, 5. Heads, post-antennal region, dorsal view. 4, *Ibidoecus threskiornis* Bedford, 5, *I. meinertzhageni* n. sp. Compare homologous setæ, specially postemporal and first marginal temporal setæ. 6, 7, *I. meinertzhageni* n. sp., external genitalia. 6, Basal apodeme. 7, Posterior sclerotized area; e, endomere; h, hypomere; pa, paramere; pe, penis; t, telomere. (See Clay, 1956).

of the setæ into tergocentral (tc) and tergolateral (tl) setæ); III, 32 (26 tc, 3 + 3 tl), 29 (23 tc, 3 + 3 tl); IV, 34 (28 tc, 3 + 3 tl), 31 (27 tc, 2 + 2 tl); V, 30 (24 tc, 3 + 3 tl), 27 (23 tc, 1 + 3 tl); VI, 19 (15 tc, 2 + 2 tl), 18 (15 tc, 1 + 2 tl); VII, 1 (tr), 9 (2 tc, 4 + 2 tl), 1 (tr) and *paratype* 1 (tr), 7 (2 tc, 3 + 2 tl), 1 (tr); VIII, 1 (tr), 8 (2 tc, 4 + 2 tl), 1 (tr) and *paratype* 1 (tr), 6 (2 tc, 2 + 2 tl), 1 (tr) trichobothrium (tr) is present on terga VII and VIII; IX + X, 2 + 1, 2 + 1 (tl); XI, 16 + 16, 14 + 13 (these numerous setæ obscure the anal setæ); setæ **a** 2 + 3, 4 + 4 (fig. 3). Pleural. II, 4 + 5 (5 spiniform, 4 long), 4 + 3 (3 sp, 4 lg); III, 4 + 4 (3 sp, 5 lg), 3 + 3 (2 sp, 4 lg); IV, 4 + 4, 4 + 5 (lg); V, 3 + 5, 4 + 4 (lg); VI, 4 + 4, 3 + 4 (lg); VII, 4 + 4, 4 + 3 (lg); VIII, 5 + 5, 4 + 5 (lg); IX + X, 8 + 10, 10 + 10 (sp, fig. 1, **b**). Meso- and meta-sternal 3, 3 and 6, 5 respectively, long. Sternal. II, 5, 5; III, 17, 15; IV, 17, 15; V, 16, 14; VI, 14, 12; VII, 8, 6; VIII, 1, 2 (not on sub-genital plate); seta **c**, 1 + 1, 1 + 1; **d**, 5 + 6, 5 + 5 (fig. 1).

Body measurements of types given in table.

Holotype: ♂, slide no. 4909a in the Meinertzhagen collection, British Museum (N.H.) from *Nipponia nippon*, Japan.

Paratype: 1 ♂ from the same host individual.

The species is named to honour Col. R. Meinertzhagen, the eminent ornithologist, who has built up a matchless collection of bird Mallophaga.

Taxonomic discussion. *Ibidoecus meinertzhageni* n. sp. is included in the *clausus* group because of the shape of its parameres and mesosome, and the nature of tergal thickening XI. But it is an atypical species, and is not related to any taxon of this group. It differs from the group in characters of the male terminalia, in which it resembles *I. iberoamericanus* Eichler, 1943 of the *plateleae* group. Because of this resemblance with *I. iberoamericanus* it is intermediate between *clausus* and *plateleae* groups. Since the female is not known its affinities cannot be finalized.

The male is distinguished by the long first marginal temporal seta, the number and length of setæ on sternum II, by the characters and details of the terminalia and posterior sclerites of the external genitalia, particularly the hypomere which is in the form of two transversely elongated, narrow sclerites.

	Length		Breadth	
	Holotype	Paratype	Holotype	Paratype
Head	0·79	0·80	0·89	0·91
Prothorax	0·221	0·207	0·553	0·576
Pterothorax	0·346	0·318	0·802	0·744
Abdomen	1·09	1·05	1·28	1·18
Total	2·45	2·38		
Head Index	1·11	1 09		

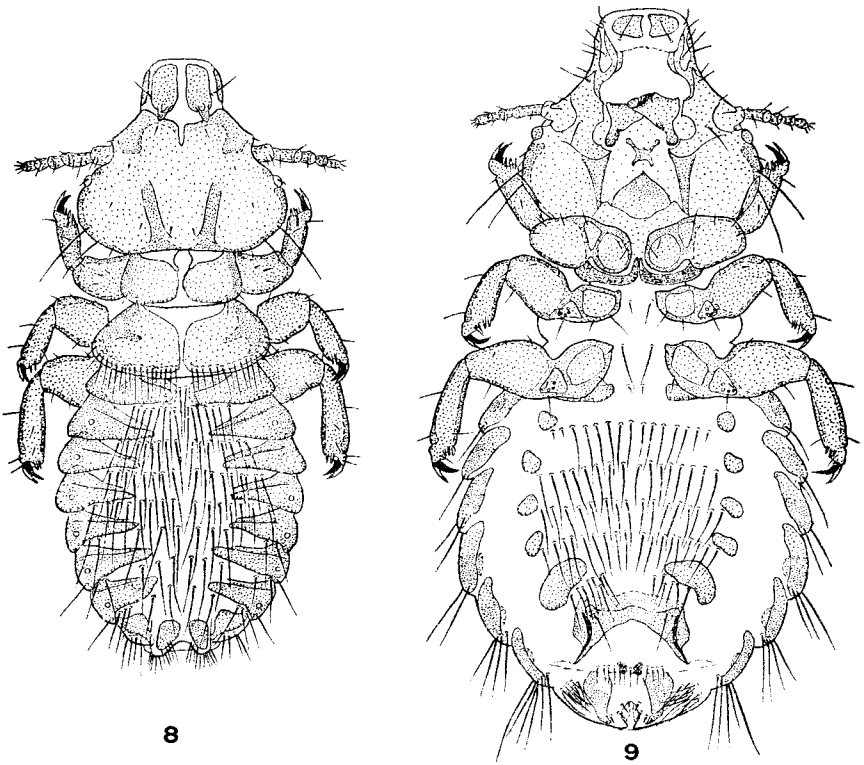
Measurements in millimetres of males.

Ibidoecus australis n. sp. (figs. 8–14).

Host: *Carphibis spinicollis* (Jameson).

Colour of mounted specimens chocolate brown. Considerable sexual dimorphism in length of the sexes, which shows no overlap.

Figs. 8 and 9.



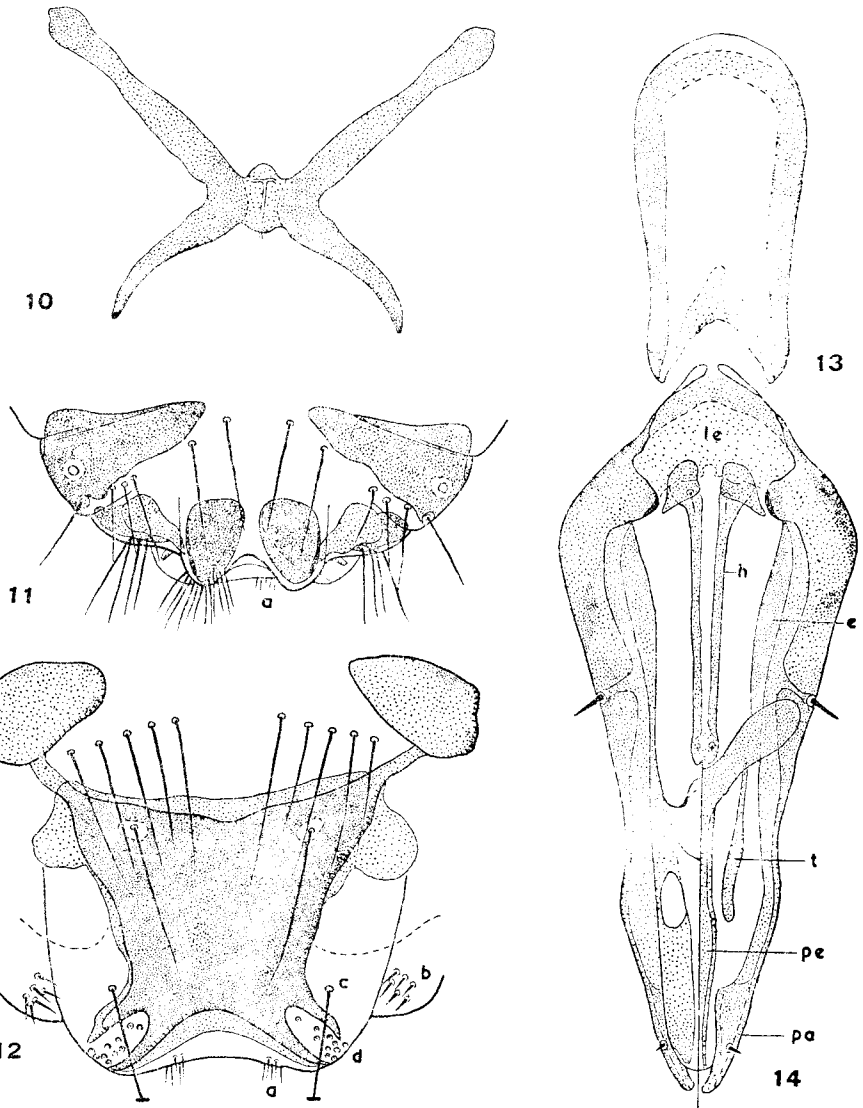
Ibidoecus australis n. sp. 8, Male (*holotype*), dorsal view (marginal temporal setæ four to six only shown). 9, Female (*allotype*), ventral view (marginal temporal setæ one to three only shown, and terminal, submarginal fringe of setæ omitted). Drawn to same scale.

Male. General characters as shown in fig. 8. Head wider than long; ventral anterior plates without oblique, parallel thickenings. Hypopharynx reduced (fig. 10). Temporal carina fairly prominent but falls short of the pre-antennal nodus. Important features of the head chaetotaxy (see Clay, 1951) are: postnodal seta minute; pre-antennal and preconal setæ spiniform; alveolus of anterior seta 2 marginal (or outer) relative to that of anterior seta 3; ocular seta on lens, spiniform; postemporal seta spiniform; first and sixth marginal tempotal setæ spiniform and second to fifth long.

Pro- and ptero-notum divided medially. Two posterior pronotal setæ; outer spiniform, inner short. Dorsal pteronotal marginal setæ 1 + 14–20 + 1 (total 31–38), and extend to the midline; the first (or anterior most), each side, is spiniform and is set apart from the second; the second is moderately long, trichobothrium-like and slightly dorsal relative to first

and third setæ. Prosternum unhardened, without setæ. No pterothoracic sternal plate. On mesosternum 1–2 moderately long, and on metasternum 2 long setæ.

Figs. 10–14.



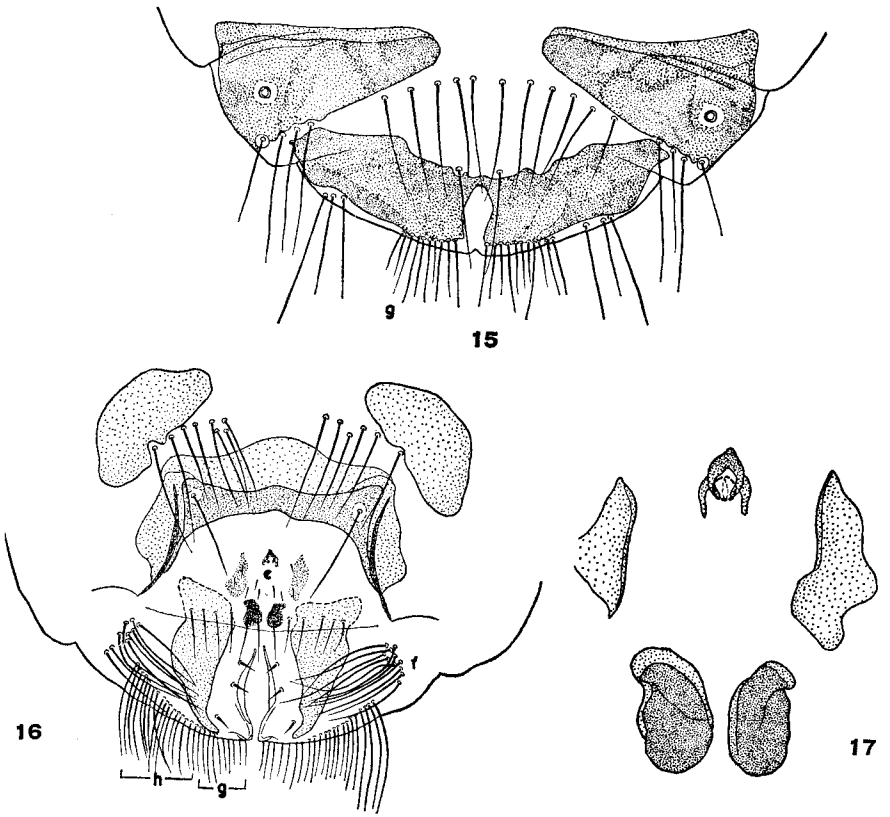
Ibidoecus australis n. sp. Male. 10, Hypopharynx, represented by anterior and posterior arms of sitophore, joined by a bridge. 11, Terminalia, dorsal view (posterior and lateral setæ on XI omitted on right-hand side). 12, Genital region, ventral view (alveoli only of setæ **d** shown). 13, Basal apodeme. 14, Posterior sclerotized area of external genitalia; **e**, endomere; **h**, hypomere; **le**, lower endomere; **pa**, paramere; **pe**, penis; **t**, telomere.

There are nine apparent segments in the abdomen; apparent nine is flanked by IX + X and projects only slightly beyond the margin of the latter; it forms the posterior margin of the abdomen (on the dorsal side), is not easily seen and is emarginate posteriorly; as the anal opening is associated with it, apparent nine has been interpreted as XI (fig. 11).

Tergal thickening II–XI as lateral tergites (fig. 8). Lateral tergites II have characteristic inner margins; III–VIII are wide apart medially and have pointed inner margins; posterior margin of VIII either not indented (as in *Ibidoecus threskiornis*) or slightly indented (as in *I. dennelli*); IX + X characteristic; XI as lateral triangular plates, heavily sclerotized and almost level with tergites IX + X (fig. 11).

Sternal thickening II–VII as lateral plates; of II narrow, heavily sclerotized transverse plates; of III–VI small rounded and of VII large triangular plates. Following the lateral sternites of VII is the large and median sub-genital plate (see Clay, 1956) (fig. 12).

Figs. 15–17.



Ibidoecus australis n. sp. Female. 15, Terminalia, dorsal view. 16, Genital region, ventral view (10 setæ of the submarginal fringe omitted on right-hand side). 17, Supravulval sclerites, opening of spermathecal duct and sclerites lateral to it.

Ano-genital opening dorso-terminal in position. External genitalia as shown in figs. 13 and 14.

Abdominal chaetotaxy. Tergal. II, anterior tergocentral 2 and posterior tergal 13—19; terga III–VIII have only the posterior tergal row; III, 13–20; IV, 14–19. On V–VIII a gap enables the separation of posterior tergal setæ into tergocentral (tc) and tergolateral (tl) setæ. V, 11–22 (9–18 tc, 0–2 tl); VI, 7–10 (5–8 tc, 1–2 tl); VII, 1 (tr), 5–10 (3–6 tc, 1–2 tl), 1; VIII, 1 (tr), 7–11 (4–7 tc, 1–3 tl), 1; trichobothrium (tr) is present on VII also; IX + X, 2–4 tl (total 6–8); XI, 20–28 (9–14 each side) (these numerous setæ obscure the anal setæ). Pleural, each side and total respectively. II, 2–3 (4–6); III, 3–4 (6–7); IV, 3–5 (6–9); V, 2–4 (6–8); VI, 3–5 (6–9); VII, 2–5 (6–9); VIII, 4–6 (8–11); IX + X, 3–8 (7–15, spiniform, fig. 12 b). Sternal. II, 2 (minute); III, 9–16; IV, 12–17; V, 11–16; VI, 10–16; VII, 7–12; VIII, 2 (on sub-genital plate).

Chaetotaxy of genital region as shown in figs. 11 and 12, setæ **a,** 4–6 (total 9–12) (anterior to these 13–12 short, identical setæ are present); **c,**2 (long); **d,** 7–12 (total 15–24, long, most are ventral, and some dorsal).

Female. General appearance as in fig. 9. Characters of head and thorax as in male, only these measure more. Count of pteronotal setæ, 1 + 17–22 + 1 (total 36–43); on mesosternum 1–2 short to moderately long and on metasternum 2 long setæ.

As in male, apparent segments one to seven have been interpreted as II–VIII. Behind VIII only one segment is apparent dorsally, which is interpreted as fused IX–XI. Lateral tergites II–VIII much as in male. Tergal thickening IX–XI continuous across, but narrow medially (fig. 15). Sternal thickening (fig. 9) II–VII as in male. Posterior to lateral sternites VII is the sub-genital plate, much broader than long and its posterior margin is deeply concave. Posterior to vulval opening large, uniformly pigmented terminal sternites present, which are relatively longer than in other species of the group. Characteristic supra-vulval sclerites, very heavily sclerotized (figs. 16 and 17). Opening of the spermathecal duct is anterior to these and is strengthened by a horse-shoe shaped sclerite and flanked by a feeble sclerite each side.

Abdominal chaetotaxy. Tergal. II, anterior tergocentral 2 and posterior tergal 17–24; III, 23–28; IV, 25–26. The gap on V–VIII enabling separation of the setæ into tergocentral and tergolateral may not be as sharp on VII. V, 26–31 (23–29 tc, 1–2 tl); VI, 24–26 (22–24 tc, 1 tl); VII, 1 (tr), 22–25 (18–23 tc, 1–2 tl), 1; VIII, 1 (tr), 17–21 (11–14 tc, 2–4 tl), 1; IX–XI, anterior tergocentral 2 (off the tergite, extend up to or slightly beyond the tip of abdomen) and tergolateral 2–4 (total 5–7 long). Pleural, each side and total respectively. II, 3–4 (6–7); III, 3–4 (7–8); IV, 3–6 (7–10); V, 2–5 (6–10); VI 3–4 (7–8); VII, 3–4 (7–8); VIII, 2–6 (7–11). Sternal. II, 2(minute); III, 14–19; IV, 16–17; V, 16–18; VI, 18–21; VII, 13–16; VIII, 2 (in one specimen the right seta was missing). Genital region and its chaetotaxy as shown in figs. 15 and 16. Margin of vulva set with 12–15 short setæ which tend to be confined to the middle. Setæ **e,** 4–7 (total 9–12, minute); **f** (outer to each terminal sternite), 9–14 (total 20–26,

inwardly directed and moderately long). There is a terminal, submarginal fringe of 27–33 (total 57–66) setæ; of these 7–11 (total 18–21) are dorsal and 17–23 (total 38–45) are ventral (fig. 15, g; fig. 16 g, h respectively).

Holotype: ♂, allotype: ♀, slide no. 4830a, Meinertzhagen collection British Museum (N. H.), deposited in the Division of Entomology Museum, C.S.I.R.O., Canberra, from *Carphibis spinicollis*, Australia.

Paratypes: 11 ♂, 3 ♀ from the type host and locality.

Taxonomic discussion. Three species groups, called for convenience *bisignatus*, *plateleae* and *clausus* groups, have been recognized in *Ibidoecus*. Because of the structure of its hypopharynx, arrangement of the pteronotal setæ* and characters of the head and genital region in both sexes, *Ibidoecus australis* has been included in the *clausus* group. It is not closely related to any of the four known taxa comprising the group (*I. clausus* (Giebel), *I. threskiornis* Bedford, *I. dianae* Tandan and *I. dennelli* Tandan) and can easily be distinguished thus: In the male by the nature of sternal thickening VII, shape of sclerites and chaetotaxy of terminalia, and proportions of the various sclerites of the mesosome. In the female by the shape of the supra-vulval sclerites, the markedly concave posterior margin of the sub-genital plate, fewer setæ on margin of vulva and the larger number of inwardly directed setæ each side of the terminal sternites.

		Male			Female		
		Range	Mean	Holotype	Range	Mean	Allotype
Head	Length	0·81–0·90	0·85	0·87	1·00–1·03	1·02	1·01
	Breadth	0·89–0·98	0·94	0·98	1·09–1·14	1·11	1·12
Prothorax	Length	0·214–0·249	0.229	0·249	0·277–0·290	0·280	0·277
	Breadth	0·581–0·622	0·598	0·622	0·678–0·705	0·695	0·695
Pterothorax	Length	0·318–0·360	0·345	0·360	0·415–0·429	0·325	0·429
	Breadth	0·816–0·885	0·859	0·885	1·037–1·079	1·057	1·037
Abdomen	Length	1·04–1·31	1·17	1·31	1·58–1·92	1·73	1·69
	Breadth	1·19–1·38	1·26	1·26	1·59–1·83	1·71	1·71
	Total length	2·41–2·79	2·57	2·79	3·25–3·63	3·40	3·41
	Head Index	1·06–1·15	1·10	1·15	1·09–1·11	1·09	1·10

Measurements in mm of 11 males and 4 females, mounted in Canada balsam.

ACKNOWLEDGMENTS.

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* In the taxonomic discussion of *Ibidoecus clayae* Kumar, 1965 (*Ann. Mag. nat. Hist.* (13), **8**, 391–398) for ' arrangement of pteronotal setæ ' the manuscript contained ' arrangement of pronotal setæ ' and it appeared thus on p. 396, fourth line from bottom. For that species also it is the arrangement of pteronotal setæ which is a group character.

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