From the ANNALS AND MAGAZINE OF NATURAL HISTORY
Ser. 13, vol. iii. p. 657, *November*, 1960
Published 8/5/1961.

A REVISION OF THE MALLOPHAGAN GENUS *AEGYPOECUS* CLAY AND MEINERTZHAGEN, 1939 (ISCHNOCERA : PHILOPTERIDAE), WITH DESCRIPTIONS OF THREE NEW SPECIES.

By VIJAI DHANDA,

Department of Zoology, University of Lucknow, Lucknow, India.

INTRODUCTION.

SPECIES of the genus *Aegypoecus* parasitize vultures (Order Falconiformes: family Accipitridae). These are round bodied forms and occupants of the head and neck niche. It is rather doubtful if *Aegypoecus* is a monoxenous genus, for the forms on *Pseudogyps africanus* and *Gyps rüppellii erlangeri* are not separable specifically or subspecifically on morphological characters ; their *Falcolipeurus* species, however, are specifically quite distinct.

In the check-list (Hopkins and Clay 1952), seven species are included in the genus *Aegypoecus* of which four are considered to be valid, and since another species, *Aegypoecus hopkinsi* Dhanda, 1959, has been described, the present number of valid species becomes five. Out of these five, only four were available for study—*A. brevicollis* (Burmeister) has not been seen.

This study is based mainly on material in the British Museum (Natural History) collections. The chaetotaxy in the figures, unless otherwise stated, agrees with the specimen from which it is drawn and individual variation is indicated in the Tables.

DESCRIPTION OF THE GENUS *AEGYPOECUS* Clay and Meinertzhagen, 1939.

Helluo Clay and Meinertzhagen, 1938, *Entomologist*, 71, 276, figs. 2, 3 (*nec* Bonelli, 1809). Host : *Neophron p. percnopterus*. Type species : *H. neophron* Clay & Meinertzhagen = *A. perspicuus* (Kellogg, 1914).

Aegypoecus Clay and Meinertzhagen, 1939, *Entomologist*, 72, 36. *Nomen novum* for *Helluo* Clay and Meinertzhagen.

Head large, triangular, wider than long, without marked sexual dimorphism. Marginal carina interrupted medianly by a hyaline margin ; laterally complete or interrupted into pre- and post-marginal carinæ (for terminology of head sclerites and setæ see Clay, 1951). Dorsal preantennal suture originates at the tip of marginal or premarginal carina and cuts off a uniformly pigmented dorsal anterior plate, pointed posteriorly. When the marginal carina is interrupted, the interruption is continuous with the dorsal suture. Ventral carina interrupted medianly, with its tips carried forward. Ventral anterior plate present

as a narrow strip immediately anterior to the ventral carinæ. Temporal carina well or feebly developed. Pulvinus bilobed, attached to parallel edges of ventral carina. Mandibles large and stout. Well developed sitophore and lingual sclerites in hypopharynx. Coni small, scarcely projecting beyond lateral margins of head. Anterior dorsal setæ short, arising from the dorsal preantennal suture ; preantennal and preconal setæ when present, short, spine-like ; ocular seta elongated, extending beyond the posterior margin of head. Four long marginal temporal setæ ; a fifth when present, short, spine-like.

Thorax : Prothorax and pterothorax with rounded lateral and posterior margins. Dorsolateral margin of prothorax with a long seta each side. Pronotum not divided medianly. Pterothoracic sternal plate present.

Abdomen : In the male there are nine apparent segments, of which one to seven are interpreted as segments II–VIII ; apparent seven = VIII, being the last spiracle-bearing segment. Apparent eight is interpreted as fused IX–X. The next segment is small and not so apparent. It forms the posterior margin of the abdomen on the dorsal side, and the anal opening lies at its tip. This is interpreted as segment XI. Tergal thickening on segments II–VIII and IX–X is as lateral tergites, widely separated medianly. Sternites present or absent. A median terminal sternite, when present, is upturned distally to become dorsal. Setæ of two types, short and stout, somewhat lanceolate and long and slender. Post spiracular setæ elongated, without sensilli, present on segments III–VII ; segment VIII with the typical seta lying in pocket of the integument each side (Clay, 1954). Anogenital opening dorsal. Genitalia large in proportion to the size of abdomen. Parameres well developed and curl round distally to become dorsal.

In the female abdomen there are also nine apparent segments ; segments II–VIII much as in male ; segments IX–X fused, with the tergal thickening continuous across the segment ; segment XI suturally separate from segment IX–X, and with or without tergal thickening. Sternites absent. Setæ as in male. Genital plate absent. Ventral wall of genital chamber with two large inner genital sclerites (*sensu* Clay, 1957) which are bean-shaped. Two lateral sclerites posterior to the genital opening, termed as post-vulval sclerites*, with a cluster of setæ adjoining the outer posterior margin of each. Sclerites around the opening of spermathecal duct present or absent. Margin of vulva set with fine setæ and small, spine-like, setæ arranged on its ventral side.

Aegypoecus is a homogenous genus and can be distinguished from the related philopterid genera by a combination of the above characters.

---

* These are sclerotizations of that part of the sternum which anteriorly forms the dorsal wall of the genital chamber and probably represent the fused sternites of one or more segments. The term " subvulval sclerite " (Clay, 1957) for these sclerites is somewhat misleading, as although in *Degeeriella* they pass under the line of the vulval opening when viewed ventrally, they are in fact dorsal to the vulva. It is suggested that this term be replaced by " post-vulval sclerites ".

Morphological characters of specific importance.

The head offers several important characters, more especially in the preantennal region which is important for specific identification. The specifically important characters are : its shape, particularly of the preantennal region ; whether the hyaline margin extends anteriorly or not, and how far ; the shape of the dorsal anterior plate and the form of the dorsal preantennal suture ; nature of the marginal carina, whether complete or interrupted laterally ; temporal carina, well or feebly developed ; the shape of coni ; presence or absence of preantennal and preconal setæ and the number and size of marginal temporal setæ.

The specific differences in the thorax concern the nature of the pteronotum, whether interrupted partially or completely in the middle; the shape of the pterothoracic sternal plate ; the number and position of the dorsal setæ on the pterothorax and those associated with the pterothoracic sternal plate.

In the abdomen the more important specific differences are : the presence or absence of tergal thickening on segment XI in both the sexes ; in male the presence or absence of sternal thickenings ; the chætotaxy, tergal, sternal and pleural, in both sexes. In male the details and proportions of the external genitalia are reliable characters, as is usual throughout the Ischnocera ; the genital region in the female has interspecifically distinct sclerites round the opening of the spermathecal duct, or they may be absent ; the post-vulval sclerites present in all species differ in shape and size. The number of setæ, on the margin of vulva and those associated with the post-vulval sclerites differ greatly.

The species of *Aegypoecus*.

Aegypoecus griffoneae Ansari, 1947.

Aegypoecus griffoneae Ansari, 1947, Proc. nat. Inst. Sci. India, 13, 261, fig. 2. Host : *Gyps himalayensis* Hume.

This species was created on six specimens, four females and two males, obtained from *Gyps himalayensis* Hume ; a female was designated as the *holotype* and a male as the *allotype*, and the types, with some *paratypes*, were deposited in the British Museum (Natural History) collections. Dr. Theresa Clay (*in litt.*) states that the slide marked as " female *holotype* and male *allotype* " has two females mounted on it, one of them marked with a circle of black ink as the holotype ; as there is no male on the slide, no specimen has been designated as the *allotype*.

Holotype of *Aegypoecus griffoneae* Ansari, 1947, female, mounted on slide no 654 ; *paratypes*, one female and two males, in the British Museum (Natural History) collections, and perhaps two females with Dr. M. A. R. Ansari.

It was found that the original description and figures of the female of *A. griffoneae* did not fit the single female available from the same host (P. T. Dodaworth collection of v. 1912, No. 1912, 373), but, in spite of

being incomplete, applied to another species ; the description and figures of the male, agreed equally with the male of the latter species. This raised the possibility that either Ansari's specimens or this particular female did not come from *Gyps himalayensis*, and so examination of the type material in British Museum (Natural History) collections became essential. One male *paratype* of *A. griffoneae*, made available through the kindness of Dr. Clay, on examination proved to be conspecific with *Aegypoecus perspicuus* (Kellogg, 1914), thus establishing that *Gyps himalayensis* was not the true host of this specimen. Dr. Theresa Clay has kindly examined the female *lectotype*, and the *paratypes*, one female and one male, and confirms that these specimens too are *A. perspicuus*. Therefore, their natural host is *Neophron percnopterus*. Even Ansari noticed the similarity of *A. griffoneae* to *Aegypoecus neophron* (Clay and Meinertzhagen, 1939) (= *Aegypoecus perspicuus* (Kellogg, 1914)), but pointed out certain differences as well, which are not of specific importance.

As there is no doubt that *Aegypoecus griffoneae* Ansari, 1947, is *Aegypoecus perspicuus* (Kellogg, 1914), the former name sinks as an absolute synonym of the latter.

Aegypoecus perspicuus (Kellogg, 1914).

(Text figures 1, 7, 9, 14, 22, 28, 34, 36 and 41.)

Type Host : *Neophron p. percnopterus* (Linnaeus).

Docophorus perspicuus Kellogg, 1914, Sce. Bull. Mus. Brookl. Inst. Arts a. Sces., 2, 83, pl. 16, fig. 3. Host : *Corvus*. Error.

Helluo neophorn Clay and Meinertzhagen, 1938, Entomologist, 71, 276, figs. 2, 3. Host : *Neophron p. percnopterus*.

Aegypoecus griffoneae Ansari, 1947. Proc. nat. Inst. Sci. India, 13, 261, fig. 2. Host : *Gyps himalayensis*.

Aegypoecus perspicuus (Kellogg, 1914) and *Aegypoecus griffoneae* Ansari, 1947. Hopkins and Clay, 1952. A check list of the genera and species of Mallophaga, London, 25.

Both the sexes are distinguished from all other species by the absence of preantennal, preconal and the fifth marginal temporal setæ and the short, spine-like seta on each dorso-lateral margin of pterothorax. Further, the male is distinguished by its large genitalia and the female by three large, heavily sclerotized plates round the opening of the spermathecal duct.

The colour of alkali treated specimens is golden-yellow, as it is not a deeply pigmented species, in contrast to the others which after alkali treatment appear light or dark brown in colour.

Male : Anterior hyaline margin extends beyond the tip of premarginal carina and has a straight anterior edge. Preantennal region of head (as in fig. 1), differs greatly from all other species in shape. It is longer and narrower at the tip, so that the dorsal anterior plate, cut off by the preantennal suture, is relatively longer and in extreme cases extends backwards to the level of the posterior margin of the coni. Posteriorly the preantennal suture may extend to the level of the posterior margin of the

antennal socket ; on each side it reaches the lateral interruption of the marginal carina and curves round to the ventral side where it encloses the third anterior ventral seta. Ventral carina produced forward but the tips do not fuse with the premarginal carinæ. First ventral submarginal seta distinctly posterior to second anterior seta ; similar disposition of these setæ present in *hopkinsi*, *jordani* sp. n. *africanus* sp. n. and *trigonoceps*. Preantennal and preconal setæ absent. Only four, long marginal temporal setæ (fig. 7). Temporal carina well developed. Coni not pigmented, with a bluntly pointed tip (as in fig. 1). Head measurements and cephalic index as in Table VI.

Pteronotum with a deep median notch arising from the anterior margin. Dorsolateral margin of pterothorax with three long setæ and posterodorsal margin with 2–3 long setæ, each side, and 4–6 short setæ in the middle (fig. 9). Pterothoracic sternal plate small, pointed anteriorly and without setæ on or adjoining it (as in fig. 14).

In the abdomen, segment XI without tergal thickening. Sternal thickening as lateral sternites on segments II–VII. Chætotaxy as shown in Table III. Outermost 1–3 setæ in tergal and sternal rows long ; remaining setæ short, stout, somewhat lanceolate, characteristic of the genus. Pleural setæ on segment II absent. In the genitalia the basal apodeme is large and reaches up to segment II proximally. Endomeres partially divided into a proximal and a distal element by an incomplete interruption arising on the outer margin. Penis surrounded by telomeres laterally and an unpaired hypomere ventrally (fig. 41).

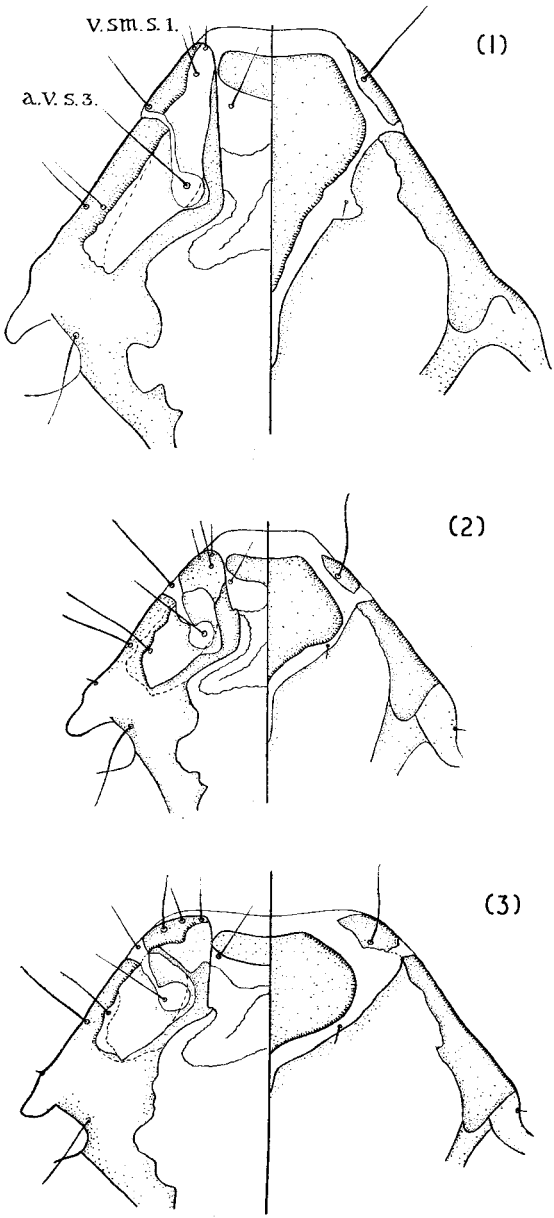
Female : General characters of head (fig. 1) and thorax as in male, but the measurements are slightly larger (Table VI).

Abdominal segment XI without tergal thickening. Abdominal chætotaxy as in male (Table IV) ; that of terminal segments shown in fig. 22. Two anterior tergocentral setæ on segment IX–X, near the median notch on anterior margin of tergite ; and two setæ each side on its posterior margin. Genital region as in fig. 28. Dorsal wall of vulva with three heavily sclerotized irregular sclerites, surrounding the opening of spermathecal duct (fig. 34). Post-vulval sclerites present as small paired thickening and adjoining each is a cluster of 4–7 setæ (fig. 36). Margin of vulva set with 15–23 setæ each side, and 7–13 short, spine-like setæ, on its ventral side, each side.

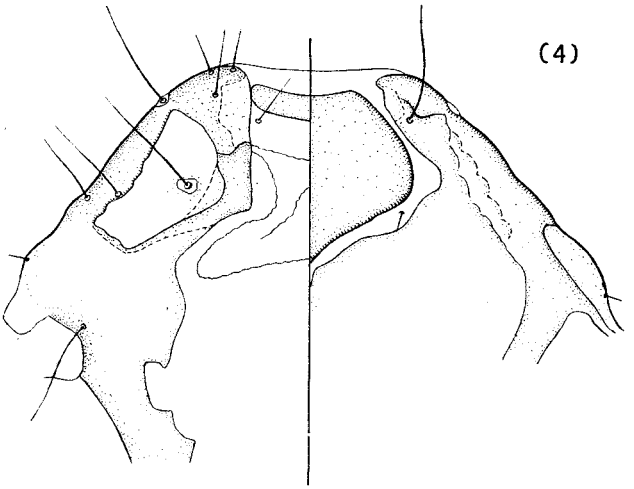
Material examined : one male from *Neophron p. percnopterus* (Linnaeus) from Ljubljana Zoo Gardens, Yugoslavia, collected on 27. vii. 1955 ; five males, three females from the same host from Arabia collected in January, 1948, Meinertzhagen collection British Museum (Natural History), and a large number of males and females from *Neophron percnopterus* (Linnaeus) from Lucknow, India.

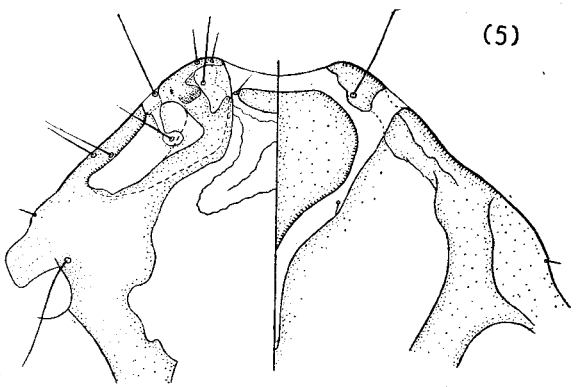
In the five remaining species three characters are constant : short, spine-like preantennal and preconal setæ are present ; a fifth spine-like marginal temporal seta present each side ; a short, spine-like seta each side on the dorsolateral margin of pterothorax.

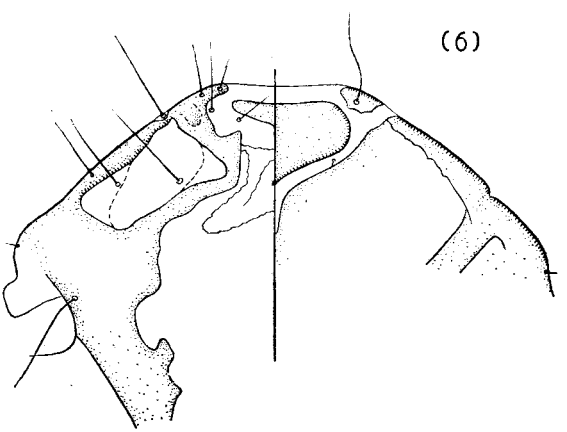
Figs. 1–6.



Preantennal region of heads of females, drawn to same scale : mandible not shown. 1. *A. perspicuus* (Kellogg), a.v.s.3, third anterior ventral seta ; v.sm.s.1, first ventral submarginal seta. 2. *A. hopkinsi* Dhanda. 3. *A. clayae* sp. n. 4. *A. jordani* sp. n. 5. *A. africanus* sp. n. 6. *A. trigonoceps* (Giebel).


(4)


(5)


(6)

Aegypoecus hopkinsi Dhanda, 1959.

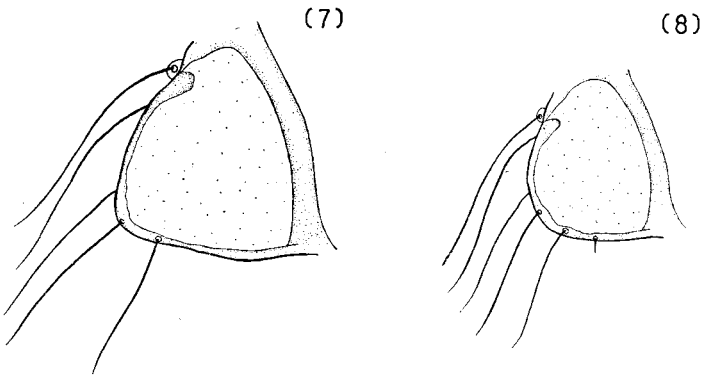
(Text figures 2, 8, 10, 15, 21, 23, 29, 37 and 42.)

Type Host : *Necrosyrtes monachus pileatus* (Burchell).

This is the smallest species of *Aegypoecus*, readily distinguished by the presence of paired tergites on abdominal segment XI, in both sexes.

Male : Preantennal region of head as in *perspicuus*, but is relatively shorter in length and wider at the tip (as in fig. 2) ; it is intermediate in shape between *perspicuus* and the remaining species. The dorsal anterior plate is wider than long. Temporal carina feebly developed. Coni similar to *perspicuus*, but somewhat larger in size. Five marginal temporal setaæ, first four long, fifth short, spine-like (fig. 8). Head measurements and cephalic index as shown in Table VI.

Figs. 7–8.

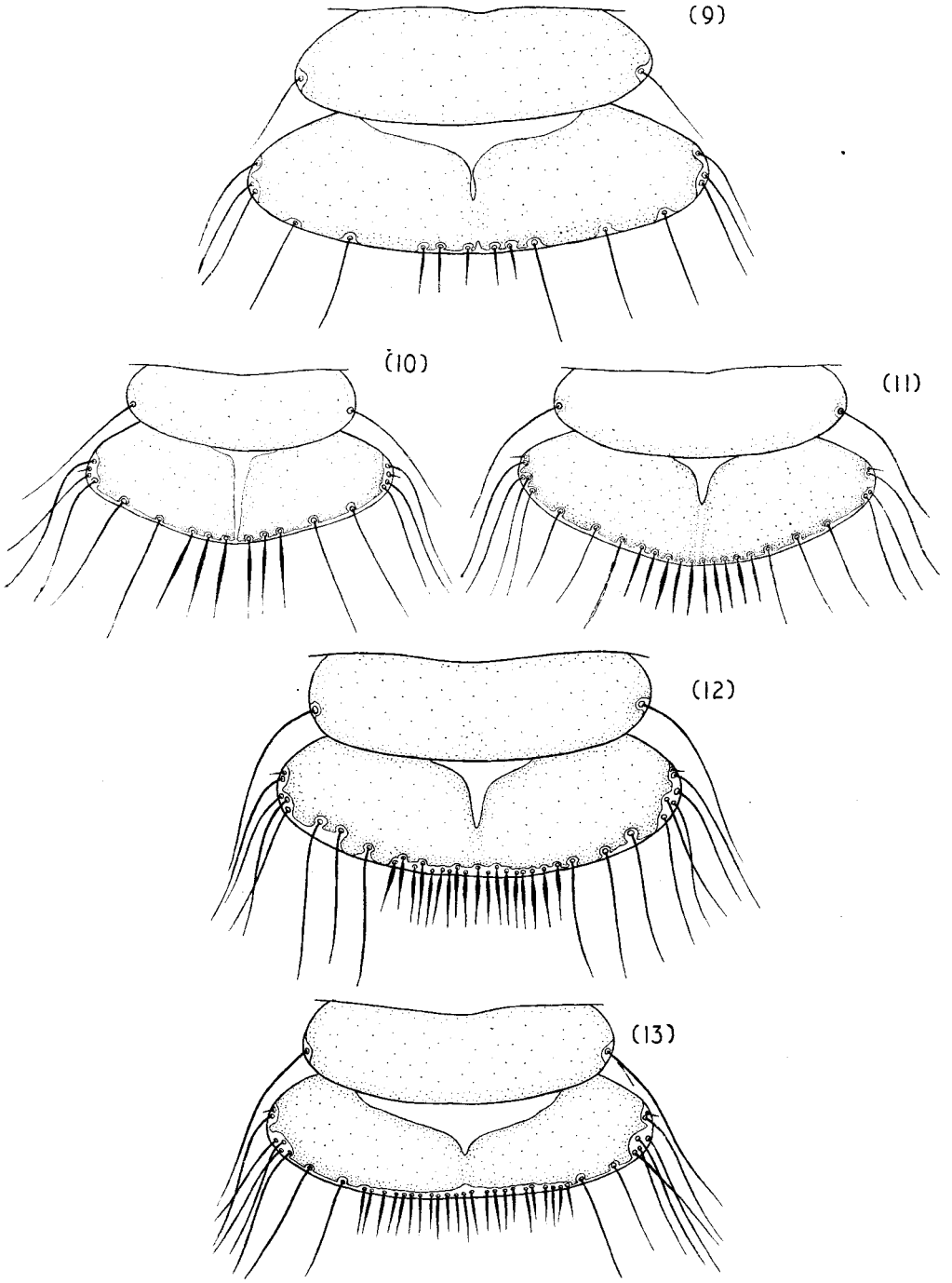


Temporal region of heads of males, drawn to same scale. 7. *A. perspicuus* (Kellogg). 8. *A. hopkinsi* Dhanda.

Pteronotum completely interrupted medianly. Dorsolateral margin of pterothorax with four setæ each side ; outermost seta long, followed by a short, spine-like and two long setæ (fig. 10). Posterodorsal margin with two types of setæ : outermost 2–4, each side, elongated, remaining median 5–7 short and stout. Pterothoracic sternal plate large, with two anterior and two posterior elongated setæ either on or adjoining the plate (as in fig. 15).

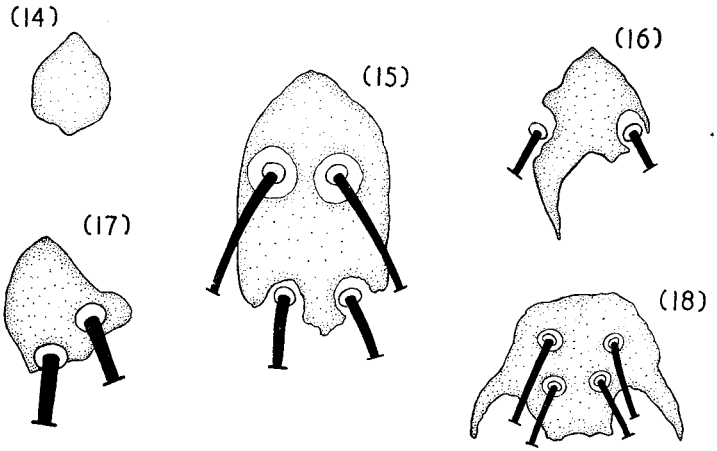
Abdominal segment XI with small lateral tergites (fig. 21). Segment II without sternal thickening. On the following segments the venter shows six pairs of feebly sclerotized sternites, followed by two median sternites ; the anterior median sternite is wider than long, arched and feebly pigmented whereas the posterior sternite, terminal in position, is longer than wide, more deeply pigmented and curls round to become dorsal (Dhanda, 1960, fig. 2). It is not possible to say which of the sternites

Figs. 9–13.



Male thorax, dorsal view, drawn to same scale. 9. *A. perspicuus* (Kellogg). 10. *A. hopkinsi* Dhanda. 11. *A. clayae* sp. n. 12. *A. jordani* sp. n. 13. *A. africanus* sp. n.

Figs. 14–18.



Female pterothoracic sternal plates, drawn to same scale. 14. *A. perspicuus* (Kellogg). 15. *A. hopkinsi* Dhanda. 16. *A. clayae* sp. n. 17. *A. jordani* sp. n. 18. *A. africanus* sp. n.

represent the genital plate. Only one male, out of three examined, is well sclerotized and pigmented and shows the above arrangement of sternites ; this interpretation is not fully satisfactory. Chætotaxy as shown in Table III. Segment II with one pleural seta each side. Genitalia much smaller as compared to *perspicuus*. Basal apodeme reaches to segment V proximally. Endomeres without a dividing suture on outer margin, and extend beyond the paramere of its side. Telomeres and hypomeres fused to form a gutter-shaped structure surrounding the small and pointed penis ventrally and laterally (fig. 42). A small median triangular sclerite associated with the genitalia ventrally and distally present.

Female : Head (fig. 2) and thorax similar to male but the measurements are slightly larger (Table VI).

Abdominal segment XI with lateral, triangular tergites (fig. 23). Chætotaxy similar to male (Table IV). There are no anterior tergo-central setæ on segment IX+X near the notch in tergite ; but on the posterior margin there are 2–3 setæ each side. Sclerites round opening of spermathecal duct absent. Post-vulval sclerites large, notched posteriorly, with a cluster of 7–12 setæ in the notch (fig. 37). Anteriorly the post-vulval sclerites extend into the dorsal wall of vulva. Although this is the smallest species, yet the post-vulval sclerites are largest in size. Margin of vulva set with 11–16 setæ each side, and the ventral side with 11–22 short, spine-like setæ each side (fig. 29).

Material examined: one male, five females collected by G. H. E. Hopkins on 20. iii. 1936 and one female on 16. vi. 1936, in Gulu District, Uganda ; two females on 25. i. 1934 in Mubende, Uganda ; one male, three females

collected by A. W. Williams on 26. v. 1933, in Kampala, Uganda ; one male, one female collected by W. Ruttledge on 8. xi. 1941, in Wad Medani, Anglo Egyptian Sudan—all specimens collected from *Necrosyrtes monachus pileatus* (Burchell) ; and one female collected by O. Theodor on 24. xi. 1958, in Abalti, Ethiopia, from *Necrosyrtes monachus* (Temminck).

In the following four species, abdominal segment XI is without tergal thickening in both sexes. Furthermore, in contrast to the two preceding species, the anterior hyaline margin never extends beyond the tip of marginal or premarginal carina and the preantennal region of head is much shorter in length (*cf.* figs. 1 and 2 with 3–6).

Aegypoecus clayae, sp. n.

(Text figures 3, 11, 16, 19, 20, 24, 30, 35, 38 and 43.)

Type Host : *Trigonoceps occipitalis* (Burchell).

This species is distinguished readily by the ventral carina which is joined to the premarginal carina by a narrow sclerite. In comparison to other species the head is larger in proportion to the body in both the sexes.

Male (fig. 19) : Hyaline margin with straight anterior edge. Marginal carina interrupted into pre- and post-marginal carinæ ; premarginal carina joined with the tip of ventral carina by a slender oblique bar of sclerotization (as in fig. 3). Dorsal preantennal suture as in *perspicuus*. Dorsal anterior plate wider than long, with a short, posteriorly pointed process. Temporal carina feebly developed. Coni smaller than in *perspicuus* and *hopkinsi*, which they resemble in shape but are unpigmented. First ventral submarginal seta not posterior, but on the outer side of the second anterior seta. Measurements and cephalic index as in Table VI.

Pteronotum with a deep median notch, arising from the anterior margin. Dorsolateral margin of pterothorax with 4–5 setæ ; outermost seta short, spine-like, followed by 3–4 long setæ (fig. 11). Posterodorsal margin with two types of setæ ; outermost 2–3 each side long, remaining median 7–10 short and stout. Out of two specimens examined, one had one long seta on pterothoracic sternal plate and the other, one each side of the plate.

Sternal thickening on segment II absent ; on the following segments the venter shows either six or seven pairs of lateral and a median terminal thickenings. The former are difficult to delineate in the available specimens and may belong to segments III–VII ; and the remaining one or two pairs along with the terminal sternite may represent the genital plate. A few of the tergal and sternal setæ are elongated, and the remaining are short and stout ; chætotaxy shown in Tables I and III. Pleural setæ on segment II present, from 1–3 each side. All pleural setæ elongated. Genitalia with large basal apodeme, reaching to the middle of segment IV proximally. Parameres curved obliquely, directed towards the

TABLE I.—Abdominal chætotaxy of *holotypes*, male, of *Aegypoecus* species.

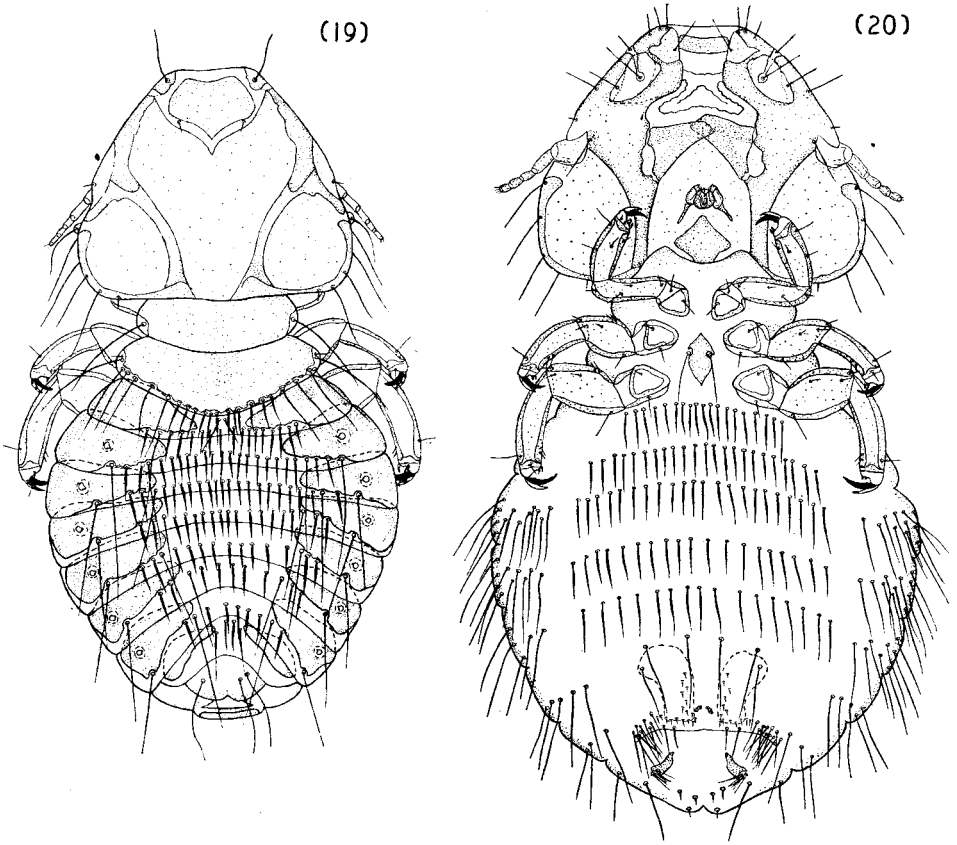
Species	Abdominal segment	II	III	IV	V	VI	VII	VIII
clayae sp. n. (cf. fig. 19)	Tergal	2, 17	24	24	21	17	13	11
	Sternal	21	27	23	22	22	7	2
	Pleural	2+2	8+6	16+17	6+13	8+8	6+5	5+3
jordani sp. n.	Tergal	2, 40	44	46	42	38	29	24
	Sternal	27	30	33	28	23	10	2
	Pleural	10+10	30+—	30+31	19+23	13+16	9+12	5+7
africanus sp. n.	Tergal	4, 49	50	69	73	66	50	29
	Sternal	33	55	58	59	52	36	30
	Pleural	5+3	24+18	32+26	27+27	20+23	24+17	5+5

TABLE II.—Abdominal chætotaxy of *allotypes*, female, of *Aegypoecus* species.

Species	Abdominal segment	II	III	IV	V	VI	VII	VIII
clayae sp. n. (*cf.* figs. 20, 24 & 30)	Tergal	2, 17	24	24	23	25	19	14
	Sternal	19	23	22	19	16	6	0
	Pleural	2+2	6+8	12+11	10+11	5+8	5+5	3+3
jordani sp. n. (*cf.* figs. 25 & 31)	Tergal	2, 43	48	56	61	45	37	25
	Sternal	26	33	33	30	21	7	0
	Pleural	7+8	21+18	31+27	24+22	17+15	11+8	6+6
africanus sp. n. (*cf.* figs. 26 & 32)	Tergal	4, 70	85	too numerous to count				24
	Sternal	28	too numerous to count					0
	Pleural	3+4	28+27	36+33	28+31	28+28	19+20	15+14*

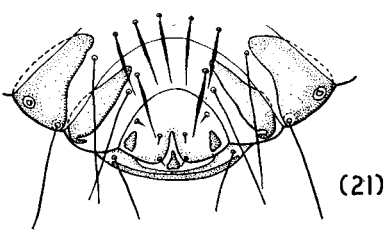
* For the sake of convenience setæ on the sternum each side of the inner-genital sclerites are included with the pleural setæ of that segment.

Figs. 19–20.



Aegypoecus clayae sp. n., drawn to same scale. 19. Male, dorsal view. 20. Female, ventral view ; ocular setæ not shown.

Fig. 21.



Aegypoecus hopkinsi **Dhanda.** Terminal segments of male abdomen, dorsal view.

midline. Endomere does not extend beyond paramere of its side (fig. 43). Median elements fused to form a tubular structure, enclosing the small and pointed penis.

Female (fig. 20) : Head (fig. 3) and thorax similar to male with slightly larger measurements (Table VI) Pterothoracic sternal plate with one long seta each side, adjoining the plate (fig. 16). Chætotaxy much as in male (Tables II and IV). Two anterior tergocentral setæ on segment IX+X near the median notch in anterior margin of tergite, and 4–5 setæ each side on its posterior margin (fig. 24). Genital region with a pair of feebly sclerotized sclerites slightly anterior to opening of the spermathecal duct (figs. 30 and 35). Post-vulval sclerites small, irregular in shape and notched posteriorly, with 9–11 setæ in the notch. Margin of vulva set with 14–15 setæ and 19–21 short, spine-like setæ on its ventral side, each side.

Measurements of the types given in Table V.

Type material : *Holotype* male and *allotype* female, slide No. 18725 in the Meinertzhagen collection, British Museum (Natural History), collected in Somaliland in February, 1949, from *Trigonoceps occipitalis* (Burchell) ; *paratypes* one male and one female from the same host.

The species is named in honour of Dr. Theresa Clay, British Museum (Natural History).

Aegypoecus jordani, sp. n.

(Text figures 4, 12, 17, 25, 31, 39 and 44.)

Type Host : *Torgos tracheliotus nubicus* (Smith).

This is a distinctive species which can be recognized by the continuous marginal carina. Besides, the male can be distinguished by the shape and proportions of the genitalia and the female by the shape of post-vulval sclerites and the number of anterior tergocentral setæ on segment IX+X.

Male : Anterior edge of hyaline margin straight. Marginal carina not interrupted laterally into pre- and post-marginal carinæ, as in the preceding forms. Consequently, the dorsal preantennal suture arises at the tip of the marginal carina (as in fig. 4) ; since there is no lateral interruption in the marginal carina, the suture does not extend on the ventral side (*cf.* figs. 4 and 5). Dorsal anterior plate resembles *clayae* sp. n. in shape. Anterolaterally the ventral carina is joined to the marginal carina by a broad sclerite. Temporal carina feebly developed. Coni unpigmented, differ markedly in shape from *perspicuus* (as in fig. 4). Measurements and cephalic index as shown in Table VI.

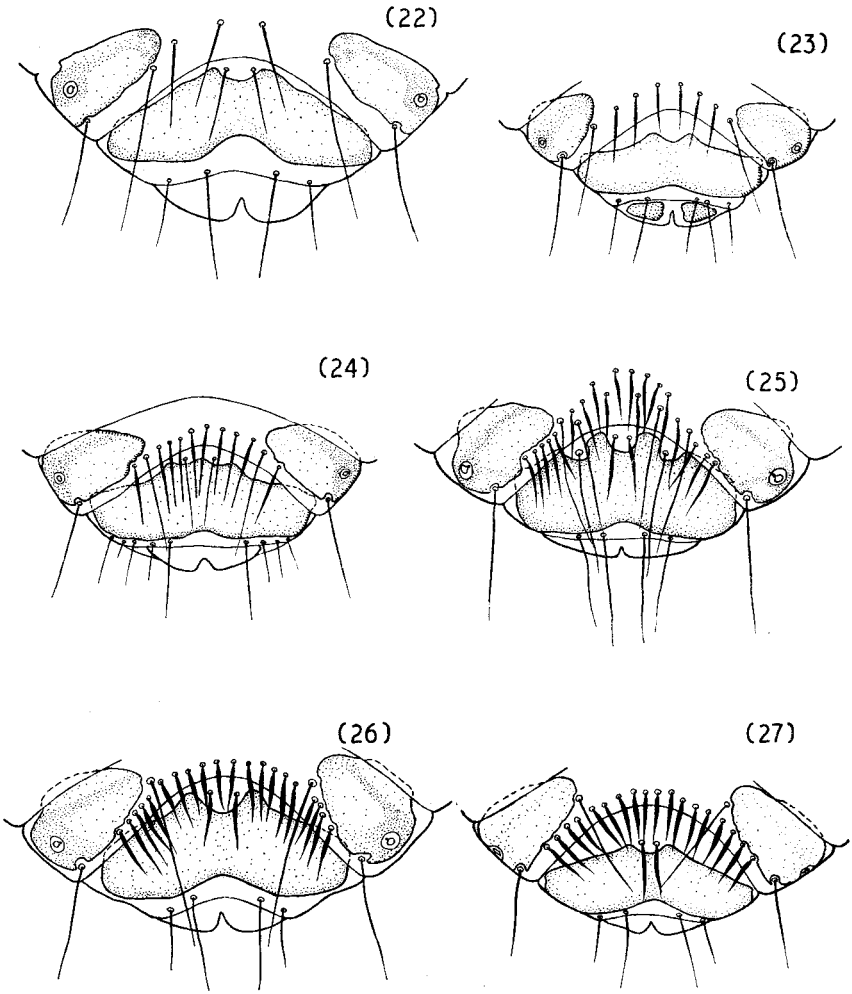
Pteronotum shown in fig. 12. Dorsolateral margin of pterothorax with 5–6 setæ each side ; outermost short, spine-like, followed by 4–5 long setæ. Posterodorsal margin with two types of setæ ; outermost three each side long, and the median 18 short and stout. Pterothoracic sternal plate with one long seta each side (as in fig. 17).

TABLE III.—Variations in abdominal chætotaxy of males of *Aegypoecus* species ; number of specimens examined is given within brackets and the type forms of *hopkinsi*, *clayae*, jordani and africanus are also included. (*Trigonoceps* (Giebel) is not included as no males were available.)

Species	Abdominal segment	II	III	IV	V	VI	VII	VIII
perspicuus (Kellogg) (4)	Tergal	2, 21–27	25–31	25–34	25–31	16–31	16–23	9–11
	Sternal	5–13	12–30	13–28	16–28	10–19	2–3	2
	Pleural	0+0	2–3+2–3	7–14+7–15	8–10+7–11	6–9+5–8	5–8+3–7	3–4+3
hopkinsi Dhanda (3)	Tergal	2, 14–17	16–21	10–16	12–13	7–12	7–11	5–9
	Sternal	7–18	11–21	15–19	15–18	11–16	7–11	2
	Pleural	1+1	2–4+2–4	7–10+8–10	5–8+7–9	6–7+7–8	4–5+4–5	2+2
clayae sp. n. (2)	Tergal	2, 14–17	19–24	18–24	17–21	17	13–16	8–99
	Sternal	17–21	21–27	22–23	12–22	15–22	7–8	2
	Pleural	2–3+1–2	7–8+6	13–16+11–17	6–11+10–13	6–8+6–8	4–6+4–5	3–5+3
jordani sp. n. (1)	Tergal	2, 40	44	46	42	38	29	24
	Sternal	27	30	33	28	23	10	2
	Pleural	10+10	30+—	30+31	19+23	13+16	9+12	5+7
africanus sp. n. from *Pseudogyps africanus* (1)	Tergal	4, 49	50	69	73	66	50	29
	Sternal	33	55	58	59	52	36	30
	Pleural	5+3	24+18	32+26	27+27	20+23	24+17	5+5
africanus sp. n. from *Gyps ruppellii erlangeri* (2)	Tergal	43–49	58–62	64–68	64–67	48–55	43	23–25
	Sternal	32–36	45–53	57–58	46–47	39–47	33–39	5–6
	Pleural	6+6–7	20–28+19–25	too numerous to count		29–35+33–35	20–24+21–25	7–12+11–14

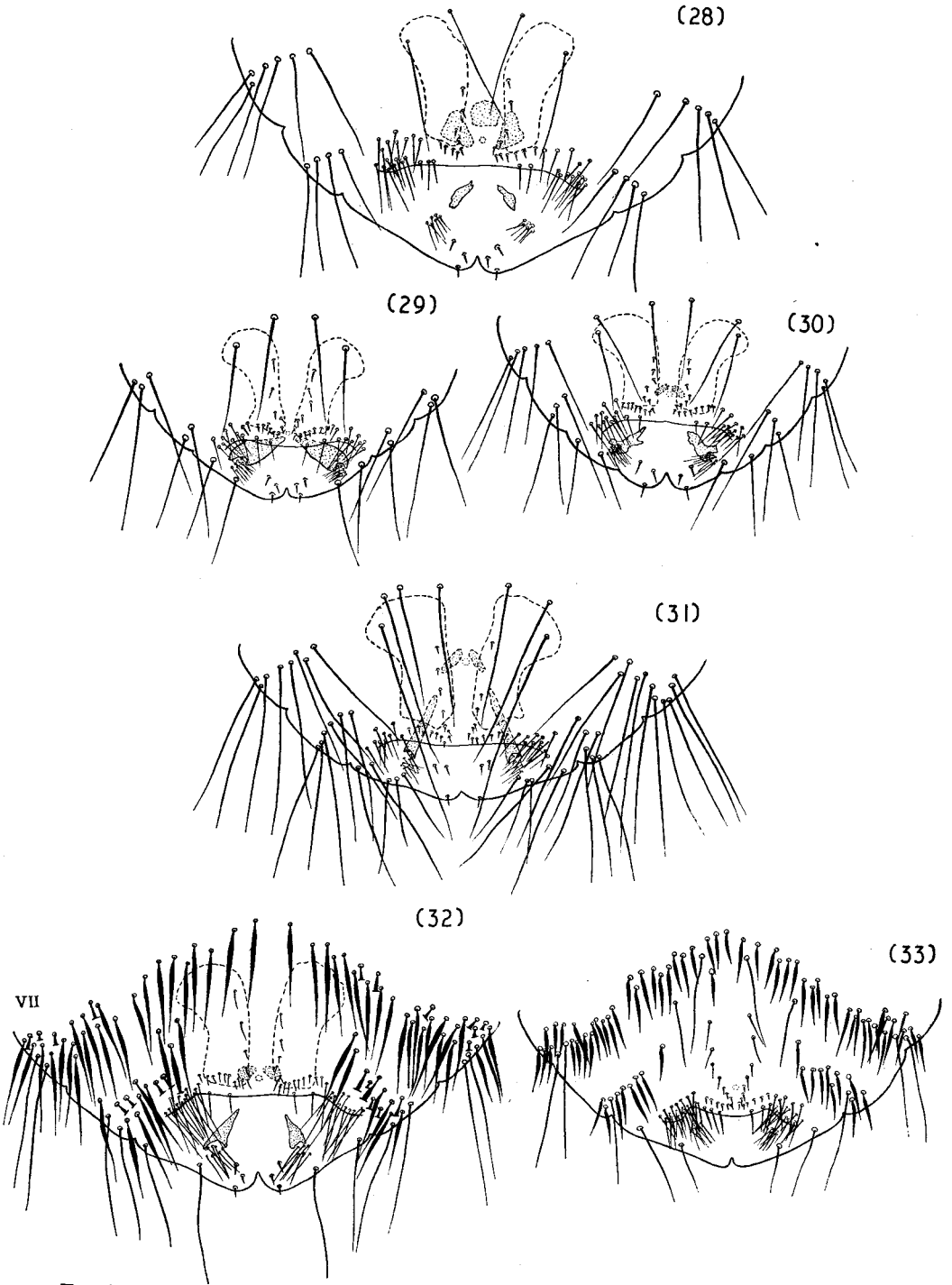
Abdomen with only a median terminal sternite, which resembles the last sternite of *hopkinsi*. Chætotaxy dense ; majority of setæ are short and stout, and some are narrow and elongated (Tables I and III). There is a long seta near the apices of lateral tergites on segments II–VIII ; these setæ are slightly anterior to the row of short lanceolate setæ on the posterior margin of the segment (as in fig. 25). Pleural setæ are dense and somewhat intermediate between the short and elongate types

Figs. 22–27.



Terminal segments of female abdomen, dorsal view, drawn to same scale. 22. *A. perspicuus* (Kellogg). 23. *A. hopkinsi* Dhanda. 24. *A. clayae* sp. n. 25. *A. jordani* sp. n. 26. *A. africanus* sp. n. 27. *A. trigonoceps* (Giebel).

Figs. 28–33.



Terminal segments of female abdomen, ventral view, drawn to same scale ; not all setæ each side of vulva and associated with post-vulval sclerites shown as they were too numerous. 28. *A. perspicuus* (Kellogg). 29. *A. hopkinsi* Dhanda. 30. *A. clayae* sp. n. 31. *A. jordani* sp. n. 32. *A. africanus* sp. n. As sternocentral setæ on segment VII were too numerous, about 32, only 20 are shown 33. *A. trigonoceps* (Giebel).

of setæ. In the genitalia the basal apodeme extends up to the anterior margin of segment V. Parameres taper slightly distally (fig. 44). Endomeres short, reach only to the middle of parameres. Median elements fused and difficult to homologize with other species ; the tip of this structure is swollen and bulb like.

Female : Similar to male, but larger in size (Table VI).

In the abdomen, tergite IX+X differ from the preceding species in having two lateral notches on its anterior margin in addition to the median notch (fig. 25). Chætotaxy dense ; much as in male (Tables II and IV). Anterior margin of tergite IX–X with four tergocentral setæ ; one long seta in each lateral notch and two short and stout in the median notch. Genital region with sclerites round opening of the spermathecal duct similar to *clayae* sp. n. Post-vulval sclerites elongated, converging towards each other proximally, and extending into the dorsal wall of vulva; posteriorly they are notched, with 8–10 setæ in the notch (fig. 39). Margin of vulva with 12–19 setæ each side and 15–16 short, spine-like setæ each side on its ventral side (fig. 31).

Measurements of types given in Table V.

Type material : *Holotype* male and *allotype* female, slide No. 18789, in the Meinertzhagen collection, British Museum (Natural History), collected in Kenya from *Torgos tracheliotus nubicus* (Smith) ; *paratype* one female from the same host.

This species is named in honour of the late Dr. H. E. Karl Jordan, whose contributions have so greatly enriched our knowledge of insects.

Aegypoecus africanus, sp. n.

(Text figures 5, 13, 18, 26, 32, 40 and 45 ; all drawn from specimens from the type host.)

Type Host : *Pseudogyps africanus* (Salvadori).

This species is close to *triganoceps* (Giebel), from which it is distinguished by the characters of marginal carina.

Male : The hyaline margin has a curved anterior edge (as in fig. 5). Marginal carina interrupted into pre- and post-marginal carinæ. This interruption is only partial as it is confined to the preantennal suture, on dorsal and ventral sides, and does not divide the entire thickness of the marginal carina, as in *perspicuus*. The preantennal suture curves round to the ventral side and encloses the third anterior ventral seta. Dorsal anterior plate longer and more pointed posteriorly, than in *trigonoceps*. Temporal carina well developed. Coni pigmented, similar in shape to *trigonoceps*. Measurements and cephalic index as in Table VI.

Pteronotum interrupted by a deep median notch arising from the anterior margin (fig. 13). Dorsolateral margin of pterothorax with 5–7 setæ each side ; outermost seta short, spine-like, followed by an elongated and a group of 4–6 elongated setæ. Posterodorsal margin with two types of setæ ; outermost 2–3, each side, elongated, and the median

TABLE IV.—Variations in abdominal chætotaxy of females of *Aegypoecus* species ; number of specimens examined is given within brackets and the type forms of *hopkinsi*, *clayae*, *jordani* and *africanus* are also included.

Species	Abdominal segments	II	III	IV	V	VI	VII	VIII
perspicuus (Kellogg) (4)	Tergal	2, 22–29	23–32	22–29	20–26	17–25	12–19	5–12
	Sternal	13–20	25–31	20–31	16–28	11–17	3–4	0
	Pleural	0+0	2–3+2–3	9–13+10–13	8–12+8–11	6–8+7–9	5–7+5–8	3–4+3–4
hopkinsi Dhanda (13)	Tergal	2, 13–20	15–24	16–22	11–18	9–16	9–14	5–10
	Sternal	13–19	16–20	9–19	11–15	7–12	4–5	0
	Pleural	1+1	2–4+1–3	4–6+6–8	4–7+3–7	3–6+4–6	3–4+2–3	2+2–3
clayae sp. n. (2)	Tergal	2, 17	21–24	23–24	20–23	21–25	19–21	11–14
	Sternal	19	23	22–25	19–20	16	6	0
	Pleural	2–3+2	6–11+8–9	12–21+11–19	10–11+11	5–8+8	5+5–7	3+3
jordani sp. n. (2)	Tergal	2, 43–45	48–60	56–67	61–67	45–53	37–50	25–31
	Sternal	26–29	33–37	33–37	27–30	21–24	6–7	0
	Pleural	7–8+8	21–24+18–21	31–42+27–37	24–23+22	17+12–15	11–9+8–9	6+6
africanus sp. n. from *Pseudogyps africanus* (3)	Tergal	4, 62–70	71–85	too numerous to count				20–28
	Sternal	too numerous to count						6–7
	Pleural	3–5+4–5	21–28+22–27	29–43+32–44	28–38+25–40	24–32+21–30	17–26+16–25	6–12+10–15*
africanus sp. n. from *Gyps ruppellii* (1)	Tergal	too numerous to count						
	Sternal	3–32	55	62	55	36	34	6
	Pleural	8+8	32+22	45+42	19+31	26+29	18+23	15+11*
trigonoceps (Giebel) (2)	Tergal	too numerous to count						
	Sternal	too numerous to count						
	Pleural	4–8+4–5	30+26–27	38–45+35–37	30–34+30	24–25+21–23	13–18+16–19	4–9+8–11*

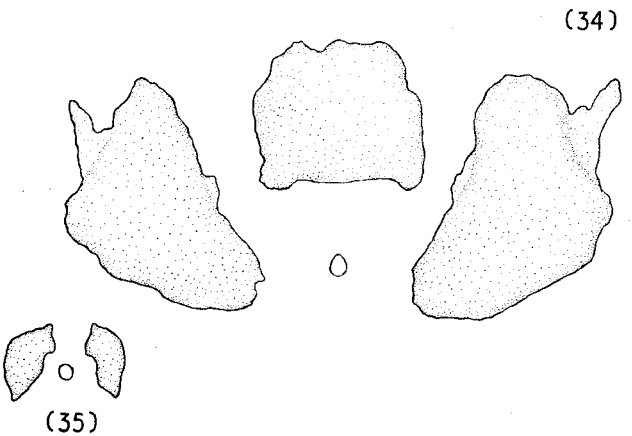
* For the sake of convenience setæ, when present, on the sternum, each side of the inner-genital sclerites are included with the pleural setæ of that segment.

20–30 are short and stout. Pterothoracic sternal plate (as in fig. 18) with two long setæ on or adjoining the plate each side.

Lateral tergites on abdominal segments II–X with heavily sclerotized transverse bars, separating a narrow feebly sclerotized anterior strip from the tergite proper. The venter with only a median terminal sternite as in *jordani* sp. n. and its posterior part curves round to the dorsal side. A large number of setæ form a thick covering over the abdomen and the majority of the setæ are short, stout, somewhat spindle-shaped. The setæ are so dense that their arrangement cannot be recognized and they appear distributed uniformly all over the segment (Tables I and III). As in *jordani*, there is a long seta near the apices of lateral tergites on segments II–X. Pleural setæ are dense ; majority of them being short and stout, a few outermost somewhat intermediate between the short and long types. Genitalia with a large basal apodeme, extending up to segment IV proximally and comparatively small distal elements (fig. 45). Parameres and endomeres as in *jordani*, but the latter are smaller, and fall short of, or just reach the paramere, of its side. Median elements fused as in *jordani*, and the resulting structure is swollen proximally but taper off distally.

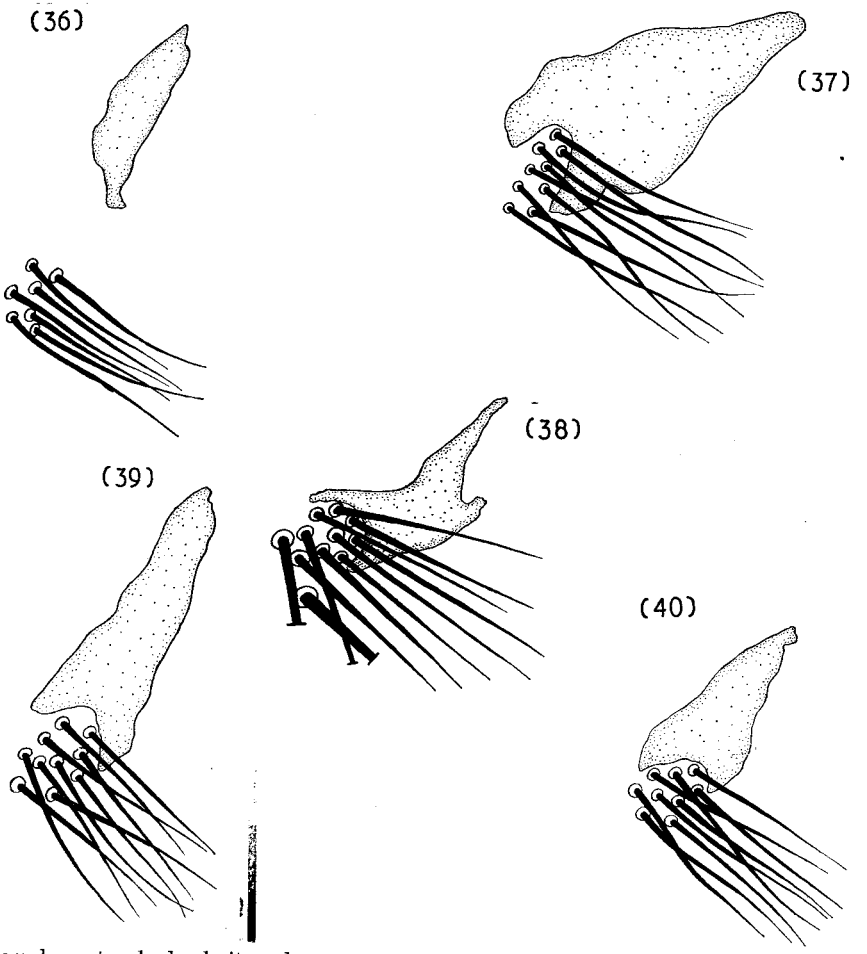
Female : General characters of head (fig. 5) and thorax similar to male, but larger in size (Table VI). Tergite IX+X with a single median notch anteriorly, lodging two tergocentral setæ in it (fig. 26). Posterior margin of segment IX+X with two setæ each side. Chaetotaxy much as in male (Tables II and IV). Small paired sclerites present anterior to the opening of the spermathecal duct. Post-vulval sclerites small and triangular ; posteriorly notched, with 6–10 setæ in the notch (fig. 40).

Figs. 34–35.



Female sclerites (drawn to same scale) round opening of spermathecal duct which is represented by the circle. 34. *A. perspicuus* (Kellogg). 35. *A. clayae* sp. n.

Figs. 36–40.



Female post-vulval sclerites, drawn to same scale. 36. *A. perspicuus* (Kellogg). 37. *A. hopkinsi* Dhanda. 38. *A. clayae* sp. n. 39. *A. jordani* sp. n. 40. *A. africanus* sp. n.

Margin of vulva with 23–30 setæ each side ; 6–11 setæ, relatively longer than in other species, present on ventral side, each side (fig. 32).

Measurements of types given in Table V.

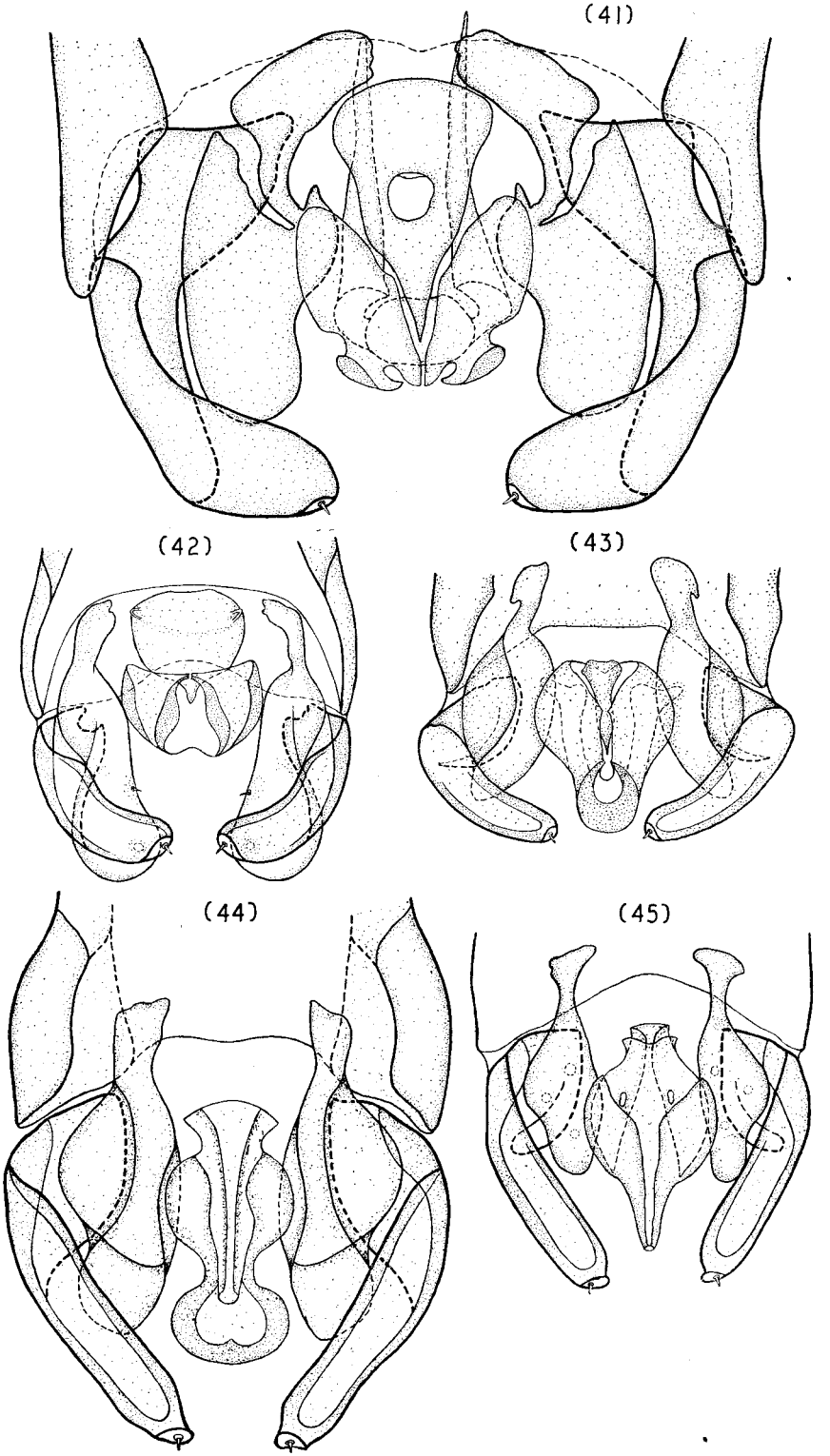
Material examined : one male, three females collected by W. J. Eggeling in East Madi, Uganda from *Pseudogyps africanus* (Salvadori) on 19. vi. 1933 ; two males, one female from *Gyps rüppellii erlangeri* Salvadori, from Somaliland collected in January, 1949, Meinertzhagen collection slide No. 18408.

Type material : *Holotype* male and *allotype* female slide No. 653 from *Pseudogyps africanus* (Salvadori) collected by W. J. Eggeling on 19. vi. 1933 ; *paratypes* two males and three females with the data given above.

TABLE V.—Measurements in mm. and C.I. of types of new *Aegypoecus* species mounted in Canada balsam.

		Male, *holotype*			Female, *allotype*		
		clayae sp. n.	*jordani* sp. n.	*africanus* sp. n.	*clayae* sp. n.	*jordani* sp. n.	*africanus* sp. n.
Head	Length	0·62	0·75	0·61	0·70	0·83	0·77
	Breadth	0·75	0·93	0·81	0·86	1·02	1·05
Prothorax	Length	0·15	0·15	0·16	0·15	0·15	0·22
	Breadth	0·44	0·56	0·52	0·53	0·61	0·65
Pterothorax	Length	0·16	0·21	0·16	0·19	0·19	0·26
	Breadth	0·56	0·67	0·64	0·64	0·78	0·80
Abdomen	Length	0·83	1·04	1·02	1·07	1·26	1·41
	Breadth	0·95	1·30	1·15	1·25	1·44	1·60
Total	Length	1·76	2·15	1·95	2·11	2·43	2·66
	C. I.	1·21	1·24	1·34	1·23	1·23	1·36

Figs 41–45.



Male external genitalia, distal components only, drawn to same scale. 41. *A. perspicuus* (Kellogg). 42. *A. hopkinsi* Dhanda. 43. *A. clayae* sp. n. 44. *A. jordani* sp. n. 45. *A. africanus* sp. n.

TABLE VI.—Head measurements in mm. and C.I. of *Aegypoecus* species, mounted in Canada balsam.

Species	Number of specimens examined	Male			Female		
		Length	Breadth	C.I.	Length	Breadth	C.I.
perspicuus (Kellogg)	7 males and 7 females	0·86 0·81 0·78 0·80 0·81 0·83 0·80	1·01 0·96 0·93 0·98 1·02 1·04 1·01	1·17 1·18 1·19 1·22 1·25 1·25 1·26	0·84 0·87 0·90 0·87 0·78 0·84 0·84	1·01 1·04 1·08 1·07 0·96 1·05 1·05	1·19 1·19 1·20 1·22 1·23 1·24 1·24
hopkinsi Dhanda	1 male and 9 females	0·56	0·68	1·21	0·59 0·56 0·57 0·62 0·59 0·61 0·61 0·58 0·56	0·70 0·67 0·68 0·74 0·71 0·73 0·73 0·70 0·70	1·18 1·18 1·18 1·19 1·20 1·20 1·20 1·21 1·24
clayae sp. n.	1 male and 1 female	0·63	0·80	1·26	0·74	0·90	1·22
jordani sp. n.	1 female only				0·89	1·10	1·22
africanus sp. n. from *P. africanus*	2 females only				0·74 0·74	1·01 1·01	1·36 1·36
africanus sp. n. from *G. ruppellii*	2 males and 1 female	0·65 0·67	0·87 0·89	1·34 1·33	0·74	0·99	1·34
trigonoceps (Giebel)	2 females only				0·73 0·73	1·01 1·01	1·39 1·39

Aegypoecus trigonoceps (Giebel, 1874).

(Text figures 6, 27 and 33.)

Type Host : *Gyps fulvus fulvus* (Hablizl).

Docophorus trigonoceps Giebel, 1874. Insecta Epizoa, 68. Host : (*Vulture fulvus*)= *Gyps fulvus fulvus* (Hablizl).
Aegypoecus trigonoceps (Giebel). Hopkins and Clay, 1952. A check list of the genera and species of Mallophaga, London, 25.

Only two females of this species were available. Even these were almost completely depigmented due to overtreatment with alkali, and as important sclerites were not delineable, precise specific characters were difficult to study.

The species is apparently closely related to *africanus* sp. n., from which it is distinguished by the characters of the marginal carina, which is complete in this form.

Female : Head similar to *africanus* sp. n. in shape (*cf.* figs. 5 and 6), but differs in having laterally complete marginal carina. The dorsal anterior plate appears to differ in shape from *africanus* sp. n. Coni pigmentation lost.

Thorax and abdomen similar to *africanus* sp. n. The number, shape and length of abdominal setæ closely correspond to *africanus* sp. n. ; there are slight differences in the shape and chætotaxy of the terminal segments (*cf.* figs. 26 and 27). Setæ on ventral side of vulva somewhat longer than in preceding species (*cf.* figs. 32 and 33). Head measurements and cephalic index given in Table VI.

Material examined: two females, slide No. 36, Karpoff collection, British Museum (Natural History), collected in Moscow Zoo Gardens in November 1925, from *Gyps fulvus* (Hablizl).

Key to the species of *Aegypoecus*.

Male.

The species *brevicollis* (Burmeister) and *trigonoceps* (Giebel) are not included as no specimens were available for study.

1. Anterior hyaline margin of head produced forward, beyond the tip of premarginal carina (as in figs 1 and 2) ..... 2.
   Anterior hyaline margin not produced forward (as in figs. 3–6) ..... 3.
2. Preconal, preantennal and fifth marginal temporal setæ absent (figs. 1 and 7). Pterothoracic sternal plate small, without setæ (fig. 14). Dorsolateral margin of pterothorax without spine-like seta (fig. 9). Genitalia extremely large (fig. 41) ..... *perspicuus.*
   Preconal, preantennal and fifth marginal temporal setæ present (figs. 2 and 8). Pterothoracic sternal plate large with two long setæ each side (fig. 15). Dorsolateral margin of pterothorax with a spine-like seta (fig. 10). Genitalia small (fig. 42) ..... *hopkinsi.*
3. Marginal carina not interrupted laterally into pre- and post-marginal carinæ (fig. 4). Median elements of genitalia with a bulb-like swelling distally (fig. 44) ..... *jordani* sp. n.
   Marginal carina incompletely divided into pre- and post-marginal carinæ (figs. 3 and 5). Median elements of genitalia without bulb-like distal swelling ..... 4.

4. A distinct narrow sclerite joins the ventral carina to premarginal carina (fig. 3). Abdominal chætotaxy sparse ; setæ slender .... *clayae* sp. n.
   Ventral carina joined to premarginal carina by a broad and thick sclerite (fig. 5). Abdominal chætotaxy dense ; setæ stout and spindle shaped ..... *africanus* sp. n.

Female.

The species *brevicollis* (Burmeister) is not included as no specimens were available for study.

1. Anterior hyaline margin of head produced forward, beyond the tip of premarginal carina (figs. 1 and 2) ..... 2.
   Anterior hyaline margin not produced forward (figs. 3–6) ..... 3.
2. Abdominal segment XI without tergal thickening (fig. 22). Three heavily sclerotized sclerites present round opening of the spermathecal duct (figs. 28 and 34) ..... *perspicuus.*
   Abdominal segment XI with a pair of triangular tergites (fig. 23). Sclerites round opening of the spermathecal duct absent (fig. 29) .. *hopkinsi.*
3. Marginal carina not interrupted laterally into pre- and post-marginal carinæ (figs. 4 and 6) ..... 4.
   Marginal carina incompletely divided into pre- and post-marginal carinæ (figs. 3 and 5) ..... 5.
4. Anterior margin of tergite IX–X with one median and two lateral notches ; the former with two setæ, and the latter with one seta in each notch (fig. 25). Ventral carina continuous with the tip of marginal carina (fig. 4)..... *jordani* sp. n.
   Anterior margin of tergite IX–X with only one median notch with two setæ in it (fig. 27). Ventral carina joined laterally to marginal carina by a broad sclerite (fig. 6) ..... *trigonoceps.*
5. A distinct narrow sclerite joins the ventral carina to premarginal carina (fig. 3). Abdominal chætotaxy sparse ; setæ slender. Post-vulval sclerites irregular in shape (fig. 38) ..... *clayae* sp. n.
   Ventral carina joined to premarginal carina by a broad and thick sclerite (fig. 5). Abdominal chætotaxy dense ; setæ stout and spindle-shaped. Post-vulval sclerites triangular (fig. 40) ..... *africanus* sp. n.

Host-parasite list.

Host	*Aegypoecus* species	Page
Aegypius monachus	*brevicollis*	*
Gyps fulvus fulvus	*trigonoceps*	681
Gyps ruppellii erlangeri	*africanus* sp. n.	677
Necrosyrtes monachus pileatus	*hopkinsi*	664
Neophron p. percnopterus	*perspicuus*	660
Pseudogyps africanus	*africanus* sp. n.	674
Torgos tracheliotus nubicus	*jordani* sp. n.	670
Trigonoceps occipitalis	*clayae* sp. n.	667

* Species not seen, hence not included in the text.

Summary.

Diagnostic characters of the genus *Aegypoecus* are presented. Only four species, out of five accepted as valid up to the present, were studied critically as *brevicollis* was not available. One of these *Aegypoecus griffoneae* Ansari, 1947, obtained from *Gyps himalayensis* Hume, is shown to be an absolute synonym of *Aegypoecus perspicuus* (Kellogg, 1914) and the remaining three species, *perspicuus*, *hopkinsi* and *trigonoceps* are described completely. Three new species, *clayae*, *jordani* and *africanus*

are described from East African vultures. The affinities of different species are discussed and a key for their identification provided.

Acknowledgments.

I am thankful to Dr. Theresa Clay, British Museum (Natural History), for kindly placing the *Aegypoecus* material at my disposal, and for many valuable suggestions ; to Professor M. B. Lal, Head of the Department of Zoology, for all laboratory facilities and for his unceasing interest in my work and to Dr. B. K. Tandan whose guidance made my initiation into the study of Mallophaga far easier. To the Ministry of Scientific Research and Cultural Affairs, Government of India, I owe thanks for financial assistance in the form of a Scientific Research Training Scholarship.

References.

Ansari, M. A. R. 1947. Mallophaga (Ischnocera) infesting birds in the Punjab (India). *Proc. nat. Inst. Sci., India*, **13**, 253–303.

Clay, T. 1951. An introduction to the classification of avian Ischnocera (Mallophaga) Part I. ~~*Proc.*~~ Trans. *R. ent. Soc., Lond.* **102**, 171–194.

——. 1954. The post-spiracular seta and sensillus in the Mallophaga (Ischnocera). *Ann. Mag. nat. Hist.* **12**, 716–718.

——. 1957. The *Degeeriella* (Insecta : Mallophaga) parasitic on *Pernis* (Aves : Falconiformes). *Proc. zool. Soc., Calcutta*, Mookerjee Memor. Vol, 337–347.

—— & Meinertzhagen, R. 1938. New genera and species of Mallophaga. *Entomologist*, **71**, 275–279.

—— & Meinertzhagen, R. 1939. *Aegypoecus, nom. nov. Entomologist*, **72**, 36.

Dhanda, V. 1959. A new species of the mallophagan genus *Aegypoecus* Clay and Meinertzhagen, 1939 (Ischnocera : Philopteridae). *Ann. Mag. nat. Hist.* **13**, 725–730.

Hopkins, G. H. E. & Clay, T. 1952. *A check list of the genera and species of Mallophaga.* London.

Kellogg, V. L. 1914. Mallophaga from birds of the South Atlantic. *Sce. Bull. Mus. Brookl. Inst. Arts a Sces.* **2**, 80–89.