# KEY TO THE SPECIES OF AUSTROMENOPON BEDFORD (MALLOPHAGA) PARASITIC ON THE CHARADRIIFORMES

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While considering the diagnosis of Austromenopon phaeopodis (Schrank) for inclusion in Part IV of the Early Literature of the Mallophaga now in preparation, various characters were found which made it possible to separate in the form

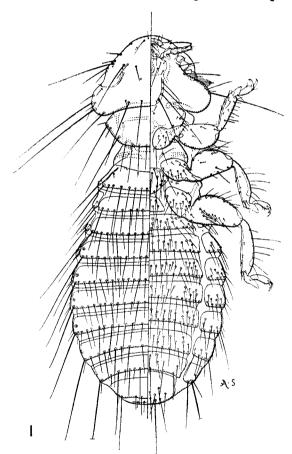


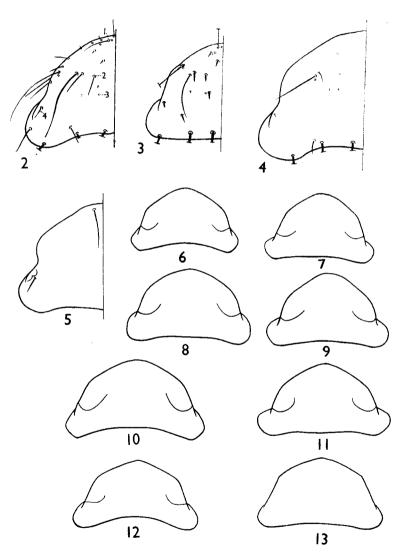
Fig. 1 -Austromenopon phaeopodis (Schrank, 1802): male.

of a key both males and females of most of the species of Austromenopon Bedford parasitic on the Charadriiformes. As this key may be of use to other workers, especially those wishing to describe new forms, it is given below, together with notes on some of the species. Owing to the inadequacy of the original descriptions of the species of Austromenopon it has been necessary,

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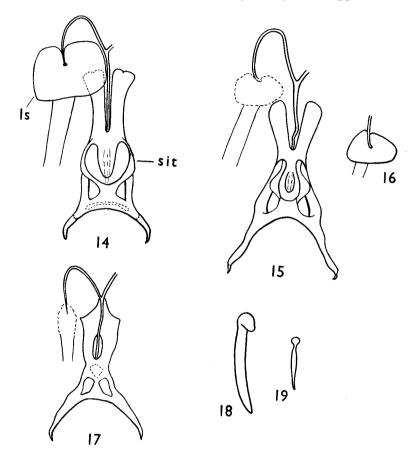
where the types are not available, to assume that specimens from a type host of a particular species are that species and to base the diagnosis of the species on these specimens.

The most important diagnostic characters are the degree of development of the hypopharynx, the dorsal setae of the head and prothorax, the lateral abdominal thickening, the male genitalia, the vulva and the ventral sclerites



Figs. 2-13 —(2-5) Heads of male Austromenopon spp. to show diagnostic dorsal setae:
(2) A. phaeopodis, 1-4 dorsal head setae (d.h.s.); (3) A. nigropleurum (size of setae somewhat exaggerated); (4) A. cursorius; (5) A. durisetosum. (6-13) Outline of heads of Austromenopon spp.: (6) A. atrofulvum, β; (7) A. aegialitidis, ♀ from Charadrius vociferus; (8) A. gregariae, ♀; (9) A. leucurae, ♀; (10) A. haematopi, ♀; (11) A. squatarolae, ♀; (12) A. atrofulvum, ♀; (13) A. micrandum, ♀.

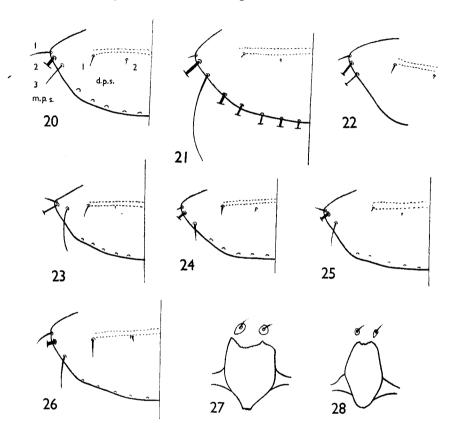
of the terminal segments of the female abdomen. The degree of development of the hypopharynx does not seem to be a character of phylogenetic value, as it is so different in the otherwise rather similar species, A. phaeopodis and A. crocatum, found on different species of Numerius. It has not been possible to separate all the described forms in the key, owing to the apparent variation



Figs. 14-19.—(14-17) Hypopharynx of female Austromenopon spp. (dissected specimens): (14) A. phaeopodis. Is., lingual sclerite; sit., sitophore; (15) A. transversum from Larus ridibundus; (16) A. fuscofasciatum from Stercorarius parasiticus; lingual sclerite; (17) A. limosae. (18-19) "Pestle" or epipharyngeal crest: (18) A. phaeopodis; (19) A. transversum.

of certain characters and the small numbers of specimens from some of the The following characters were found to show too much individual variation to be of diagnostic value: number of setae on the gular plate; dorsal mesothoracic setae; size and number of the abdominal tergal setae and number of rows of abdominal sternal setae. There is frequently minor variation in the length of marginal prothoracic seta 3 (see Note 1) and its length relative to the length of marginal prothoracic seta 1 or dorsal prothoracic seta 1, and these

relative lengths which may be reasonably constant throughout certain populations are not invariable (see Note 11). The shape of the head and of the prothorax is liable to distortion in mounted specimens and the apparent shape of the sclerites in the genital sac of the male is variable owing to the position in which these may lie in the mounted specimen.



Figs. 20–28.—(20–26) Prothorax of male Austromenopon spp. to show diagnostic dorsal setae: (20) A. phaeopodis (m.p.s., marginal prothoracic setae 1–3; d.p.s., dorsal prothoracic setae 1–2); (21) A. transversum from Rissa tridactyla; (22) A. fuscofasciatum from Stercorarius parasiticus; (23) A. durisetosum; (24) A. himantopi; (25) A. haematopi; (26) A. crocatum. (27–28) Female prosternal plate: (27) A. atrofulvum from Sterna fuscata; (28) A. himantopi.

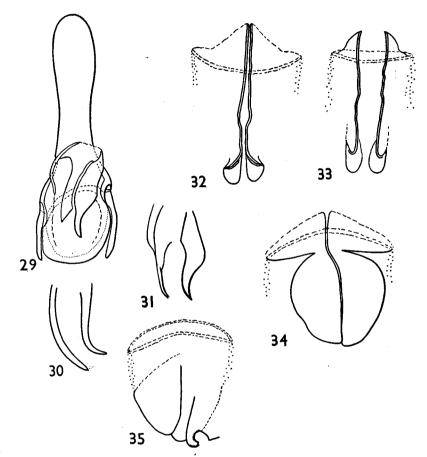
## KEY TO THE SPECIES OF Austromenopon Bedford\*

1		$M.p.s.^{1}$ 3 reaches to metathorax (fig. 21)	2				
_		M.p.s. 3 does not reach to metathorax (fig. 20)	4				
<b>2</b>	(1)	Sclerites of hypopharynx <sup>2</sup> (fig. 14) and epipharyngeal "pestle"					
		(fig. 18) fully developed, or if these sclerites reduced then					
		internal pleural thickening <sup>3</sup> II-VIII large relative to size of					
		pleurite Species from Phaethon and some Procellariforme	84				

<sup>\*</sup> Small numbers refer to notes on pp. 164-165.

3

- Sclerites of hypopharynx (fig. 15) and epipharyngeal "pestle" (fig. 19) show some reduction; internal pleural thickening small or absent
- 3 (2) Inner surface of pleurites with definite semicircular markings (more marked in female than in male); relative lengths of d.n.s. and m.n.s. 1 as in figure 22 . . . . . fuscofasciatum<sup>5</sup>



Figs. 29-35.—Male genitalia of Austromenopon spp.: (29) A. phaeopodis; (30) A. limosae, tips of parameres. (31-35) Sclerites of genital sac: (31) A. sachtlebeni; (32) A. micrandum; (33) A. himantopi; (34) A. haematopi; (35) A. atrofulvum. (Figs. 32-35 drawn to same scale).

- 6	to size of pleurite; tergites with single row of setae; sclerites of genital sac as in figures 29, 31
	straight (fig. 40) phaeopodis
	36 37 38 39
	40
	42
	44

Figs. 36-45.—(36-39) Inner pleural and tergal thickening of female abdomen: (36) A. phaeopodis, inner view of pleurite and lateral part of tergite VI from female in which abdomen has been split down centre and mounted flat on side; (37) A. phaeopodis, normal view of lateral thickening of segment V (tb., tergal bar); (38) A. corporosum, pleural thickening of segment III; (39) A. madagascariensis, pleural thickening of segment IV. (40-45) Edge of vulva and terminal ventral sclerites of female abdomen of Austromenopon spp.: (40) A. phaeopodis; (41) A. crocatum; (42) A. meyeri; (43) A. lutescens; (44) A. limosae; (45) A. gregariae.

-		Sclerites of male genital sac as in figure 31; female vulval margin slightly concave medially sachtlebeni
_		
7	(4)	Some of the dorsal head setae spine-like, d.h.s. 3 spine-like with
	` '	adjacent sensilla (fig. 3) nigropleurum group <sup>6</sup>
_		Dorsal head setae not as above
8	(7)	D.h.s. 2 minute (fig. 4) (d.h.s. 4 short; m.p.s. 3 reaches to or
		nearly to end of lateral margin of prothorax; lateral abdo-
		minal thickening well developed) cursorius
-		D.h.s. 2 not minute (fig. 2)

lval margin markedly concave centrally; prosternal plate similar to figure 27, not figure 28 lutescer	ns
Ival margin not markedly concave, if slightly concave, prosternal plate similar to figure 28	24
nultimate ventral abdominal sclerite elongated (fig. 45)	25
nultimate ventral abdominal sclerite not elongated, shape	
characteristic (fig. 44) limosa	ae
ternal pleural thickening, including that of VIII, large relative	
to size of pleurite (fig. 39) madagascariens	is
	26
gment VI with definite lateral tergal bar aegialitidis 11,	12
gment VI without definite lateral tergal bar	27
othoracic sternal plate broad and scarcely narrowed anteriorly	
fig. 27); outline of head characteristic (fig. 12) atrofulvum	l <sup>10</sup>
	28
lval margin slightly concave centrally himanto	pi
lval margin not concave centrally micrandu	m

#### Notes

1. Diagnostic setae are referred to as follows: d.h.s. 1-4, dorsal head setae, as shown in figure 2; m.p.s. 1-3, marginal prothoracic setae; and d.p.s. 1-2, dorsal prothoracic setae as shown in figure 20.

2. The terminology for the sclerites of the hypopharynx is that used by Snodgrass (1944); the "pestle" is the epipharyngeal crest of Symmons (1952). It should be noted that the figures (14-17) are drawn from the hypopharynx removed from the head, and thus this organ may appear somewhat different when viewed in the whole insect, as the posterior

part may lie partly under the anterior part.

3. The majority of the species of Austromenopon have an internal pattern of thickening along the lateral edges of the abdomen; part of this thickening lies on the inside of the pleurite and part on the inside of the lateral end of the tergite; this is shown in figure 36, where the lateral edge of the abdomen has been opened and flattened out. The tergal thickening often forms a definite bar, here referred to as the tergal bar (fig. 37, tb.). Owing to the lateral thickening being partly tergal and partly pleural, its appearance may vary in different specimens with the amount of pressure and subsequent distortion exerted on the abdomen during mounting on the slide.

4. It has not been possible to find a definite group of characters which would separate all the species parasitic on the Procellariformes from those on the Charadriiformes, and it is therefore considered that *Procellariphaga* Eichler, 1949, should not be maintained as a

separate genus.

5. No critical work has be done on the populations from the different species of the Larinae, and Timmermann (1954:204) has been followed in placing all the species described from the various members of this subfamily as synonyms of A. transversum (Denny, 1842). Specimens from the Stercorariidae, however, were found to be distinct and are placed in the key under A. fuscofasciatum (Piaget, 1880); A. circinatum (Piaget, 1890) is a synonym. In addition to the characters given in the key to separate the two species, it seems that in specimens from the Stercorariidae the lingual sclerites are somewhat more heavily sclerotized and thus have a more distinct outline (fig. 16).

6. The nigropleurum group. Austromenopon specimens from the Alcidae are distinctive in having many of the dorsal setae of the head spine-like (fig. 3). No attempt has been made to study the populations parasitic on the various members of the Alcidae to see whether these are subspecifically distinct. A. fraterculae Timmermann, 1954, cannot be included in this group, and there seems little doubt that the single specimen on which this species was based is a straggler from one of the petrels, almost certainly Puffinus p. puffinus.

7. Only three females have been seen from the type host of *icterum* and, as these are near the females of *durisetosum* (but somewhat larger), it is probable that the male of the former species would be included in the key at this point.

8. There is insufficient material available to show whether A. spenceri Timmermann,

1956, can be separated from corporosum.

9. Only two males have been seen from the type host of micrandum, and it is not possible to be certain from this material whether the apparent differences in the sclerites of the genital sac between this species and himantopi are real or due to distortion during the preparation of the specimens. Although measurements of head width in the Menoponidae may be misleading, it appears that this measurement is greater in micrandum. A single male from Recurvirostra americana, the type host of indistinctum, is in too poor condition to decide whether it differs from males of micrandum.

- 10. No critical examination has been made of the populations from the various species of the Sterninae. The alleged type host of A. atrofulvum (Piaget, 1880), i.e. Platalea leucorodia, is obviously a mistake and the type material, as pointed out by Timmermann. 1954: 201, must have come from one of the Sterninae; it is the earliest name for the species of Austromenopon found on this subfamily. The measurements of the lectotype and paratypes fall within the range of those of specimens from Thalasseus bergi. Until the variation in size and chaetotaxy within the populations from the various members of the Sterninae is known it is not possible to decide whether more than one form will be taxonomically recognisable. Only one other name has been used, that is A. sternophilum (Ferris, 1932) from Sterna fuscata: if this proves to be separable it will not be more than subspecifically distinct, so that atrofulvum should be used as the specific name for populations found on Sternus and Thalasseus. A. pachypus (Piaget, 1888), alleged to have come from Sterna hirundo, is represented in the Piaget collection by a single nymph (see Clay, 1949: 901); this specimen resembles both third instar nymphs and adults of the species usually found on Larus (i.e. A. transversum) in the form of the hypopharynx and chaetotaxy of the prothorax and differs in these characters from nymphs and adults of the species usually found on Sterna; it must be presumed that this nymph is a straggler from one of the Larinae and the name can be sunk as a synonym of transversum (Denny).
- 11. The aegialitidis group. It has not been possible to separate in the key the members of this group. It includes the described species aegialitidis, leucurae and gregariae and the populations parasitic on Hemiparra, Hoplopterus, Stephanibyx, Rhinoptilus, Vanellus and probably other genera. Although it is usual in specimens from Charadrius for m.p.s. 3 to equal or to be only slightly longer than d.p.s. 1 and thus to differ from the type material of leucurae and gregariae, in which m.p.s. 3 is noticeably longer than d.p.s. 1, there is some variation in the length of m.p.s. 3 in the populations from Charadrius and, further, the population from Hoplopterus tends to be intermediate in this character. There may be diagnostic characters in the shape of the sclerite of the genital sac, but this appears different in different specimens according to how it is lying, so that on the present material it cannot be used. The three described species can be separated on the shape of the head (figs. 7, 8, 9), but specimens of other populations have heads of intermediate shape and size. A further revision of the characters and their variation based on a greater number of specimens of all these populations must be undertaken before any adequate classification can be made. Until then these populations can be included in the species aegialitidis, as any future divisions are unlikely to be of more than subspecific rank.

12. In the females no reliable characters have been found to separate haematopi and squatarolae from all the populations discussed under Note 11 above. Although these two species can be separated from the named populations of the aegialitidis group in having m.n.s. 1 obviously longer than d.p.s. 1, they are not distinguishable in this character from the females of some of the other populations. There are some differences in the shape of the heads (figs. 7-11).

13. The lutescens group. This includes A. lutescens (Burmeister) from Philomachus pugnax, A. alpinum Timmermann from Calidris alpina, and the populations from Crocethia alba, Arenaria and Tringa. Except for lutescens, too little material of this group has been seen to make a decision on the status of these populations.

# Neotype of Austromenopon phaeopodis (Schrank)

Pediculus phoeopodis (sic) Schrank, 1802. Briefe naturhistorischen, physikalischen und oekonomischen Inhaltes an Herrn Nau. Erlangen: 361.

The host is given as Scolopax phaeopas L. (Numenius p. phaeopus), so that the name must obviously be a misprint for phaeopodis. The long and fairly detailed description leaves little doubt that it refers to a species of Austromenopon; it was used in this sense by Hopkins and Clay (1952: 49), where the spelling was emended, and by Timmermann (1954: 203) in his revision of Austromenopon. Menopon ambiguum Nitzsch (Giebel, 1874:295) from the same host is also an Austromenopon and a synonym of phaeopodis.

The characters separating this species from other known species of Austro-

menopon have been given above in the key.

#### Measurements in mm.

	Ma	le	Female		
	Length*	$\mathbf{Breadth}$	$\stackrel{\star}{\mathbf{L}}\mathbf{e}\mathbf{n}\mathbf{g}\mathbf{t}\mathbf{h}$	Breadth	
Head .	$0 \cdot 27$	0.50	$0 \cdot 32$	0.57	
Prothorax		0.37	•	$0 \cdot 46$	
Metathorax		0.44	•	0.56	
Abdomen	0.89	0.65	$1 \cdot 27$	0.87	
Total .	$1 \cdot 51$	•.	$2 \cdot 10$	•	
Genitalia .	0.55	•	•		

<sup>(\*</sup> In mid-line; genitalia to end of endomeral plate.)

Neotype 3 (figs. 1, 2, 20, 29) and neallotype  $\mathcal{L}$  (figs. 14, 18, 36, 37, 40) of Austromenopon phaeopodis (Schrank) from Numenius phaeopus (L.) from ICELAND: August, 1934, Meinertzhagen Collection, British Museum (Nat. Hist.), slide No. 2090. Neoparatypes: 8 ♂, 27 ♀ from the same host species from Iceland and Shetland.

## Lectotype of Menopon transversus Denny

Female in the Denny Collection in the British Museum (Nat. Hist.), slide No. 503 from Larus tridactylus = Rissa tridactyla.

## LIST OF SPECIES OF Austromenopon Parasitic ON THE CHARADRIIFORMES

(Those names considered to be synonyms in Hopkins and Clay, 1952, are not repeated here. \* denotes that the types have been seen; † that specimens have been seen from the type host.)

Species				Host and comments		
†aegialitidis (Durrant, 1906)				Charadrius v. vociferus. Note 11.		
albemarlei (Kellogg and Kuwana, 1902)			•	Unknown. It seems possible that this may be an Eidmaniella; if not, it probably		
		•		originated from one of the Procellariformes.		
*alpinum Timmerman, 1954	•	*	•	Erolia alpina schinzi. Included under the lutescens group. Note 13.		
*atrofulvum (Piaget, 1880)			•	Unknown. Note 10. Lectotype, see Clay, 1949:819.		
cinerea (Thompson, 1939)				Needs confirmation. At present unplaceable.		
*circinatum (Piaget, 1890)			. ,	Stercorarius pomarinus. Note 5. Lectotype, see Clay, 1949 : 823.		

confine (Blagoveshtchensky, 1948)	• • •	•	Numenius tenuirostris. Not identifiable from
/TZ 11 1 TZ	1001)		the description.
†corporosum (Kellog and Kuwana, 1	1901)	•.	Phalaropus fulicarius.
†crocatum (Nitzsch, 1866)	•	•	Numenius a. arquatus.
†cursorius (Giebel, 1874)		•	Cursorius c. cursor.
†durisetosum (Blagoveshtschensky,	1948)	٠	Capella g. gallinago.
*fraterculae Timmermann, 1954	•		Described from a specimen believed to have
•			come from Fratercula arctica grabae, but
			probably a straggler from a petrel. Note 6.
*fuscofasciatum (Piaget, 1880)			Stercorarius pomarinus. Note 5. Lectotype,
) accopace taken (2 = 18 = 1, = 1 = 1)			see Clay, 1949: 829.
*gregariae Timmermann, 1954			Chettusia gregaria. Note 11.
*haematopi Timmermann, 1954	Ţ.		Haematopus ostralegus. Note 12.
*himantopi Timmermann, 1954	•	•	Himantopus h. himantopus. Note 9.
†icterum (Burmeister, 1838)	•	•	Scolopax r. rusticola. Note 7. Female only
ricterum (Burmeister, 1836)	•	•	seen.
†indistinctum (Kellogg, 1896) .			Recurvirostra americana, Note 9.
tinfrequens (Kellogg, 1896) .			Larus glaucescens. Note 5.
lemniscatum (Enderlein, 1908)	_		Larus dominicanus. Note 5.
*leucurae Timmermann, 1954			Chettusia leucura. Note 11.
*limosae Timmermann, 1954 .	•	•	Limosa limosa.
47. deceme (Proposition 1939)	•	•	Philomachus pugnax.
†lutescens (Burmeister, 1838) . †madagascariensis (Mjöberg, 1910)	•	•	Scopus umbretta. A member of the Ciconii-
	•	•	formes, not the Charadrifformes. Incorrectly placed in <i>Ciconiphilus</i> by Hopkins and Clay, 1952: 71.
*merguli Timmermann, 1954 .	•	•	Plautus alle. Note 6.
†meyeri (Giebel, 1874)			Limosa lapponica lapponica.
micrandum (Nitzsch, 1866) .			Recurvirostra avosetta. Note 9.
mohni Ansari, 1955			Himantopus h. himantopus. This (and sohni)
			was published three times as new species (Ansari, 1955, 1956 and 1957). In 1957 there is a figure in which the chaetotaxy of the prothorax is similar to that of A. transversum; however, if m.p.s. 3 was missing from this specimen it is possible that mohni is a synonym of himantopi Timmermann.
†nigropleurum (Denny, 1842) .	•	•	Alca torda. No type material in Denny Collection.
*pachypus (Piaget, 1888) .			Sterna hirundo. Error, see Note 10.
†phaeopodis (Schrank, 1802) .	·		Numenius p. phaeopodis. Neotype designated
phaeopous (Solitaire, 1992)	•	•	above.
*ridibundus (Denny, 1842) .	•	•	Larus ridibundus. See Note 5.
*sachtlebeni Timmermann, 1954			Catoptrophorus semipalmatus inornatus.
sohni Ansari, 1955			Tringa ochropus. Not identifiable from the description.
*squatarolae Timmermann, 1954			Squatarola squatarola. Note 12.
*spenceri Timmermann, 1956 .			Lobipes lobatus. Note 8.
†sternophilum (Ferris, 1932) .			Sterna fuscata oahuensis. Note 10.
*transversum (Denny, 1842)	•	٠	Rissa t. tridactyla. Note 5. Lectotype desig-
trunsversum (Denny, 1042)	•	•	nated above.
*uriae Timmermann, 1954 .			Uria aalge albionis. Note 6.

### SUMMARY

A key to most of the species of Austromenopon parasitic on the Charadriiformes is given, with some discussion on the characters of taxonomic importance.

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A list of species with notes is included. A neotype is designated for A. phaeopodis (Schrank) and a lectotype for A. transversum Denny.

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