

Revision of the Feather Mite
Genus *Freyana* (Freyanidae; Analgoidea)

by
Bruce Spencer Calder

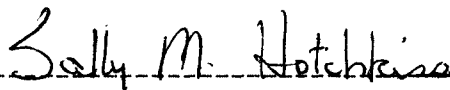
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ABSTRACT

Revision of the Feather Mite Genus
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The feather mite genus *Freyana* Haller, 1877 (Analgoidea, Freyanidae, Freyaninae) is revised with *Freyana anatina* Koch, 1884 as the type species. Twenty-five of the subspecies described by Dubinin in 1950 and 1953 are elevated to the species level. To date the genus *Freyana* is comprised of thirty-three species: *Freyana anatina* (*Dermaleichus anatinus*, Koch, 1884; *Freyana anatina anatina*, Dubinin, 1950); *Freyana dendronessae* (*Freyana anatina dendronessae*, Dubinin, 1950); *Freyana procerocrus*, Dubinin, 1953 (*Freyana anatina cyanocheni*, Dubinin, 1950); *Freyana sarkidiornis* (*Freyana anatina sarkidiornis*, Dubinin, 1950); *Freyana obliquasetae* (*Freyana anatina obliquasetae*, Dubinin, 1950); *Freyana nyrocae* (*Freyana anatina nyrocae*, Dubinin, 1950); *Freyana armata* (*Freyana anatina armata*, Trouessart and Megnin, 1884); *Freyana bucephalae* (*Freyana anatina bucephalae*, Dubinin, 1950); *Freyana oidemia* (*Freyana anatina oidemia*, Dubinin, 1950); *Freyana largifolia* (*Freyana anatina largifolia*, Trouessart and Megnin, 1885; *Freyana largifolia largifolia*, Dubinin,

1950); *Freyana casarcae* (*Freyana largifolia casarcae*, Dubinin, 1950);
Freyana magnosetae, Dubinin, 1953 (*Freyana largifolia alopocheni*,
Dubinin, 1950); *Freyana secundus* (*Freyana largifolia sarkidiornis*,
Dubinin, 1950); *Freyana aythinae* (*Freyana largifolia aythinae*, Dubinin,
1951); *Freyana tadornae* (*Freyana largifolia tadornae*, Dubinin, 1950);
Freyana nettapina (*Freyana anatina nettapina*, Trouessart and Megnin, 1885;
Freyana australis nettapina, Dubinin, 1950); *Freyana dendrocygni* (*Freyana*
dendrocygni dendrocygni, Dubinin, 1950); *Freyana australis* (*Freyana*
australis australis, Dubinin, 1950); *Freyana celebensis* (*Freyana australis*
celebensis, Dubinin, 1950); *Freyana stictonettae* (*Freyana australis*
stictonettae, Dubinin, 1950); *Freyana plectropteri*, Dubinin, 1950; *Freyana*
undulativentris, Dubinin, 1950; *Freyana microchaeta*, Dubinin, 1950;
Freyana anserina, Trouessart and Megnin, 1884; *Freyana cairinae*, Dubinin,
1950; *Freyana turcata*, Dubinin, 1950; *Freyana furculasetae* (*Freyana*
dendrocygni furculasetae, Dubinin, 1950); *Freyana leucophrysi*, Dubinin,
1950; *Freyana lophodytes* (*Freyana anatina lophodytes*, Dubinin, 1950);
Freyana marmaronettae (*Freyana largifolia marmaronettae*, Dubinin, 1950);
Freyana subanatina, Dubinin, 1950; *Freyana cyanocheni* (*Freyana largifolia*
cyanocheni, Dubinin, 1950) and *Freyana alopocheni* (*Freyana anatina*
alopocheni, Dubinin, 1950).

This study confirms that the species of the genus *Freyana* are exclusive parasites of ducks, geese and swans (Anatidae; Anseriformes). Furthermore, it has been shown that the thirty-three species have two morphological forms of males which are designated as the homeomorph (ho) and the heteromorph (he). Specific ecological data regarding the microhabitat of these forms within individual feathers is lacking.

ACKNOWLEDGEMENTS

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INTRODUCTION

The superfamily Analgoidea (feather mites) is a diverse group of obligatory ectoparasites which inhabit the feathers of birds. Most commonly, these mites are found at specific sites along the barbs of the remiges of the wings and retrices of the tail. Fewer numbers of species are found within the quills of the flight feathers or on the downy feathers of the body. To date there have been over 1400 species of feather mites described which have been assigned to twenty-five families and numerous subfamilies (Gaud and Atyeo, 1978). Most major studies of feather mites in recent years have dealt with acarine systematics. To date there have been few comprehensive biological and ecological studies conducted on this group of arthropods.

The family Freyanidae Dubinin is currently subdivided into four subfamilies and sixteen genera. The four subfamilies include the Freyaninae Gaud and Atyeo, 1981, with eight genera; the Burhinacarinae Gaud and Atyeo, 1981, with four genera; the Diomedacarinae Gaud and Atyeo, 1981, with one genus; and the Michaeliinae Gaud and Mouchet, 1959 with three currently assigned genera.

Within the subfamily Freyaninae there are currently eight assigned genera. These include: *Allofreyana* Gaud and Atyeo, 1975, *Dobyella* Gaud and Atyeo, 1975, *Freyanopsis* Dubinin, 1950, *Halleria* Megnin and Trouessart, 1884, *Parafreyana* Cerny, 1969, *Pavlovskiana* Dubinin, 1950, *Pelecymerus* Gaud and Atyeo, 1975, and *Freyana* Haller, 1877. This study confirms the existence, within the genus *Freyana*, of thirty-three species of feather

mites. Data indicates that these mites are exclusively host specific on twenty-eight of the thirty-three avian genera currently assigned to the family Anatidae.

Species of *Freyana* are described and differentiated in this study by characteristics of their idiosoma, coxo-sternal skeleton, chaetotaxy and the structure of the tibia of legs II. Females of *Freyana* are of one morphological type but the males may be of two types : heteromorphic (he) and homeomorphic (ho). The heteromorphic male is generally larger and more heavily sclerotized. The setae are thicker and have greater dimensions and the tibia of legs II may be more developed dorsally. *Freyana* are bilaterally symmetrical with a widely rounded to oval shaped idiosoma.

Birds of the family Anatidae have a cosmopolitan distribution and although collections are limited, data suggests the zoogeography of the mites closely parallels that of their hosts. Additionally, while most species of *Freyana* are host specific at the generic level, there are instances of two or three species of *Freyana* on the same genus of bird. The usual degree of host specificity is one in which different species of mites are host specific at the generic level. Prior to this study the species of *Freyana* were poorly defined and incompletely illustrated. Recognition of the species was virtually impossible. Host specificities and locality data was incomplete. Dubinin's definition of the subspecies was exceptionally broad and consequently variability amongst species was lost.

In this study twenty-four species of feather mites belonging to the genus *Freyana* were identified, described and illustrated. Twenty-five of the subspecies, described by Dubinin (1950a, 1953), are elevated to the

species level. Numerous new host and locality records are included.

MATERIALS AND METHODS

Mites were obtained from the entomological collection at the University of Georgia, Athens, GA. Careful examination of 239 alcoholic vials of specimens, which had been collected from ornithological study skins belonging to the family Anatidae, revealed twenty-four of the thirty-three species in the *Freyana*. Nine species of mites described by Dubinin were not collected. Mites were removed from the vials, placed in lactophenol and subsequently heated to 100° C for twenty minutes. After clearing, the mites were mounted on microscope slides with Hoyer's mounting media and placed in a drying oven for 72 hours. After drying, the slides were labeled.

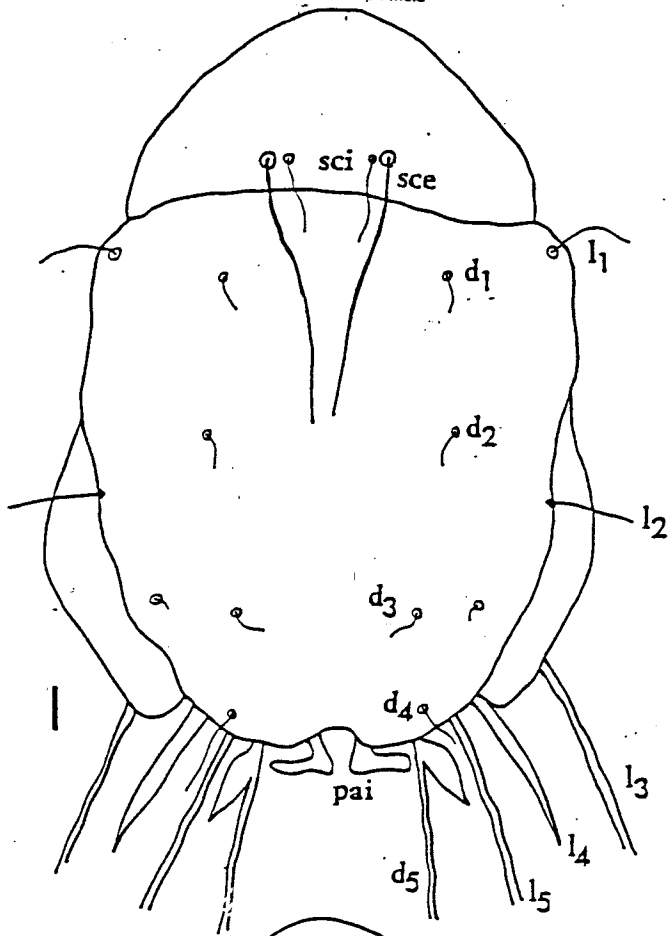
EXTERNAL MORPHOLOGY. (Figs. 1-4)

IDIOSOMAL CHAETOTAXY.

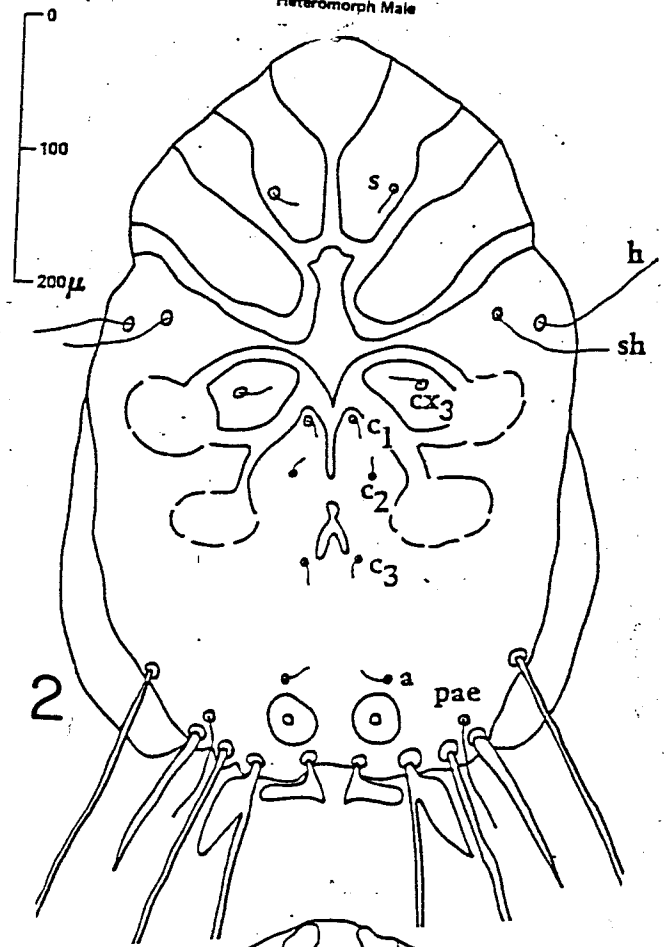
Dorsal idiosoma. The propodosma is generally uniform among the species of *Freyana* and between the sexes and is of little diagnostic value. The propodosomal shield has two pairs of setae associated with it: the external scapular (*sce*) and internal scapular (*sci*). These setae are setiform and *sce* is considerably longer than *sci*.

Diagrammatic representation of the dorsal and ventral idiosomal chaetotaxy of *Freyana anatina* (Koch, 1884). Fig. 1 : male, dorsal aspect. Fig. 2 : male, ventral aspect. Fig. 3 : female, dorsal aspect. Fig. 4 : female, ventral aspect.

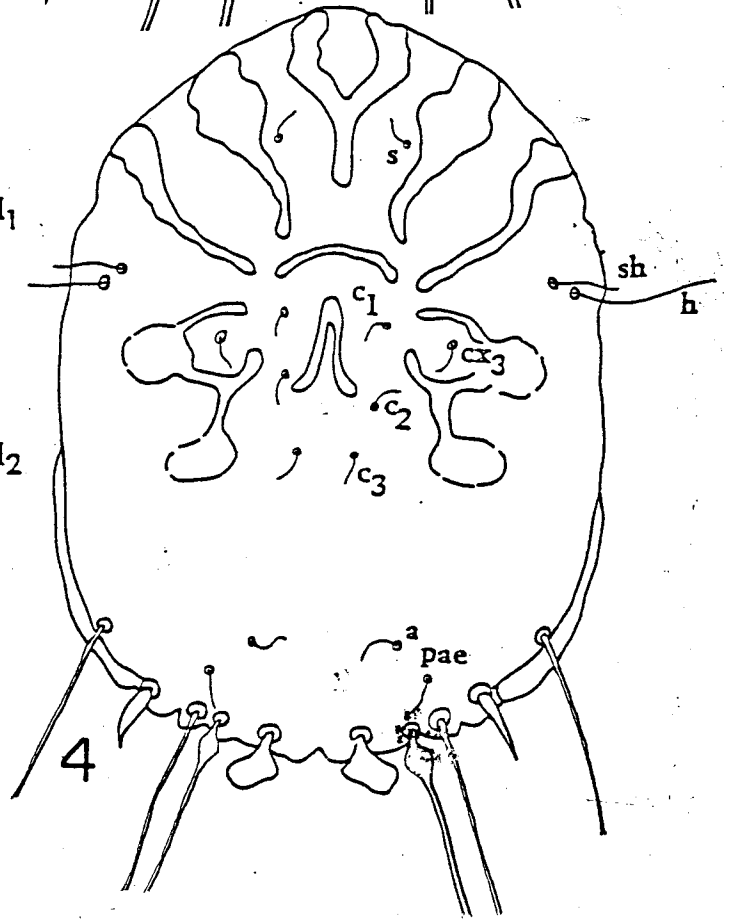
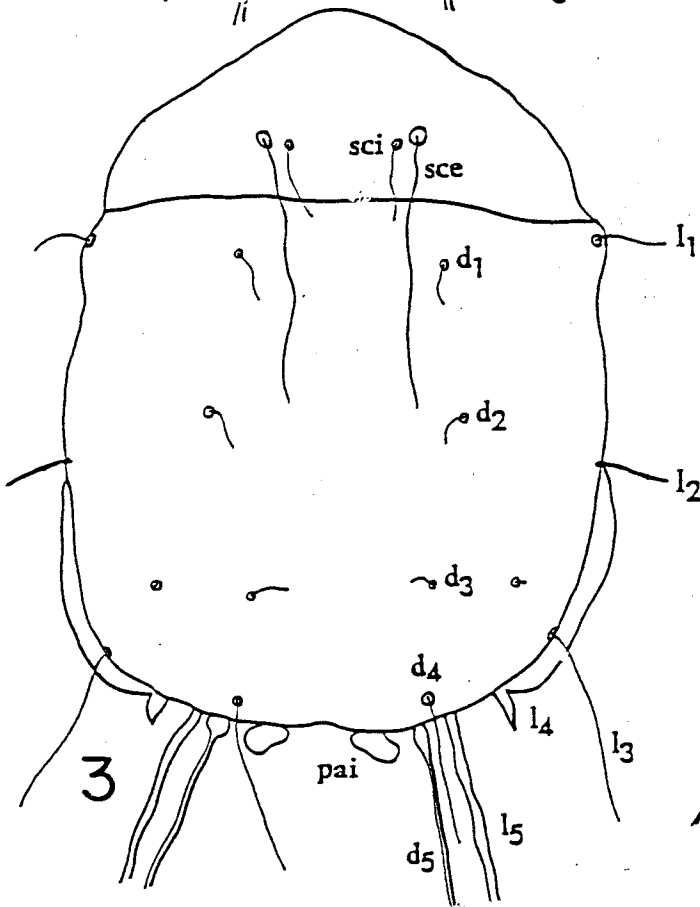
Heteromorph Male



Heteromorph Male



5



Female

Female

The propodosomal and hysterosomal shields are separated by a transverse suture which is well defined in most species. In some species it appears as a wider band of delicate striated integument. The hysterosomal shield has associated with it five pairs of dorsal setae ($d1 - d5$), five pairs of lateral setae ($l1 - l5$), and one pair of postanal interal setae ($Pa1$). The dorsal setae are all setiform and short with $d5$ being the longest in all cases except one. Setae $d1$, $d2$ and $d3$ originate on the dorsal shield away from the idiosomal border; $d4$ originates toward the terminal end above or slightly lateral to $d5$, which is located on the terminal end of the idiosoma. The lateral setae all originate on the lateral margin of the idiosoma. Setae $l1$, $l2$ and $l3$ are setiform and relatively long; $l4$ is lanceolate or petal-like and of variable dimensions while $l5$ is setiform and very long, occasionally with lateral membranous expansions. Setae $Pa1$ is of primary diagnostic value in determining species since it has a wide range of shapes and sizes within the genus.

Posterior to the transverse suture along the lateral edge of the hysterosoma are two pairs of setae: the humeral (h) and subhumeral (sh). They are setiform and of medium length, with sh always greater in length.

Ventral idiosoma. The structure of the epimerites and the coxo-sternal skeleton are another primary diagnostic character within the genus *Freyana*. Males are generally more sclerotized than the females and the heteromorphic males are more sclerotized than the homeomorphic males in those species where both are present. Each epimerite has an anterior and posterior branch and these isolate the coxal fields of the legs in varying shapes and degrees. Epimerites I are always fused medially in a Y-shaped

sternum of varying length. Epimerites II, IIA, III and IIIA are variable in length and degree of fusion.

There are seven pairs of ventral setae: the sternal setae (*s*), coxal field III setae (*cx3*), three pairs of central setae (*c1*, *c2*, *c3*), one pair of adanal setae (*a*) and one pair of post anal external setae (*Pae*). All of these setae are setiform and relatively short. The position of *Pae* varies among the species and the sexes while the position of the other six remains relatively constant.

The genitalia of the male are located at the midline at the level of legs III or IV. Two specialized cup structures, the adanal discs, are located posteriorly and serve to hold the opisthodorsal region of the female during copulation. The female genitalia are circumscribed by a crescentric pregenital apodeme. The genital opening appears as an inverted V posterior to the crescentric apodeme.

LEG CHAETOTAXY.

Each leg is composed of seven segments: coxa, trochanter, femur, genu, tibia, tarsus, and pretarsus. This study concentrates on the tibia, tarsus, and pretarsus of legs II due to the dorsal expansions on the tibia in the heteromorphic males. The dimensions and appearance of these expansions serve as a diagnostic characteristic in the genus *Freyana*. The tibia of leg II has two setae: *gT* small, setiform, paraxial and ϕ (phi) which is longer, setiform, and dorsally positioned. The tarsus of leg II has nine setae. Each of these setae are small and setiform. The solenidia

is *wa* and is dorsal. The remaining setae, *la* paraxial, *l* ventral, *d* dorsal, *r* paraxial, *e* antaxial, *s* ventral, *ba* dorsal and *ra* antaxial, are tactile. The pretarsus is expanded to form an ovoid ambulacrum which may or may not have an apical point.

SPECIES DESCRIPTIONS

Freyana anatina Megnin et Trouessart
(Figs. 5-10)

Megnin et Trouessart, 1884b, Journ. Microgr., 8(2) : 99-100
(*Freyana anatina anatina*, heteromorph male; *Freyana anatina simplex*, homomorphic male).

Trouessart et Megnin, 1885, Bull. Soc. Angers, 14 : 37, fig. 5.

Ginetzinskaya, 1942, Acad. Sciences USSR, 37(4) : 170-173.

Ginetzinskaya, 1949, Scientific Notes of Leningrad State Univ., Problems of Ecol. Parasit., 19(4) : 92, 103-107.

Dubinina, 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb., 12 : 22-23, fig. 21,27.

Dubinina, 1951a, Fauna of the USSR, 6(5) : 1-363, fig. 10.

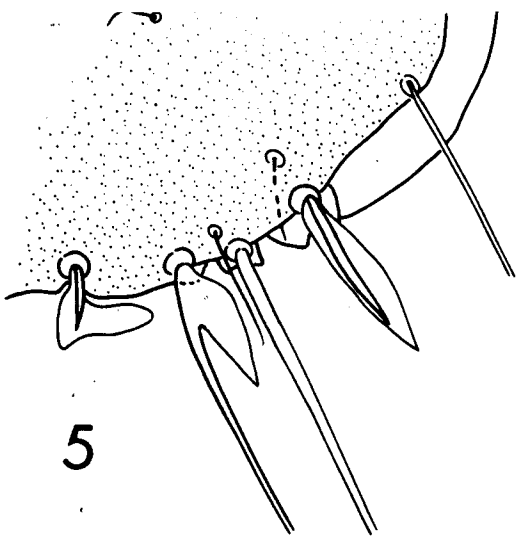
Dubinina, 1951b, Parazit. Sb., 13 : 211, 214.

Radford, 1953, Parasitology, 42 (3-4) : 199.

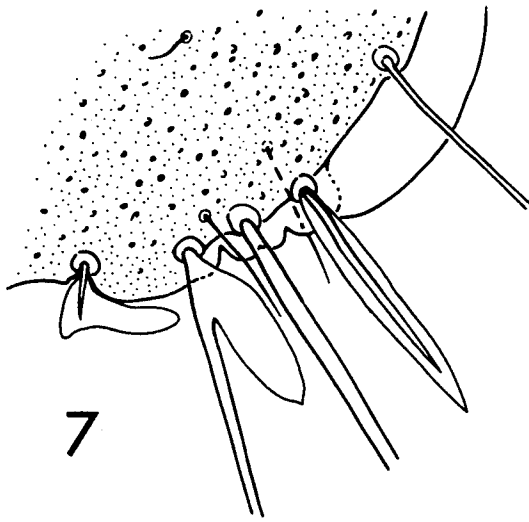
Dubinina, 1953, Fauna of the USSR, 6(6) : 251-52, fig. 100.

In this species there are two morphological types of males and one female type. The males differ in the structure of the tibia of legs II, the appearance of the coxo-sternal skeleton, the width of the lateral hysterosomal membranes and the shape of the caudal setae. In the heteromorphic male the tibia of leg II is widely expanded dorsally and truncate at the tip, with a horn-like projection in the mid-region. In the homeomorphic male, the tibia of leg II is slightly expanded dorsally forming a much smaller expansion that is pointed on the tip. The coxo-sternal skeleton is more developed in the heteromorph than the homeomorph with a greater fusion of the epimera of legs I, II, III, & IV. The lateral

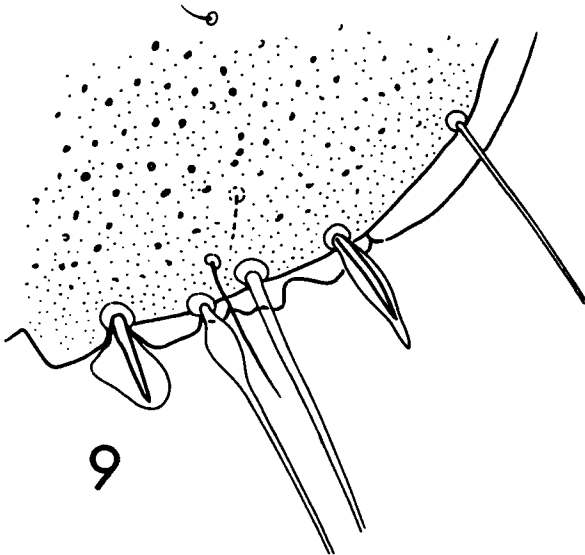
Freyana anatina (Koch, 1884). Fig. 5 : homeomorphic male terminal setae. Fig. 6 : tarsus of leg II, homeomorphic male. Fig. 7 : heteromorphic male terminal setae. Fig. 8 : tarsus of leg II, heteromorphic male. Fig. 9 : female, terminal setae. Fig. 10 : tarsus of leg II, female.



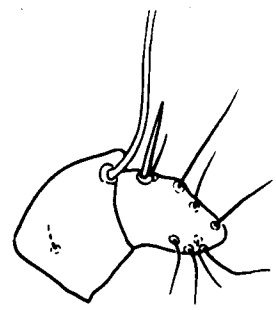
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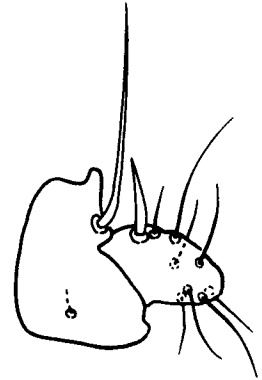


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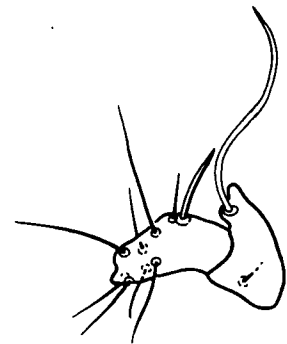


11

6



8



10

100μ

♂

100μ

♀

hysterosomal membranes are one and one half times wider in the heteromorph. The caudal setae are larger in the heteromorph than in the homeomorph, with *Pa2* wider and more tapered. In the heteromorph the lateral expansions of *d5* are large and more rounded than in the homeomorph. Additionally, setae *l4* is longer and wider in the heteromorphic male.

This species is found on ducks of the genus *Anas* (Linnaeus), the species of which have a cosmopolitan distribution. The mites are localized on the first ten primary feathers and the upper wing covert feathers.

Male. Heteromorph. Length (including gnathosoma) 630 μ , width 370 μ . Idiosoma widely oval; lateral hysterosomal membranes wide, width 30 μ , extending from level of leg III to setae *l4*. *Dorsal idiosoma* : Propodosomal shield granular in appearance anterior to setae *sci*; transverse suture present; setae *d1* at same level as setae *h* and *sh*; setae *d2* between level of legs III & IV; setae *d3* just anterior to level of setae *l3*. Hysterosomal shield granular in appearance over entire surface with small unevenly spaced lacunae from level of legs IV to terminal end. Setae *d4* long, setiform, length 70 μ , origin at border of hysterosomal shield between setae *d5* and *l5*; *l3* long, setiform; *l4* straight, lanceolate, length 113 μ ; *l5* long, setiform, slight outer expansion at base tapering distally; *d5* thin, long with narrow, rounded leaf-like lateral expansion in the base, expansion length 62 μ . Setae *Pa2* boot-shaped with wide lateral and narrow medial membranes, length 29 μ , width 48 μ . *Ventral idiosoma* : strongly sclerotized coxo-sternal skeleton, epimerites I fused into a long sternum; closed coxal field I; epimerites II and IIA fused; closed coxal field II; epimerites III and IIIa fused; oval coxal field III; medial sclerite present, anterior to the genital organ resulting in an enclosed assymetrical center. Setae *Pae*

setiform, located anterior to base of setae *l4*. Genital organ at level of base of legs IV.

Male. Homeomorph. Length (incl. gnathosoma) 635 μ , width 400 μ . Lateral hysterosomal membrane, width 26 μ , extending from level of leg IV to setae *l4*. *Dorsal idiosoma*: As in heteromorph, appears granular overall without small lacunae. Setae *d4* thin, setiform, length 48 μ , positioned at border of hysterosomal shield above base of setae *l5*. Setae *l3* long, thin, setiform; *l4*, length 70 μ , straight, lanceolate; *l5* long, very thin with slightly thickened base; *d5* long, very thin with narrow, tapered, pointed leaf-like lateral expansion in the base. Setae *Pa2* boot shaped, length 29 μ , width 38 μ . *Ventral idiosoma*: Weakly sclerotized coxo-sternal skeleton, epimerites I fused into short sternum, open coxal field I. Epimerites II and IIA not fused, slightly curved at end, open coxal field II. Epimerites III, IIIA and IV fused. Genital organ just below level of base of legs IV. Overall idiosoma pigmentation lighter due to decreased sclerotization. Setae *Pae* setiform, short, originating above base of setae *l4*.

Female. Length (incl. gnathosoma) 640 μ , width 470 μ . Idiosoma widely oval, rounded posteriorly, slightly tapered anteriorly. Lateral hysterosomal membranes very narrow extending from level of legs IV to setae *l4*. *Dorsal idiosoma*: propodosomal shield granular, anterior to setae *sci* with smooth region posterior to level of *d1*. Region from level of *d1* posterior to terminal end, granular in appearance with large evenly spaced lacunae from level of *l3* to caudal end. Setae *d1*, *d2*, *d3* short, setiform; *d4* long, thin, originating at posterior end of hysterosomal shield between setae *l5* and *d5*. Setae *l3* long, thin; *l4* straight, lanceolate, relatively short, length 50 μ ; *l5* long, very thin, thicker in the base; *d5* shorter than

15, very thin with double-sided membranes in the base, slightly wider medially. Setae *Pai* of very characteristic shape with double-sided membranes around shaft of the setae resulting in "oar-like" shape. *Ventral idiosoma* : Epimerites I fused into a short sternum, coxal field I open, epimerites II straight with small inward curved sclerite at tip; epimerites IIA straight, thick, with coxal field II open. Epimerites III and IIIA in C-shaped configuration, with coxal field III open. Epimerites IV fused to IIIA. Epigynium at level of setae *h* and *sh*. Setae *Pae* relatively short, positioned above setae 15.

Material examined - Type host: From Anas platyrhynchos platyrhynchos (Linnaeus): 2 he, 5 ho males, 6 females, Nagykanizsa, Hungary, 4-II-1954, (UGA 7726); 1 he, 5 ho males, 5 females, Bering Island, Commander Islands, 30-IV-1912, (AMNH 731666, UGA 8362).

Additional material: From Anas acuta: 2 he, 1 ho males, 2 females, Colorado County, Texas (NU 1713); 3 ho males, 4 females, Bharatpur, Rajasthan, India (YSU 1044); 2 ho males, 2 females, Bering Island, Commander Islands; 5 he, 2 ho males, 5 females, Bharatpur, Rajasthan, India, (UGA 6303); 1 ho males, 6 females, Bharatpur, Rajasthan, India, (UGA 6297); 6 he, 1 ho males, 5 females, Bharatpur, Rajasthan, India, (UGA 6307). From *Anas carolinensis*: 1 he, 1 ho males, 7 females, Paso Real Ranch, Willacy County, Texas (DM 79, NU 1038); 1 ho male, Paso Real Ranch, Willacy County, Texas (NU 1039). From *Anas clypeata*: 1 ho male, 1 female, Port Clinton, Ottawa County, Ohio (Cleve.#25031, UGA 8685). From *Anas crecca crecca*: 1 he male, 1 female, Bharatpur, Rajasthan, India (UGA 882); 2 ho males, Bharatpur, Rajasthan, India, (UGA 6682); 5 he, 2 ho males, 2 females, Bharatpur, Rajasthan, India, (UGA 6702); 5 females, Wharphill, New Brunswick (AMNH

424204, UGA 8357); 3 he, 3 ho males, 4 females, Ukinawa, Loochoo Islands (AMNH 732255, UGA 8576); 3 he, 2 ho males, 3 females, El Saihiya, Sharqiya, Egypt (AMNH 424202, UGA 8577). From *Anas diazi*: 3 ho males, 5 females, Mexico City, Mexico (AMNH 54124, UGA 8358); 2 ho males, 4 females, South Hatch, New Mexico (AMNH 749712, UGA 8359). From *Anas discors*: 1 ho male, Imperial, Nebraska (610905-2). From *Anas erythrorhyncha*: 2 ho males, 3 females, Lepehepe, Bechuanaland, South Africa (NU 2106); 1 female, Tsessebe, Bechuanaland, South Africa (NU 3881); 1 he, 1 ho males, 1 females, Lochnivar Ranch, North Monze, Rhodesia, (NU 4061). From *Anas fulvigula*: 1 ho male, 1 female, Everglades, Florida (AMNH 749726, UGA 8360); 1 ho male, 4 females, Everglades, Florida (AMNH 749727, UGA 8361). From *Anas platyrhynchos* *platyrhynchos*: 1 ho male, 1 female, Myannis, Nebraska (610909-1); 1 he, 2 ho males, 1 female, Varaszlo, Hungary (UGA 7727); 1 he, 1 ho males, Tornyiszentmiklos, Hungary (UGA 7728). From *Anas rhyncotis*: 1 female, Queensland, Australia (AMNH 732788, UGA 8567); 1 ho male, Queensland, Australia (AMNH 732787, UGA 8571). From *Anas rubripes*: 3 he, 7 ho males, 4 females, Bharatpur, Rajasthan, India, (UGA 6831); 3 he, 4 ho males, 1 females, Bharatpur, Rajasthan, India, (UGA 6834). From *Anas strepera*: 2 ho males, 1 female, Currituck Sound, Currituck County, North Carolina (AMNH 749739, UGA 8196); 1 he, 1 ho males, 2 females, Pea Island, North Carolina (AMNH 749744, UGA 8197). From *Anas superciliosa*: 8 females, Cherbourg, S.E. Queensland, Australia (UGA 10,138). From *Anas undulata*: 2 ho males, Isis Estates, Bononi, Transvaal, Africa (NU 4079). From *Anas* (=Mareca) *penelope*: 1 he, 4 ho males, 4 females, Rajasthan, India (YSU 1036); 2 he males, 2 females, Linchuan, Anhwei, China (NU 1709); 5 he, 7 ho males, 6 females, Naestved, Zealand, Denmark (USNM 424371, UGA 2894). From *Chaulelasmus*

streperus: 2 females, Mobile Bay, Alabama (USNM 260179, UGA 2893). From *Anas (=Mareca) americana*: 1 ho male, 3 females, Lake Dallas, Texas (NU 1030); 4 he, 1 ho males, 9 females, Eagle Lake, Texas (NU 1710).

Freyana dendronessae Dubinin
(Figs. 11, 12)

Dubinin, 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb., 12 : 23, fig. 2, 10-12.

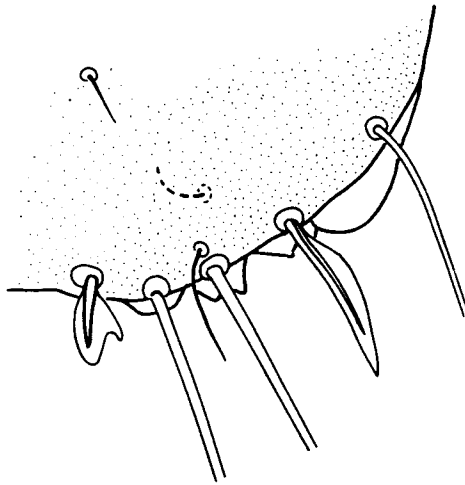
Dubinin, 1953, Fauna of the USSR, 6(6) : 253-54, fig. 101.

In this species are found both the homeomorphic and heteromorphic male. Sufficient number of male specimens of this species have not been collected, however a good description is found in Dubinin's *Fauna of the USSR (1953)*. The females of this species resemble the type species in overall idiosoma form with differences noted in epimerites III and IIIA and setae *Pai* and *14*.

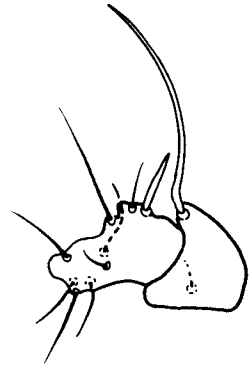
Freyana dendronessae inhabits the primary feathers and upper wing coverts of the duck *Dendronessa (=Aix) galericulata* (Linnaeus). This host has a distribution in Asia.

Female. Length (incl. gnathosoma) 540 μ , width 340 μ . Idiosoma widely oval, tapered anteriorly, slightly rounded posteriorly. Lateral hysterosomal membranes narrow, slightly rounder posteriorly, extending from bottom of base of legs IV to setae *14*, maximum width 17 μ . *Dorsal idiosoma* : Propodosomal shield granular in appearance over entire surface; transverse suture well defined. Hysterosomal shield granular in appearance over entire surface. Setae $\sigma 3$ short, setiform, located closer to midline than in the

Freyana dendronessae (Dubinin, 1950). Fig. 11 : female, terminal setae. Fig. 12 : tarsus of leg II, female.



11



12

100 μ



anatina species; *d4* setiform, very thin, positioned on border of hysterosomal shield just anterior to setae *15*. Setae *13* long, setiform, length 198 μ ; *14* lanceolate, slightly curved inward, length 71 μ . Setae *15* and *d5* long, setiform with narrow membranes at the base. Setae *Pai* are double tipped; the inner blade through which passes the shaft of the setae is rounded, narrow and pointed; the outer blade is shorter, narrow and pointed. *Ventral idiosoma* : Epimerites I fused into a short sternum; open coxal field I. Epimerites II and IIA bend around at tip to nearly close coxal field II. Epimerites III and IIIA in a ring shape, nearly close coxal field III. Epimerites IV fused to epimerites IIIA. Epigynium semicircular at level of setae *d1*. Setae *Pae* thick, short, setiform, well above and slightly lateral to origin of setae *15*.

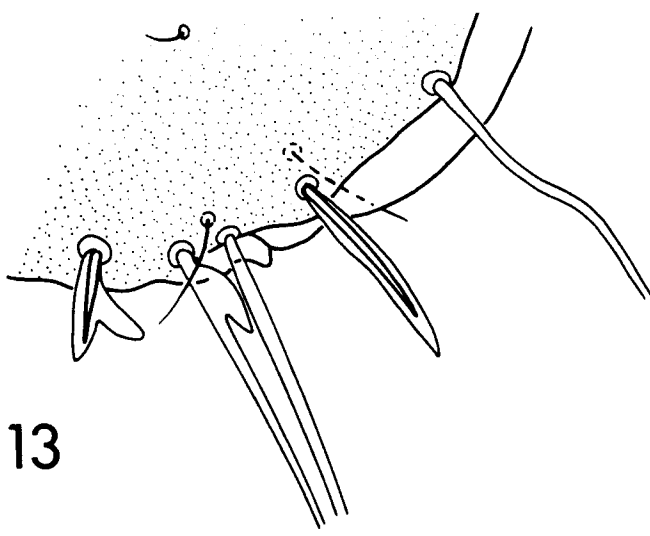
Material examined - *Type host* : From *Dendronessa galericulata* : 11 females, 3 N, Songdo, Korea, 7-IV-1930, (UGA 2890, USNM 317815).

Freyana procerocrus Dubinin
(Figs. 13-18)

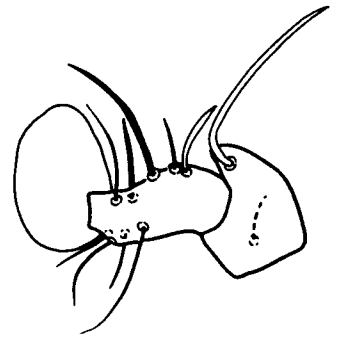
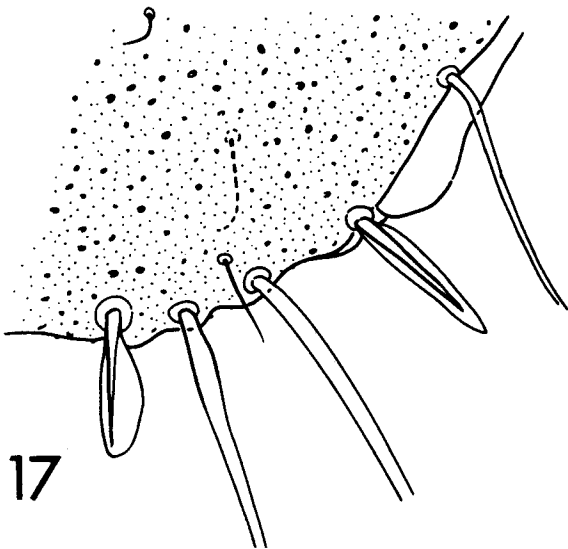
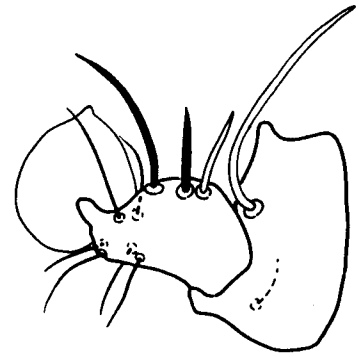
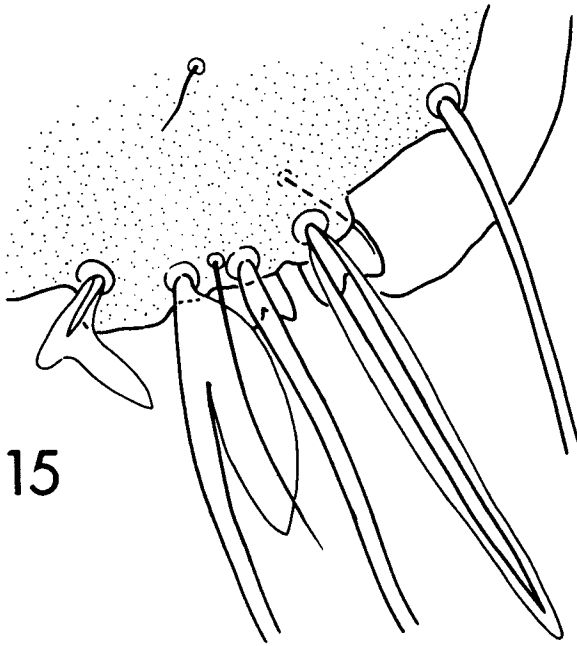
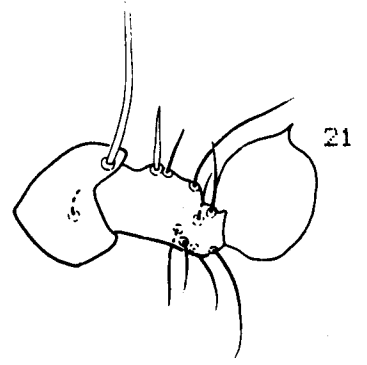
Dubinin, W. B., 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb., 12 : 23-25, fig. 4, 1-2.

In this species the males are dimorphic and the females are of one type. The males are differentiated by the degree of sclerotization of the idiosoma, the degree of fusion of the epimera, the shape and relative size of the caudal setae and the tibial expansions on legs II. The homeomorphic male is not as well developed in any of the above characteristics as the heteromorphic male. The female resembles the typical form with differences noted in the shape of *Pai*, epimerites II and IIIA, and overall idiosoma

Freyana procerocrus, Dubinin, 1953. Fig. 13 : homeomorphic male, terminal setae. Fig. 14 : tarsus of leg II, homeomorphic male, terminal setae. Fig. 15 : heteromorphic male, terminal setae. Fig. 16 : tarsus of leg II, heteromorphic male. Fig. 17 : female, terminal setae. Fig. 18 : tarsus of leg II, female.



100μ



shape.

This species inhabits the primary feathers and upper coverts of the wings of the Egyptian goose - *Alopochen aegyptiaca* (Linnaeus). In his publication, Dubinin (1950a) described only the homeomorphic form of this species. In this paper the additional morphological types similar to other *Freyana* species are described and illustrated.

Male. Heteromorph. Length (incl. gnathosoma) 700 μ , width 450 μ . Idiosoma large, egg-shaped, heavily sclerotized, robust appearance. Lateral hysterosomal membranes wide, rounded, from level of top of base legs III to just beyond base of *I4*, width 44 μ . Large, truncate, dorsal tibial expansions on legs III, with pointed horn-like expansion, width 37 μ . Genu of legs II also weakly expanded dorsally. *Dorsal idiosoma* : Propodosomal shield granular in appearance anterior to setae *sci*. Transverse suture well defined; hysterosomal shield granular in appearance over entire surface posterior to *d1*. Setae *d4* positioned just medial to origin of setae *I5*; setae *d4* long, thin, length 106 μ . Setae *d5* relatively thick, setiform with narrow, pointed, lateral leaf-like expansions at the base. Setae *I3* long, setiform, slightly wider at the base; setae *I4*, long, straight, lanceolate, length 174 μ . Setae *I5* long, thick, setiform; *Pa2* boot shaped, tip of the boot angled away from the idiosoma at 35° - 40° angle, length 38 μ , width 48 μ . *Ventral idiosoma* : Strongly developed coxo-sternal skeleton. Epimerites I fused into a long sternum, closed coxal field I; epimerites II and IIIA fused, closed coxal field II; epimerites III and IIIA fused into a closed oval shaped coxal field III; epimerites IV fused to IIIA. Additional medial sclerites present anterior to genital organ developing an enclosed asymmetrical sternum. Setae *Pa2* thin, setiform, originating anterior to

setae *l4*.

Male. Homeomorph. Length (incl. gnathosoma) 650 μ , width 440 μ .

Idiosoma oval, tapered anteriorly, rounded posteriorly. Lateral hysterosomal membranes narrow from level of bottom of base legs III to setae *l4*, width 18 μ . Tibia of legs II are slightly expanded dorsally, pointed on tip, width 10 μ . *Dorsal idiosoma*: Propodosomal shield weakly sclerotized, finely granular in appearance, anterior to setae *sci*. Transverse suture well defined; hysterosomal shield weakly sclerotized, finely granular overall, with small lacunae around the entire border. Setae *d4* very thin, positioned at border of hysterosomal shield between *l5* and *d5*, length 26 μ ; *d5*, thin, long, setiform with small pointed, leaf-like expansion at the base, expansion length 38 μ , width 10 μ ; *l3* thin, setiform; *l4* lanceolate, short, length 81 μ ; *l5* long, thick, setiform, wider at the base; *Pa2* uniquely shaped with a two-bladed pitchfork appearance, setal shaft passes through the inner membrane and both membranes are pointed and rounded, length 43 μ , width 23 μ . *Ventral idiosoma*: Weakly sclerotized, epimera I fused into long sternum, open coxal field I; epimerites II and IIA straight, slightly curved at tip, coxal field II open. Epimerites III and IIIA in an oval shape, coxal field III open. Epimerites IV fused to IIIA. Setae *Pa2* long, thin, setiform, anterior to *l4*.

Female. Length (incl. gnathosoma) 640 μ , width 460 μ . Hysterosomal membranes wide, extend from bottom of base of legs III to setae *l4*, width 36 μ . *Dorsal idiosoma*: Propodosomal shield granular in appearance over entire surface; transverse suture well defined; hysterosomal shield has a coarse bumpy appearance over entire surface. Setae *d4* short, thin, positioned at border just above setae *l5*; *d5* and *l5* long, thick, setiform;

I4 lanceolate, length 68 μ ; *I3* thin, setiform; *Pa2* lanceolate, with rounded outer edge, length 58 μ . *Ventral idiosoma* : Epimera I fused into short sternum, open coxal fields I; epimerite II bend toward IIA at tip as does IIIA curve towards III, open coxal fields II and III; epimerite IV fused to IIIA. Setae *Pa2* relatively long, thick, length 38 μ .

Material examined - *Type host* : From *Alopochen aegyptiaca* : 1 he male, 2 females, Nairobi, Kenya, 9-IX-1921, (AMNH 202524, NU 5612); 2 he, 2 ho males, 4 females, 3 N, Plains of Kilimanjaro, Kenya, 22-VIII-1888, (USNM 117773, NU 9534); 1 he, 2 ho males, 6 females, Hoache River, Southern Ethiopia, 11-III-1915, (AMNH 731270, UGA 8613).

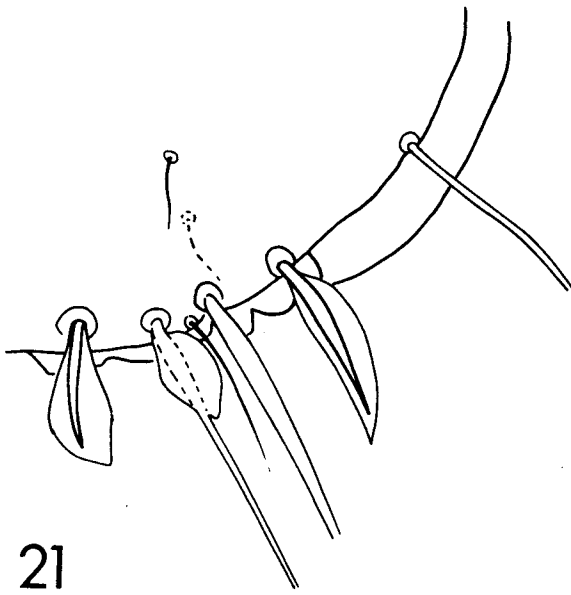
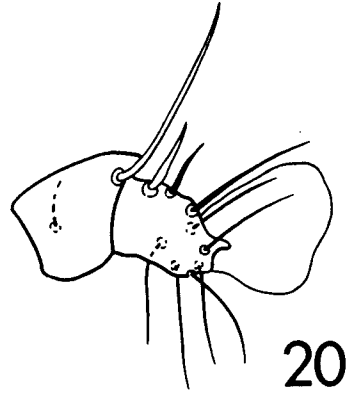
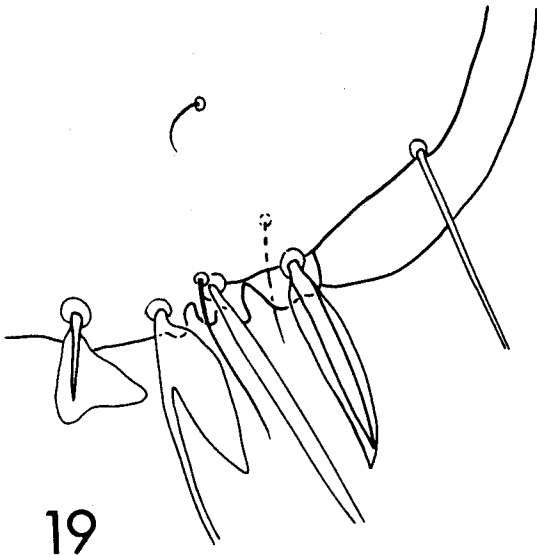
Additional material : From *Alopochen aegyptiaca* : 1 he male, Dana River, Maica Murry, North Kenya, 8-XI-1951, (NU 8354 [BMNH]); 1 he male, 8 females, 1 N, Sotik District, Kenya, 23-VI-1909, (USNM 213876, NU 9533); 1 female, Shendi, Northern Province, Sudan, 18-III-1901, (AMNH 731280, UGA 2424); 1 female, Sennar, Blue Nile Province, Sudan, 17-IX-1850, (AMNH 731282, UGA 2425); 1 female, West Somaliland, 20-IX-1894, (AMNH 731278, UGA 2426).

Freyana sarkidiornis Dubinin
(Figs. 19-21)

Dubinin, W. B., 1950a, Akad. Nauk USSR, Zool. Inst., Parazit. Sb., 12 : 25, fig. 2, 6-9.

Only one type of male and female is known to exist in this species. This mite parasitizes on the primary wing feathers and the upper coverts of the bird *Sarkidiornis melanotos* Pennant. The range of this bird covers...

Freyana sarkidiornis (Dubinin, 1950). Fig. 19 : homeomorphic male, terminal setae. Fig. 20 : tarsus of leg II, homeomorphic male. Fig. 21 : female, terminal setae.



100μ

Africa and parts of southern Asia.

Male. Homeomorph. Length (incl gnathosoma) 650 μ , width 420 μ . Weakly sclerotized, rounded oval idiosoma. Lateral hysterosomal membranes from the base of legs III to setae 14, width 26 μ . Small, pointed dorsal expansion on tibia legs II. *Dorsal idiosoma* : Propodosomal shield granular in appearance anterior to setae *sce*; transverse suture well defined; hysterosomal shield granular overall. Setae *d4* long, thin, positioned at hysterosomal border just above setae 15, length 60 μ ; setae *d5* long, thin, setiform, wider at the base with pointed leaf like growth laterally at the base. Setae *Pai* rounded triangular shape, length 43 μ , width 31 μ . Setae 13 thick, setiform; 14 lanceolate; 15 thick, setiform, slightly wider at the base. *Ventral idiosoma* : Moderately developed coxo-sternal skeleton; epimerites I fused into sternum; II and IIA straight with coxal fields I and II open. Epimerites III and IIIA fused into ring shape, IV fused to IIIA; closed coxal field III. Setae *Pae* short, setiform, originates anterior to 14.

Female. Length (incl. gnathosoma) 660 μ , width 440 μ . Large oval idiosoma; thin, lateral hysterosomal membranes from top of base legs IV to setae 14, width 24 μ . *Dorsal idiosoma* : Propodosomal shield granular in appearance anterior to *sce*; transverse suture well defined; hysterosomal shield coarsely granular overall. Setae *d4* long, thin, positioned on hysterosomal shield border between 15 and *d5*, length 68 μ ; *d5* long, thin, setiform, with oval leaf-like expansion in the base, length 34 μ , width 21 μ . Setae 13 long, thin; 14 curved, lanceolate, length 77 μ ; 15 long, thin, wider at the base; *Pai* lanceolate, length 58 μ , width 23 μ . *Ventral idiosoma* : Epimerites I fused into a short sternum; epimerites II straight with a sharp

bend at the tip; IIA straight; III and IIIA curve towards each other; IV fused to IIIA; coxal fields I, II and III open. Setae *Pae* relatively long, thin, positioned anterior to *I5*.

Materials examined - Type host : From *Sarkidiornis melanotos* : 5 ho males, 10 females, 2 N, Tsessebe, Bechuanaland, South Africa, 2-I-1956, (NU 3898); 2 ho males, Kyabé District, South Chad Territory, French Equatorial Africa, 15-V-1952, (USNM 9535, NU 9535); 5 ho males, 3 females, Bharatpur, Rajasthan, India, 3-X-1969, (UGA 6375).

Freyana obliquasetae Dubinin
(Figs. 22-26)

Dubinin, W. B., 1950a, Akad. Nauk USSR, Zool. Inst., Parazit. Sb., 12 : 26-27, fig. 3, 1-6.

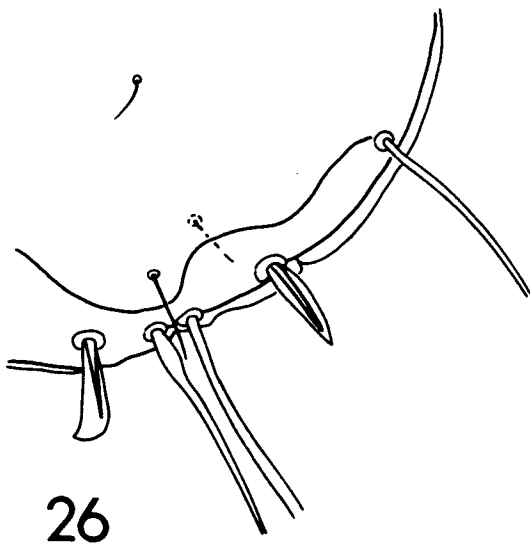
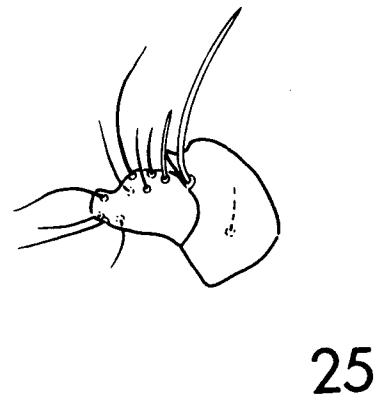
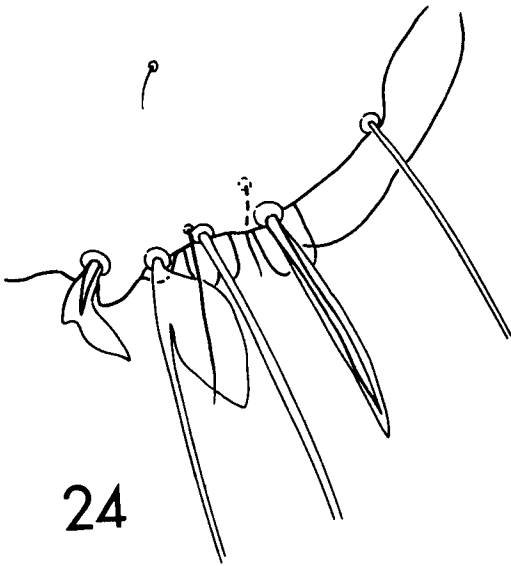
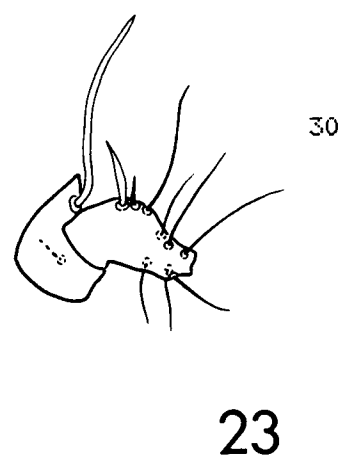
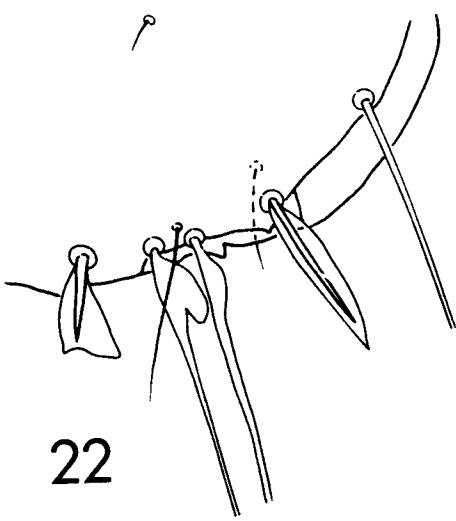
Dubinin, W. B., 1951b, Parazit. Sb., 13 : 211-14.

Dubinin, W. B., 1953, Fauna of the USSR, 6(6) : 254-55, fig. 102.

In this species the males are dimorphic and there is one type of female. These mites closely resemble the type species with differences noted in the shape of the caudal setae and the tibial expansions of leg II. This species is host specific on the duck genus *Tadorna* Fleming. These ducks have a distribution extending throughout Europe, Asia, North America, and some Pacific Islands.

Male. Heteromorph. Length (incl. gnathosoma) 570 μ , width 380 μ . Idiosoma widely oval; hysterosomal membranes from base of legs III to setae *I4*, width 28 μ . Tibial expansions legs II well-developed dorsally, rounded at tip, with horn-like growth, width 24 μ . *Dorsal idiosoma* : Propodosomal shield granular in appearance over entire surface; transverse suture well

Freyana obliquasetae (Dubinin, 1950). Fig. 22 : homeomorphic male, terminal setae. Fig. 23 : tarsus of leg II, homeomorphic male. Fig. 24 : heteromorphic male, terminal setae. Fig. 25 : tarsus of leg II, heteromorphic male. Fig. 26 : female, terminal setae.



100μ



defined; hysterosomal shield granular in appearance over entire surface, posterior to *d1*. Setae *d4* setiform, long, relatively thick, positioned on border of hysterosomal shield just above and medial to *I5*, length 76 μ . Setae *I3* thick, setiform; *I4* lanceolate, curved slightly medially, length 101 μ ; *I5* very long, thick, setiform. Setae *d5* long, thinner than *I5*, with rounded, lateral, leaf-like expansion at the base, expansion length 60 μ , width 27 μ . Setae *Pa2* boot-shaped, the tip slanted away from the idiosoma. *Ventral idiosoma* : Coxo-sternal skeleton strongly developed; all coxal fields closed and epimera fused as in previous heteromorph males; enclosed center is asymmetrical. Setae *Pae* is thin, setiform, positioned anterior to *I4*.

Male. Homeomorph. Length (incl. gnathosoma) 600 μ , width 390 μ . Idiosoma widely oval; hysterosomal membranes narrow, from bottom of base legs III to setae *I4*, width 17 μ . Leg II tibial expansions weakly developed, pointed in the tip, width 10 μ . *Dorsal idiosoma* : Propodosomal shield granular overall; transverse suture well defined; hysterosomal shield covered with small flat lacunae and coarsely granular overall. Setae *d4* very thin, setiform, relatively short, positioned on hysterosomal border above and just medial to setae *I5*; *I3* thin, setiform; *I4* lanceolate, slightly curved at tip, length 71 μ ; *I5* long, thick, setiform, wider in the base. Setae *d5* setiform with small, pointed, lateral leaf like expansion in the base, expansion length 54 μ , width 26 μ . The origins of *d5* and *I5* are drawn closer together than usual. Setae *Pa2* have two sharply pronounced pointed tips, the lateral expansion is wider and more rounded, length 42 μ , width 23 μ . *Ventral idiosoma* : Epimerites I fused into sternum, coxal field I open; II and IIA straight with curved tips, coxal field II open; III and

IIIA in an oval shape, not fused, coxal field III open; IV fused to IIIA. Setae *Pae* thin, setiform, positioned anterior to setae *I4*.

Female. Length (incl. gnathosoma) 630 μ , width 400 μ . Idiosoma widely oval; hysterosomal membranes very narrow from bottom of base legs III to setae *I4*. Tibial expansions legs II slightly developed, pointed at tip, width 10 μ . *Dorsal idiosoma*: Propodosomal shield granular in appearance over entire surface; transverse suture well defined; hysterosomal shield granular in appearance over entire surface with numerous small flat lacunae from level of legs IV to posterior. Setae *d4* at border of hysterosoma, short, very thin, positioned anterior to and between *I5* and *d5*; *I3* very thin, setiform, relatively short; *I4* short, lanceolate, length 42 μ ; *I5* and *d5* thin, relatively short, setiform, wider at the bases; *Pai* lanceolate, rounded tip, curved medially at tip, length 40 μ . *Ventral idiosoma*: All coxal fields open; epimerites I fused into a short sternum; II straight with curve at tip; IIA straight; III and IIIA in C-shaped configuration; IV-fused to IIIA. Setae *Pae* short, setiform, positioned well anterior to and between setae *I4* and *I5*.

Material examined - type host: From *Tadorna tadorna*: 2 females, Mongolia, 26-V-1922, (AMNH 205234, UGA 2432). From *Tadorna radjah radjah*: 1 ho male, 3 females, 1 N, Ceram Island, S. Moluccas, Indonesia, 25-VIII-1911, (UGA 3377); 1 he male, New Guinea, 15-IV-1931, (AMNH 467448, NU 5613).

Additional materials: From *Tadorna tadorna*: 5 females, Sarpa Lakes, Stalingrad, Russian SFSR, 5-V-1909, (AMNH 40777632, UGA B621). From *Tadorna radjah radjah*: 3 females, Halmahera Island, Moluccas, Indonesia, 15-IV-1931, (AMNH 467447, UGA 3378); 1 he male, Arfak Mts., New Guinea,

15-V-1931, (AMNH 731486, NU 5614).

freyana nyrocae Dubinin
(Figs. 27-30)

Dubinin, W. B., 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb., 12 : 27-28, fig. 2, 1-5.

Dubinin, W. B., 1951b, Parazit. Sb., 13 : 212-14.

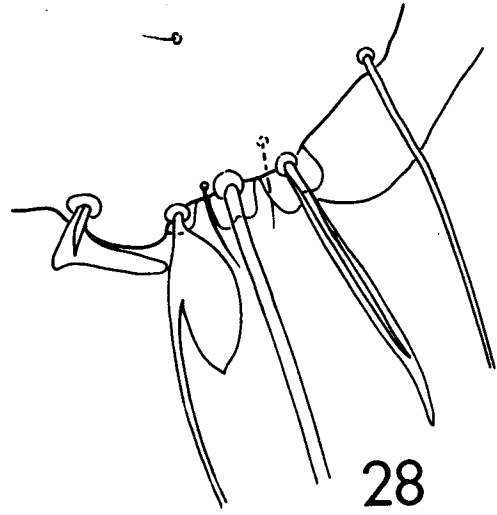
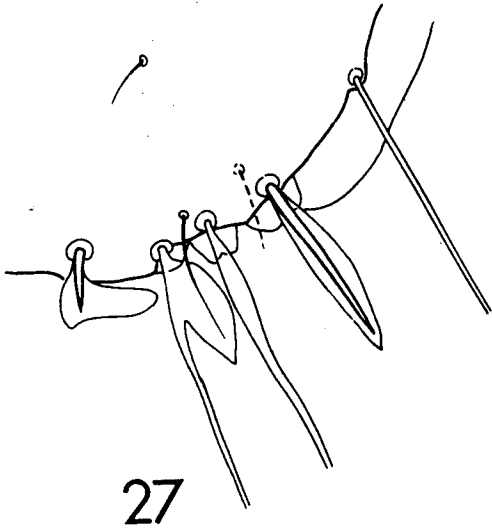
Radford, C. D., 1953, Parasitology, 42 (3-4) : 199.

Dubinin, W. B., 1953, Fauna of the USSR, 6(6) : 256-57, fig. 90, 91, 103.

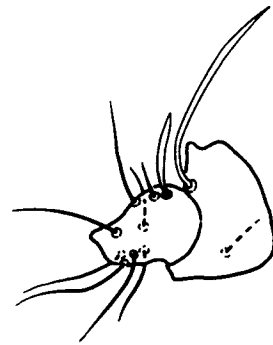
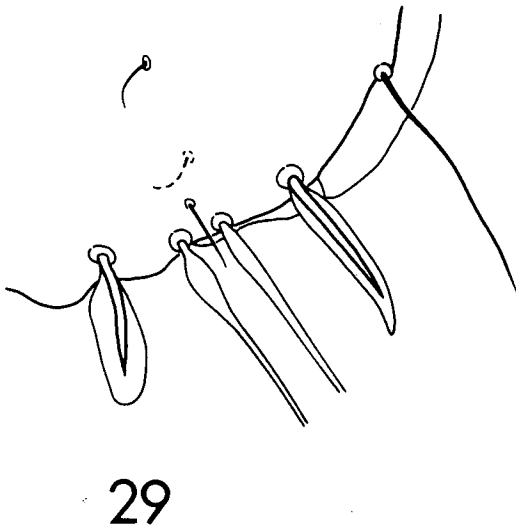
This species has two types of males and one female and closely resembles the type species with slight differences in the shape and size of the caudal setae and the extent of development of the tibia of legs II. This species is recorded from ducks assigned to the genera *Netta* Kaup and *Aythya* Boie.

Male. Heteromorph. Length (incl. gnathosoma) 540 μ , width 350 μ . Idiosoma widely oval and heavily sclerotized. Lateral hysterosomal membranes wide and rounded, extending from the base of legs III to setae 14, width 41 μ . The tibia of legs II is widely developed dorsally, truncate at the tip with a double pointed end, width 27 μ . *Dorsal idiosoma* : Propodosomal shield granular in appearance over entire surface; transverse suture well defined; hysterosomal shield granular in appearance overall with small lacunae randomly placed posterior to *d2*. Setae *d4* long, thin, setiform, located at border of hysterosomal shield between *d5* and 15, length 63 μ . Setae *d5* long, setiform, thicker at the base, bearing a long lateral

Freyana nyrocae (Dubinin, 1950). Fig. 27 : homeomorphic male, terminal setae. Fig. 28 : heteromorphic male, terminal setae. Fig. 29 : female, terminal setae. Fig. 30 : tarsus of leg II, heteromorphic male.



100μ



30

leaf-like expansion at the base, expansion length 59 μ , width 22 μ ; *I*₃ thick, long, setiform, thicker at the base; *I*₄ long, lanceolate, length 128 μ ; *I*₅ long, thick, setiform; *P*_{ai} slender boot-shaped, with narrow long lateral expansion and short wide medial expansion, length 24 μ , width 47 μ . *Ventral idiosoma* : All epimerites fused including medial sclerite between legs IV; all coxal fields closed; assymetrical enclosed sternum. Setae *P*_{ae} thin, setiform, short, positioned anterior to setae *I*₄.

Male. Homeomorph. Length (incl. gnathosoma) 570 μ , width 410 μ . Idiosoma widely oval and moderately sclerotized. Lateral hysterosomal membranes extending from base of legs III to setae *I*₄, width 24 μ . The tibia of legs II is moderately developed dorsally and pointed on the tip, width 19 μ . *Dorsal idiosoma* : Propodosomal shield coarsely granular in appearance anterior to *sce*; transverse suture well defined; hysterosomal shield coarsely granular in appearance over entire surface posterior to *d*₁. Setae *d*₄ short, very thin, setiform, positioned on border of hysterosomal shield above and medial to setae *I*₅, length 26 μ ; *d*₅ long, thin, wider at base with a tapered, lateral leaf-like expansion, length 46 μ , width 19 μ . Setae *I*₃ long, thin, setiform; *I*₄ short, lanceolate, length 83 μ ; *I*₅ long, thick, setiform, wider in the base. *P*_{ai} boot-shaped, the lateral expansion is wider and shorter than in the heteromorphic form, length 32 μ , width 41 μ . *Ventral idiosoma* : Epimerites I fused into a long sternum, coxal field I open; epimera II straight with slight bend posteriorly at the tip; IIA straight, coxal field II open; epimerites III and IIIA fused into oval shape, coxal field III closed; epimera IV fused to IIIA. Setae *P*_{ae} thin, setiform, short, positioned anterior and slightly medial to setae *I*₄.

Female. Length (incl. gnathosoma) 600 μ , width 400 μ . Idiosoma widely oval, rounded posteriorly. Lateral hysterosomal membranes relatively wide, extending from level of base of legs III to setae *l4*, width 18 μ . Tibia of legs II is relatively well developed dorsally and pointed on the tip, width 16 μ . *Dorsal idiosoma* : Propodosomal shield coarsely granular in appearance anterior to *sce*; transverse suture well defined; hysterosomal shield coarsely granular in appearance over entire surface posterior to *d1* with many small scattered lacunae around border and in a band at level of legs III; with large rounded lacunae posterior to setae *d3*. Setae *d4* thin, setiform, located anterior to the hysterosomal border between *d5* and *l5*, length 38 μ . Setae *d5* long, setiform with wide membranous expansions at the base; *l3* long, thin, setiform; *l4* lanceolate, pointed and curved at the tip, length 78 μ ; *l5* long, thin, setiform, wider at the base. *Pa1* wide, lanceolate, rounded at tip, length 62 μ . *Ventral idiosoma* : Epimerites I fused into a short sternum, II curves slightly posteriorly, IIA straight; coxal fields I, II, and III open. Epimerites III and IIIA in C-shaped configuration, IV fused to IIIA. Setae *Pa2* short, setiform, located anterior to *d5* above level of *l4*.

Material examined - Type Host : From *Nyroca (=Aythya) nyroca* : 1 he, 3 ho males, 1 female, Egypt, 1-II-1917, (AMNH 424537, UGA 2434).

Additional material examined : From *Aythya affinis* : 2 ho males, 1 female, Delaware River, Culberson Co., Texas (NU 1708); 1 ho male, Dallas Lake, Texas (NU 1052); 3 he, 1 ho males, 7 females, 4 N, Mastic, New York (AMNH 149300, UGA 8185); 10 females, Burlington, Iowa (AMNH 733402, UGA 8350); 1 he, 3 ho males, 8 females, Coldstream, Ontario (AMNH 749879, UGA 8351). From *Aythya americana* : 2 ho males, Ennis Lake, Texas (NU 1044); 1

no males, 4 females, 5 N, Montauk Point, New York (UGA 8182). From *Aythya australis* : 1 ho male, Wissel Lakes, W. Irian (AMNH 703557, UGA 8624); 1 ho male, Celebes (USNM 250634, UGA 2898); 1 he male, Australia (AMNH 733284, UGA 8627). From *Aythya baeri* : 2 he, 2 ho males, 7 females, Linchuan, Anhwei, China (NU 1707); 1 ho male, 2 N, Ningpo, China (AMNH 733254, UGA 8622); 1 he male, 6 females, Manchuria (AMNH 733253, UGA 8623). From *Aythya collaris* : 1 ho male, Eagle Lake, Texas (NU 1045); 1 ho male, Eagle Lake, Texas (NU 1048); 1 he, 2 ho males, 2 females, New York, New York (AMNH 351189, UGA 8183); 1 ho male, 1 female, 3 N, Currituck, North Carolina (AMNH 174980, UGA 8184). From *Aythya erythropthalma* : 1 he male, 1 female, Johannesburg, South Africa (NU 2101); 1 he male, 1 female, 4 N, Transvaal, South Africa (USNM 433501, UGA 2897); 1 ho male, 4 females, Cali, Valle del Cauca, Colombia (AMNH 111374, UGA 8629); 1 he, 1 ho males, 2 females, 1 N, Quito, Peru (AMNH 151159, UGA 8630). From *Aythya ferina* : 1 he, 2 females, India (USNM 107158, UGA 2880); 3 he, 3 ho males, 7 females, Bharatpur, Rajasthan, India (UGA 6218); 3 he, 4 ho males, 6 females, 2 N, Bharatpur, Rajasthan, India (UGA 6221); 4 he, 7 ho males, 4 females, Bharatpur, Rajasthan, India (UGA 6242). From *Aythya fuligula* : 3 he, 2 ho males, 4 females, Bharatpur, Rajasthan, India (UGA 6717); 5 he, 4 females, 1 N, Bharatpur, Rajasthan, India (UGA 6718). From *Aythya marila nearctica* : 1 he, 2 ho males, 3 females, 1 N, Sanford, New York (AMNH 351088, UGA 8352). From *Aythya novaseelandiae* : 1 ho male, 6 females, New Zealand (AMNH 733320, UGA 8634); 2 ho males, 2 females, New Zealand (AMNH 733325, UGA 8633). From *Aythya valisineria* : 7 females, Hackberry Lake, Nebraska (AMNH 95396, UGA 8353); 1 he, 1 ho males, 5 females, 2 N, Cayuga Lake, New York (AMNH 436161, UGA 8354). From *Nyroca (=Aythya) nyroca* : 2 ho male, Seistan, Iran (AMNH

733227, UGA 2433); 1 female, 3 N, Cairo, Egypt (AMNH 424534, UGA 2435); 1 female, Bharatpur, Rajasthan, India (UGA 6200); 1 N, Bharatpur, Rajasthan, India (UGA 6201); 2 he, 2 ho males, 2 females, Bharatpur, Rajasthan, India (UGA 6202). From *Netta erythrophthalma* : 2 females, 3 N, Johannesburg, South Africa (NU 3747). From *Netta rufina* : 1 ho male, Lake Tensitas, Greece (NU 8355 [BMNH]); 2 females, 9 N, Rome, Italy (NU 8356 [BMNH]); 1 ho male, 2 N, Calcutta, India (NU 8357 [BMNH]); 1 ho male, 1 N, Foggia Province, Italy (NU 11854, AMNH 749886); 6 females, Puglia, Italy (NU 11856, AMNH 749887); 1 he, 1 ho males, 2 females, Bharatpur, Rajasthan, India (YSU 1042); 1 female, Hassan-Cadé, Iran (AMNH 733006, NU 11855).

Freyana armata Megnin et Trouessart
(Figs. 31-35)

Megnin et Trouessart, 1884b, Journ. Microgr., 8 (2) : 100.

Trouessart et Megnin, 1885, Bull. Soc. Angers., 14 : 37.

Berlese, 1898b, A. M. S., fasc. 91, No. 13.

Dubinin, W. B., 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb., 12 : 28, fig. 4, 3-5.

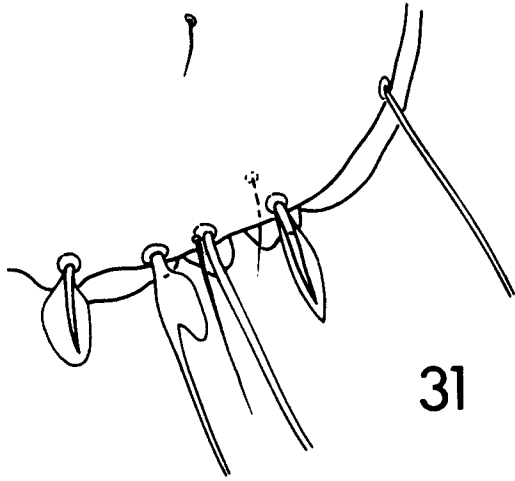
Dubinin, W. B., 1951b, Parazit. Sb., 13 : 212, 215.

Radford, C. D., 1953, Parasitology, 42 (3-4) : 199.

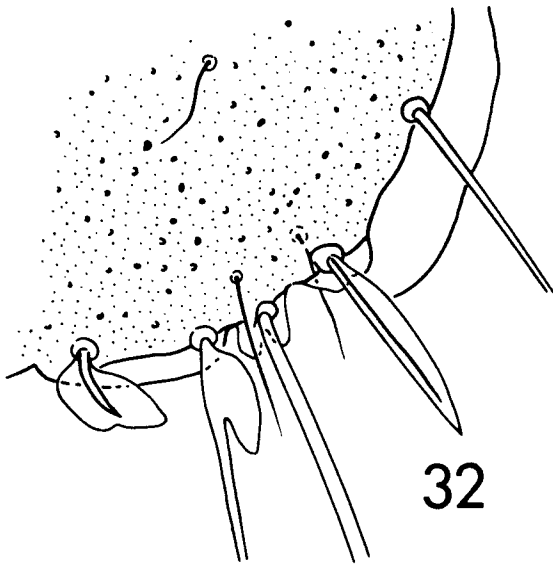
Dubinin, W. B., 1953, Fauna of the USSR, 6(6) : 257-258, fig. 104.

This species is differentiated by the shape of *Pai*, the sclerotization of the coxo-sternal skeleton and the overall idiosoma shape. This mite inhabits the primary feathers and upper wing coverts of mergansers

Freyana armata (Trouessart and Megnin, 1884). Fig. 31 :
homeomorphic male, terminal setae. Fig. 32 : heteromorphic male,
terminal setae. Fig. 33 : tarsus of leg II, heteromorphic male. Fig.
34 : female, terminal setae. Fig. 35 : tarsus of leg II, female.

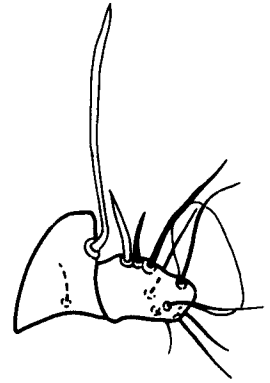


31

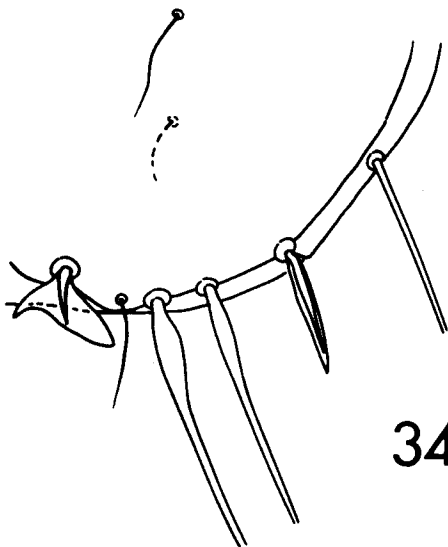


32

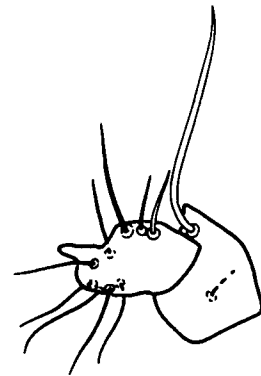
100μ



33



34



35

of the genus *Mergus* Linneaus. These hosts range throughout North America, Asia, Europe, and northern Africa.

Male. Heteromorph. Length (incl. gnathosoma) 590 μ , width 360 μ . Idiosoma shaped as a stretched out oval, slightly tapered posteriorly. Lateral hysterosomal membranes wide, extending from level of leg III to setae 14, width 31 μ . Tibial expansions on leg II moderately developed dorsally, rounded tip, width 19 μ . *Dorsal idiosoma* : Propodosomal shield coarsely granular in appearance anterior to *sce*, granular in appearance posterior to *sce*; transverse suture well defined; hysterosomal shield granular in appearance with evenly spaced small lacunae over entire surface. Setae *d1* located posterior to the level of epimerite II; *d4* long, thin, setiform, positioned on border of hysterosomal shield above setae 15, length 50 μ . Setae *d5* long, thin, wider at the base, with small, rounded oval, leaf-like expansions, length 38 μ , width 14 μ . Setae 13 long, thin; 14 lanceolate, long, thin, length 100 μ ; 15 thick, long, setiform; *Pai* drawn close in the bases, wide, grooved at midline, rounded edges, length 31 μ , width 42 μ . *Ventral idiosoma* : Epimerites I fused into long sternum, coxal field I open; epimera II slightly curved posteriorly, IIA straight not fused, coxal field II open. Epimerites III and IIIA fused in oval shape, coxal field III closed; sclerotized area present anterior to genital organ; epimerite IV fused to IIIA. Setae *Pae* thin, setiform, positioned anterior to 14.

Male. Homeomorph. Length (incl. gnathosoma) 590 μ , width 360 μ . Idiosoma widely oval with straight sides; lateral hysterosomal membranes narrow, extend from level of legs III to just in front of setae 14, width 9 μ . Leg II tibial expansions poorly developed, pointed on the tip, width

14 μ . *Dorsal idiosoma* : Propodosomal shield granular in appearance anterior to *sce*; transverse suture well defined; hysterosomal shield granular in appearance over entire surface. Setae *d4* very thin, setiform, positioned on border of hysterosomal shield directly anterior to *l5*, length 38 μ ; *d5* thin, long, setiform, wider at the base, small lateral leaf-like expansions and small medial membranes at the base, expansion length 28 μ , base width 17 μ . Setae *l3* long, thin, setiform; *l4* short, lanceolate, straight, length 53 μ ; *l5* long, thin, setiform, wider at the base; *Pa1* short, wide, rounded, length 41 μ , width 19 μ . *Ventral idiosoma* : Coxo-sternal skeleton weakly sclerotized; epimerites I fused into short sternum, coxal field I open; epimerites II and IIA straight, coxal field II open; epimerites III and IIIA in open ended oval shape, coxal field III open; IV fused to IIIA. Setae *Pae* thin, setiform, positioned anterior to *l4*, length 37 μ .

Female. Length (incl. gnathosoma) 660 μ , width 450 μ . Idiosoma large, widely oval; lateral hysterosomal membranes weakly developed; tibial expansions legs II poorly developed dorsally, with pointed tip, width 9 μ . *Dorsal idiosoma* : Propodosomal shield granular in appearance anterior to *sce*; transverse suture well defined; hysterosomal shield granular in appearance posterior to *d1*; *d3* long, thin, setiform; *d4* long, thin, setiform, located at shield border medial to *d5*, length 65 μ . Setae *d5* long, thin, expanded on both sides at the base; *l3* thin, setiform; *l4* lanceolate, length 70 μ ; *l5* long, thin, setiform, wider in the base. Setae *Pa1* uniquely shaped, hysterosomal border overlaps half the setal expansions, medial expansion narrow, pointed; lateral expansion wider, with rounded tip, length 36 μ , width 55 μ . The medial expansions nearly meet at midline. *Ventral idiosoma* : Epigynium large, curved, anterior to level of *sh*; epimerites I

fused into short sternum; epimerites II thick, bent at tip; IIA straight; III and IIIA in C shaped configuration; coxal fields I, II and III open; epimerites IV fused to IIIA. Setae *Pae* very thin, short, setiform, located well anterior and slightly medial to setae *I5*.

Materials examined - *Type host* : From *Mergus merganser americanus* : 4 he, 1 ho males, 4 females, 2 N, Montauk Point, Suffolk County, New York, 14-XII-1885, (AMNH 64733, UGA 8177). From *Mergus merganser merganser* : 1 ho male, 5 females, 2 N, Tring Reservoir, West Hertford, England, 11-XII-1903, (AMNH 734236, UGA 2441). From *Mergus serrator* : 4 females, 4 N, Seaford, Nassau County, New York, 19-IV-1909, (AMNH 351930, UGA 8178). From *Lophodytes (=Mergus) cucullatus* : 4 he, 1 ho males, 10 females, 1 N, Persimmon Hammock, St. Johns River, Florida, 3-II-1905, (AMNH 351857, UGA 8176).

Freyana bucephalae Dubinin
(Figs. 36-40)

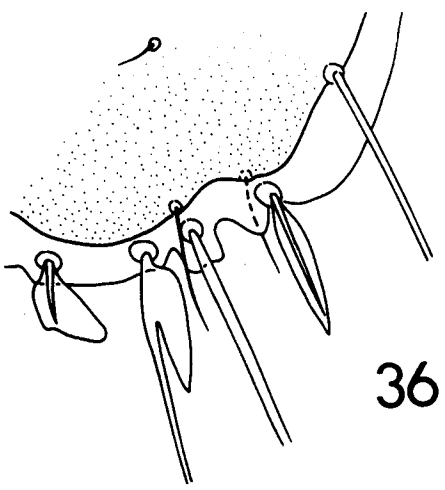
Dubinin, W. B., 1950a, Akad. Nauk USSR, Zool. Inst., Parazit. Sb., 12 : 28-30, fig. 4, 11-13.

Dubinin, W. B., 1951b, Parazit. Sb., 13 : 211, 214, 215.

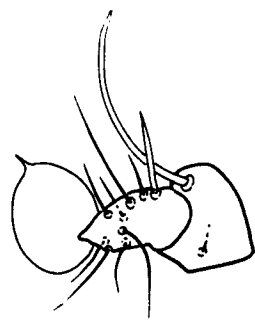
Dubinin, W. B., 1953, Fauna of the USSR, 6 (6) : 259, 260, fig. 105.

This species resembles the type species with differences noted in the form of the caudal setae *Pai* and *d5* and the overall idiosoma shape. There are two male types and one female type. These mites are restricted to

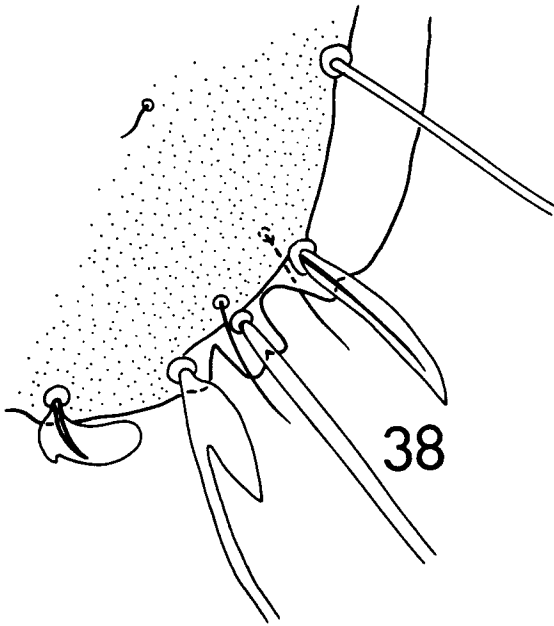
Freyana bucephalae (Dubinin, 1950). Fig. 36 : homeomorphic male, terminal setae. Fig. 37 : tarsus of leg II, homeomorphic male. Fig. 38 : heteromorphic male, terminal setae. Fig. 39 : tarsus of leg II, heteromorphic male. Fig. 40 : female, terminal setae.



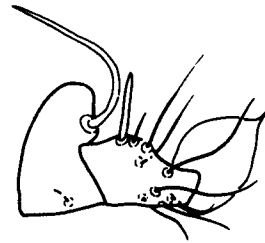
36



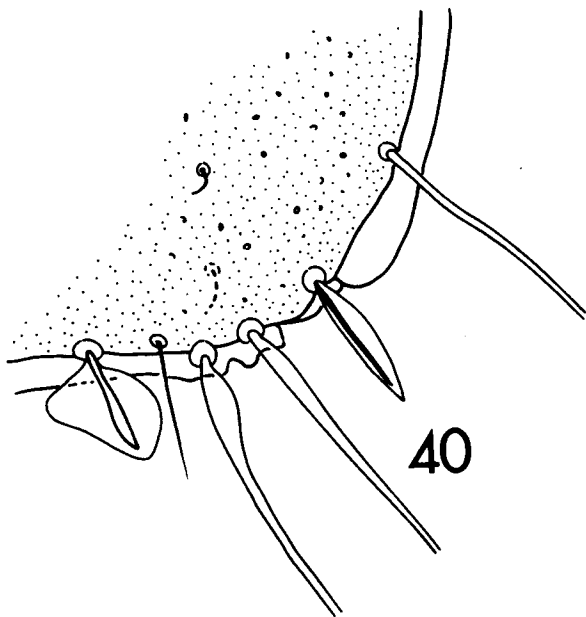
37



38



39



40

100μ



the genus *Bucephala* Baird. The hosts have a distribution throughout North America and northern Europe.

Male. Heteromorph. Length (incl. gnathosoma) 625 μ , width 350 μ . Idiosoma oval shaped, longer tapered posterior, rounded anterior. Lateral hysterosomal membranes wide, extending from level of base of legs IV to setae *Pai*, width 38 μ . Tibial expansions on legs II are well-developed dorsally, rounded on the tip, width 22 μ . *Dorsal idiosoma* : Propodosomal shield granular in appearance, anterior to *sce*; posterior to transverse suture is a thin delicate integument with lateral lines extending to level of *d1*. Hysterosomal shield granular in appearance posterior to *d1*, covered with numerous, small, randomly spaced lacunae decreasing in number postero-medially. Setae *d4* positioned on border of shield directly antero-medial to setae *I5*; *d5* thin, setiform, wider at the base with a medium sized lateral leaf-like expansion tapered to a point, expansion length 50 μ , width 19 μ . Setae *I3* setiform, thicker towards the insertion; *I4* lanceolate, relatively short for heteromorph, length 82 μ ; *I5* setiform, thicker towards the insertion; *Pai* shoe-shaped, wider laterally, pointed at tip medially, length 24 μ , width 42 μ . *Ventral idiosoma* : Epimerites I fused into long sternum, coxal field I open; epimerites II and IIA fused, coxal field II closed; epimerites III and IIIA fused in oval shape, coxal field III closed; epimerite IV fused to IIIA. Medial sclerite present between legs IV. Setae *Pae* long, thin, setiform, positioned antero-medial to setae *I4*, length 40 μ .

Male. Homeomorph. Length (incl. gnathosoma) 540 μ , width 335 μ . Idiosoma widely oval; lateral hysterosomal membranes less wide, extend from level of legs IV to *I4*, width 21 μ . Tibial expansions on legs II less

developed dorsally, rounded tips, width 10 μ . *Dorsal idiosoma* : Resembles heteromorph male. Setae *d5* with leaf-like expansion, length 41 μ , width 17 μ ; *l3* thin, setiform; *l4* lanceolate, length 62 μ ; *Pa2* smaller, more rounded than in heteromorph, length 34 μ , width 26 μ . *Ventral idiosoma* : Epimerites I fused into short sternum; II and IIA straight; III and IIIA fused in oval shape; IV fused to IIIA; IVA almost nonexistent; medial sclerite absent; open coxal fields I, II; coxal field III closed. Setae *Pa2* as in heteromorph, length 34 μ .

Female. Length (incl. gnathosoma) 560 μ , width 350 μ . Idiosoma widely oval; lateral hysterosomal membranes narrow, extend from level of leg IV to just before *Pa2*, width 12 μ . Tibial expansions slightly developed dorsally, rounded at tip, width 11 μ . *Dorsal idiosoma* : Setae *d3* located slightly posterior and further apart than usual, thin, setiform; *d4* long, thin, setiform, located anterior and medial to *d5*, length 43 μ ; *d5* long, setiform with widened base; *l3* long, thin, setiform; *l4* short, lanceolate, length 58 μ ; *l5* long, setiform, thicker toward the base. Setae *Pa2* wide, rounded, cup-shaped, wider laterally, length 34 μ , width 44 μ . *Ventral idiosoma* : Resembles type species. Coxal fields I, II and III open. Setae *Pa2* thin, setiform, located well anterior to origin of *l5*.

Materials examined - Type Host : From *Bucephala albeola* : 2 he, 2 ho males, 10 females, Coldstream, Ontario, 10-IV-1918, (AMNH 749926, UGA 8348); 1 N, Pea Island, North Carolina, 7-I-1927, (AMNH 749925, UGA 8349).

Freyana oidemia Dubinin
(Figs. 41-45)

Dubinin, W. B., 1950a, Akad. Nauk USSR, Zool. Inst., Parazit. Sb., 12 : 30-31, fig. 4, 8-10.

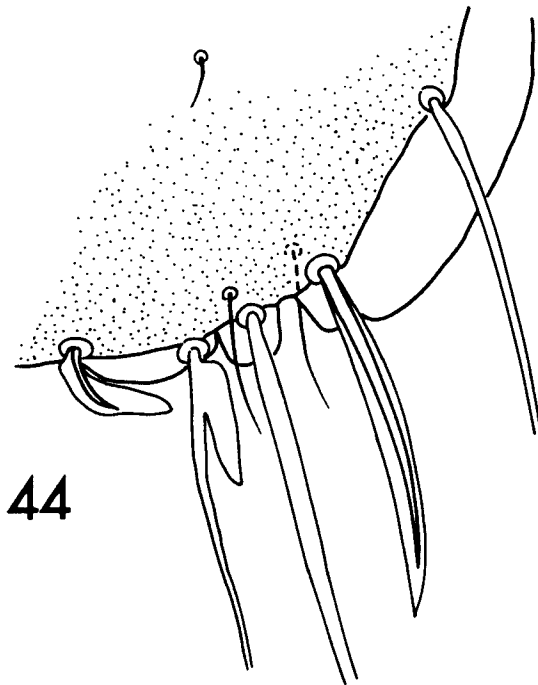
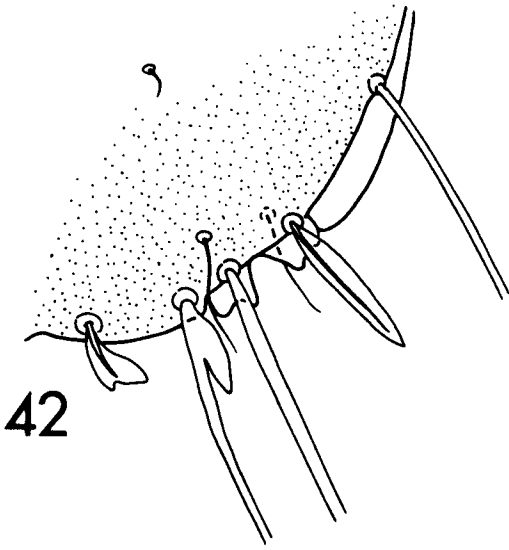
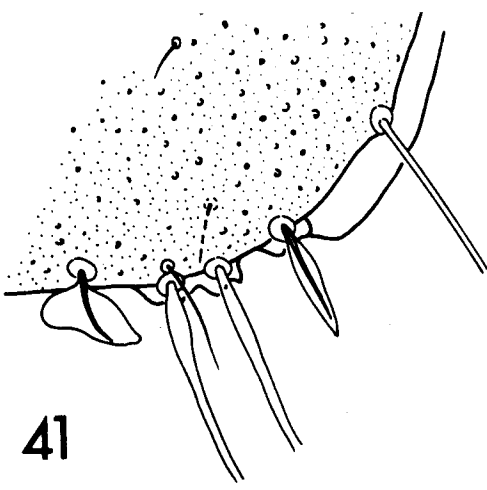
Dubinin, W. B., 1951b, Parazit. Sb., 13 : 212, 215.

Dubinin, W. B., 1953, Fauna of the USSR, 6(6) : 260, 261, fig. 106.

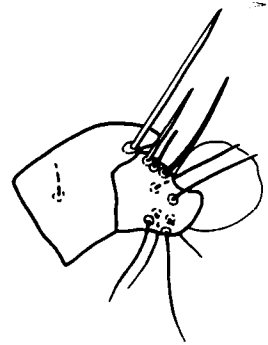
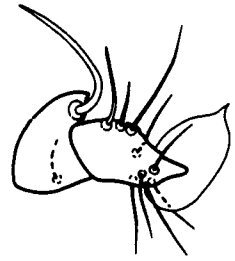
This species strongly resembles the preceding species with distinguishing characteristics being the shape of the caudal setae and the slightly larger leg II tibial expansions. This species is host specific on birds of the genera *Melanitta* Boie (= *Oidemia* Fleming), *Clangula* Leach and *Histrionicus* Lesson. These birds have a distribution throughout North America and Europe.

Male. Heteromorph. Length (incl. gnathosoma) 600 μ , width 350 μ . Idiosoma widely oval, tapered and rounded on both ends; lateral hysterosomal membranes long, wide, rounded, extending from just above level of *d2* to setae *l4*, width 39 μ . Leg II tibial expansion moderately developed dorsally, rounded on the end, width 20 μ . *Dorsal idiosoma* : Anterior propodosomal shield with granular appearance, large thinly lined delicate area posterior to level of *sh*; transverse suture poorly defined. Hysterosomal shield granular posteriorly with few medium sized lacunae. Setae *d4* relatively long, setiform, positioned on posterior border anterior and slightly medial to *l5*; *d5* thin, long, with straight edged, pointed, lateral leaf-like expansion in the base, length 45 μ , width 17 μ . Setae *l3* thick, long, setiform; *l4* long, lanceolate, length 133 μ ; *l5* long, setiform, thick in the

Freyana oidea (Dubinin, 1950). Fig. 41 : female, terminal setae.
Fig. 42 : homeomorphic male, terminal setae. Fig. 43 : tarsus of leg
II, homeomorphic male. Fig. 44 : heteromorphic male, terminal setae.
Fig. 45 : tarsus of leg II, heteromorphic male.



100μ



base; *Pae* narrow boot-shaped with long lateral and very narrow medial membranes, length 25 μ , width 43 μ . *Ventral idiosoma* : Heavily sclerotized overall. Epimerites I fused into long sternum; coxal field I open; epimerites II and IIA fused; III and IIIA fused in oval configuration; coxal fields II and III closed; epimerite IV fused to IIIA. Y-shaped sclerite present, fused to IIIA closing the posterior of the sternum. Setae *Pae* thin, setiform, originates antero-medial to *I4*.

Male. Homeomorph. Length (incl. gnathosoma) 560 μ , width 330 μ . Idiosoma widely oval; lateral hysterosomal membranes very narrow, extend from just above level of *d3* to setae *I4*, width 16 μ . Leg II tibial expansions slightly developed dorsally, widely rounded on the tip, width 13 μ . *Dorsal idiosoma* : Anterior portion of propodosomal shield granular in appearance followed by thinly lined area to level of epimerite III; posterior hysterosomal shield granular in appearance. Setae *d4* thin, setiform, positioned on border of hysterosomal shield anterior to *I5*; *d5* thin, setiform, thicker in the base with lateral leaf-like expansion, expansion length 32 μ , width 8 μ ; *I3* long, thin, setiform; *I4* lanceolate, length 62 μ ; *I5* thick, long, setiform; *Pae* cup-shaped with lateral membranes slightly wider, length 26 μ , width 21 μ . *Ventral idiosoma* : Less sclerotized than heteromorph; epimerites I fused into short sternum, coxal field I open; epimerite II slightly bent posteriorly, IIA straight, coxal field II open; epimerites III and IIIA fused in oval shape, coxal field III closed; epimerite IV fused to IIIA. Setae *Pae* thin, setiform, positioned antero-medial to *I4*.

Female. Length (incl. gnathosoma) 520 μ , width 345 μ . Idiosoma widely oval; lateral hysterosomal membranes narrow, extending from level of

legs IV to just before setae *14*, width 15 μ . Leg II with tibial expansions slightly developed dorsally, widely rounded on the tip, width 12 μ . *Dorsal idiosoma* : Propodosomal shield granular in appearance anterior to *sce*; transverse suture well defined; hysterosomal shield granular in appearance with scattered round, lightly colored lacunae. All dorsal setae relatively long, thin setiform; *d4* positioned posterior to border of hysterosomal shield above *d5*. Setae *13* thin, long, setiform; *14* short, lanceolate, length 46 μ ; *15* long, setiform with small rounded membranes and expansions at the base, width 8 μ ; *Pa2* triangular shaped with pointed tip on the lateral expansion, length 29 μ , width 34 μ . *Ventral idiosoma* : Epimerites I fused into short sternum; epimerites II curved at tip; IIA straight; III and IIIA in C-shape; IV fused to IIIA; coxal fields I, II and III open. Setae *Pae* short, setiform, located well anterior to *15*.

Materials examined - Type host : From *Histrionicus histrionicus histrionicus* : 8 females, 1 N, Lapush, Clallam County, Washington, 29-V-1916, (AMNH 749945, UGA 8344). From *Clangula hyemalis* : 3 he males, 9 females, Greenport, Suffolk County, New York, 26-XI-1927, (AMNH 233676, UGA 8345); 3 he, 1 ho males, 3 females, 4 N, Long Island, New York, 3-II-1903, (AMNH 351380, UGA 8346). From *Melanitta perspicillata* : 2 he, 1 ho males, 2 females, 3 N, Montauk Point, Suffolk County, New York, 27-III-1897, (AMNH 351692, UGA 8343).

Freyana largifolia (Megn. et Trt.) Dubinin
(Figs. 46-51)

Megnin et Trouessart, 1884b, Journ. Microgr., 8 (2) : 100.

Trouessart et Megnin, 1885, Bull. Soc. Angers, 14 : 37.

Berlese, 1886, A. M. S. ital., fasc. 24, No. 1.

Ginetzinskaya, 1942, Acad. Sciences USSR, 37 (4) : 170-73,
fig. 1.

Ginetzinskaya, 1949, Scientific Notes of Leningrad State
Univ., Prob. of Ecol. Parasit., 19 (4) : 92, 103-107.

Dubinin, 1950a, Akad. Nauk USSR, Zool. Inst., Parazit. Sb., 12
: 33-35, fig. 5.

Dubinin, 1951a, Fauna of the USSR, 6 (5) : 1-362.

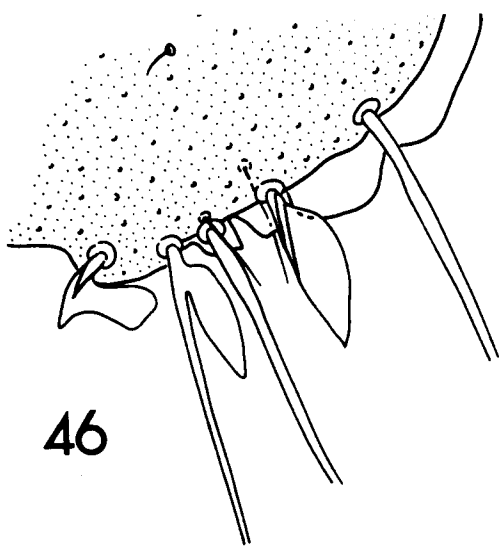
Dubinin, 1951b, Parazit. Sb., 13 : 214.

Dubinin, 1953, Fauna of the USSR, 6 (6) : 264-67, fig. 77, 85,
87, 9, 91, 94, 99, 107-9.

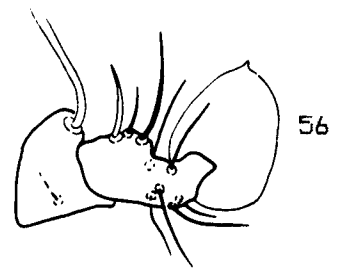
This species is easily differentiated from *Freyana anatina* and other species by the presence of an additional sclerite on the posterior ends of epimerite II positioned almost at right angles to the axis of the epimerite. It is also characterized by the structure and size of the lateral hysterosomal membranes, by the structure and dimensions of leg II tibial expansions, by the structure of the caudal setae and by the structure of the coxo-sternal skeleton. *Freyana largifolia* is recorded from birds of the genus *Anas*. This species has been found to co-inhabit the same bird as *Freyana anatina*.

Male. Heteromorph. Length (incl. gnathosoma) 600 μ , width 420 μ .
Idiosoma widely egg-shaped and well developed; lateral hysterosomal

Freyana largifolia (Trouessart et Megnin, 1885). Fig. 46 :
homeomorphic male, terminal setae. Fig. 47 : tarsus of leg II,
homeomorphic male. Fig. 48 : heteromorphic male, terminal setae. Fig.
49 : tarsus of leg II, heteromorphic male. Fig. 50 : female, terminal
setae. Fig. 51 : tarsus of leg II, female.



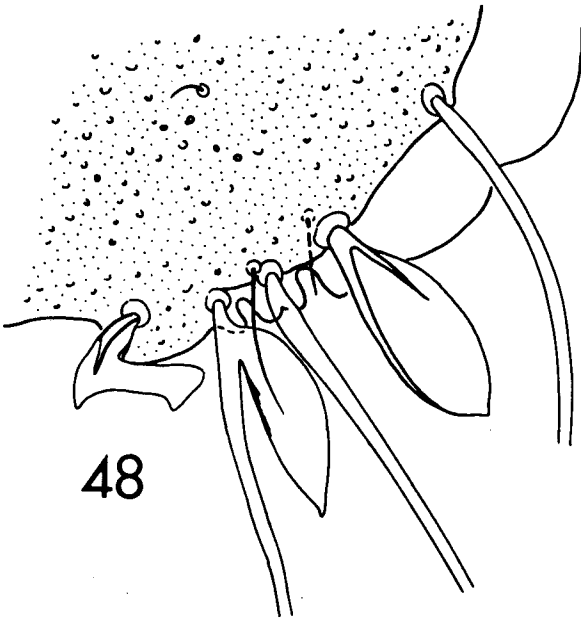
46



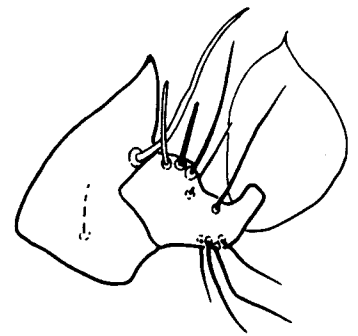
56

47

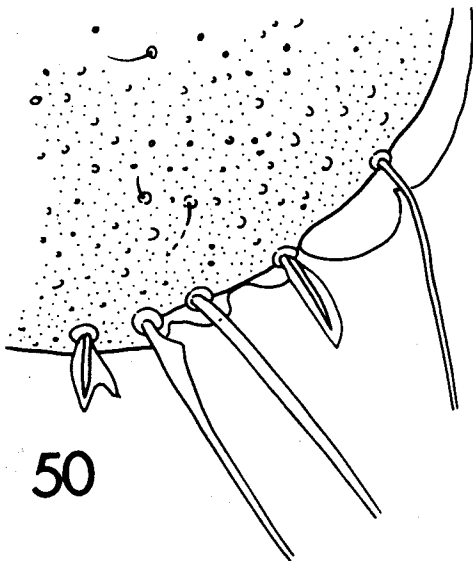
100μ



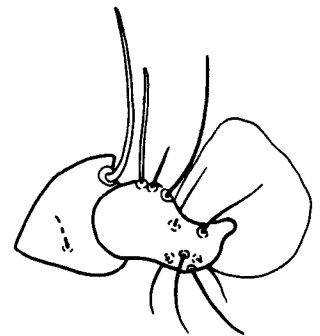
48



49



50



51

membranes very wide, extending from level of *d1* to setae *14*, with slight indentation at level of *d2*, width 55 μ . Tibial expansions of leg II widely developed dorsally, pointed on the tip, without the horn-like growth characteristic of *Freyana anatina*, width 34 μ . *Dorsal idiosoma* : Propodosomal shield densely granular in appearance over its surface; transverse suture well-defined followed by small thinly lined region to level of *d1*. Hysterosomal shield densely granular in appearance and covered with many small lacunae posterior to level of *sh*. Setae *d1* relatively long, setiform, length 36 μ ; *d2* and *d3* short, setiform; *d4* long, setiform, positioned on border of hysterosomal shield above *15*, length 41 μ ; *13* long, thick, setiform; *14* wide, large oval shape with slightly raised inner and outer edges, length 96 μ , width 32 μ ; *14* very long, thick, setiform; *15* very long, thick, setiform with large, tapered with lateral leaf-like expansion at the base, length 88 μ , width 19 μ . Setae *Pa1* positioned on terminal cleft at the midline, with sickle-shaped lateral expansion along the posterior margin of the idiosoma, length 39 μ , width 52 μ . *Ventral idiosoma* : Epimerites I and II fused forming closed coxal field I; II and IIA fused by additional sclerite between the medial tips, III and IIIA fused in oval shape; coxal field II and III closed; epimerite IV fused to IIIA. At the midline anterior to the genital organ is a Y-shaped sclerite fused to the ring of epimera legs III. Genital organ at level of base of legs IV; setae *Pa2* setiform, positioned anterior to *14*, length 30 μ .

Male. Homeomorph. Length (incl. gnathosoma) 500 μ , width 345 μ . Idiosoma widely oval, rounded posteriorly; lateral hysterosomal membranes slightly developed, extending from level of base of legs IV to setae *14*, width 18 μ ; tibial expansions of legs II is slightly developed dorsally, with

rounded tip, width 17 μ . *Dorsal idiosoma* : Propodosomal shield coarsely granular in appearance overall; transverse suture well defined; hysterosomal shield coarsely granular in appearance overall with many small scattered lacunae towards the posterior half. Dorsal setae as in heteromorph; *d4* thin, setiform, originates above setae *15* at posterior border; *d5* thin, long, setiform with narrow, tapered lateral leaf-like expansion in the base, expansion length 48 μ , width 12 μ ; *13* long, setiform; *14* large, oval shaped as in heteromorph, with slightly raised edges, length 66 μ , width 19 μ ; *15* very long, thick, setiform; *Pai* as in heteromorph, length 32 μ , width 47 μ .

Ventral idiosoma : Lesser degree of fusion than in heteromorph; coxal fields I and II open; epimerites I fused into short sternum; epimerites II with angled shape; IIA straight with a small gap between tip of II and IIA; III and IIIA fused in oval shape, coxal field III closed; IV fused to IIIA; Y-shaped sclerite present but not as developed as in heteromorph. Setae *Pae* thin, setiform, positioned anterior to *14*, length 19 μ .

Female. Length (incl. gnathosoma) 560 μ , width 370 μ . Idiosoma widely oval; lateral hysterosomal membranes slightly rounded posteriorly, extending from level of base of legs IV to setae *14*, width 21 μ ; leg II with tibial expansions slightly developed dorsally, pointed at the tip, width 14 μ . *Dorsal idiosoma* : Propodosomal shield granular in appearance overall; transverse suture well defined; hysterosomal shield granular in appearance with small and large lacunae covering the posterior one-half; *d4* short, setiform, positioned on posterior border above *15*. Setae *d5* thin, setiform with narrow membranes at the base; *13* thin, setiform; *14* short, lanceolate, length 43 μ ; *15* thin, setiform; *Pai* short, double tipped, pointed on the ends, length 30 μ . *Ventral idiosoma* : Epimerites I fused into short, thick

sternum; epimerites II slightly curved with additional sclerite angled downward medial end; IIA straight; coxal fields I and II open; epimerites III and IIIA fused in circular shape; coxal field III closed; epimerite IV fused to IIIA. Setae *Pa*e relatively long, setiform, positioned between 14 and 15. Epigynium thick, short, curved, placed between tips of epimerites IIA.

Materials examined - Type host : From *Anas cyanoptera* : 3 he, 4 ho males, 7 females, Harrah, Yakima County, Washington, 4-V-1942 (NU 1711). From *Anas discors* : 5 he, 2 ho males, 7 females, White Rock Lake, Dallas County, Texas, 14-IV-1936 (NU 1036).

Additional materials include : From *Anas acuta acuta* : 1 he male, 1 female, 2 N, Bering Island, Commander Islands (AMNH 732454, UGA 8191); 1 ho male, 2 N, Bharatpur, Rajasthan, India (UGA 889). From *Anas clypeata* : 3 he, 1 ho males, 5 females, Decatur County, Kansas (Cleveland #49278, UGA 8684); 1 he male, 6 females, Port Clinton, Ottawa County, Ohio (Cleveland #25031, UGA 8685); 2 he males, 4 females, Bharatpur, Rajasthan, India (UGA 6682). From *Anas crecca crecca* : 2 females, El Salhiya, Sharqiya, Egypt (AMNH 424202, UGA 8577). From *Anas cyanoptera* : 2 he, 1 ho males, 10 females, 1 N, Dallas Lake, Dallas County, Texas (NU 1032); 3 he, 4 ho males, 6 females, Dallas County, Texas (NU 1033). From *Anas discors* : 1 female, Imperial, Nebraska (610905-2); 1 female, Rushville, Nebraska (590831-1); 1 he male, 1 female, 3 N, Eagle Lake, Dallas, Texas (NU 1034); 1 female, 1 N, White Rock Lake, Dallas County, Texas (NU 1035); 3 he, 1 ho males, 5 females, Erie, Pennsylvania (AMNH 79489, UGA 8195). From *Anas erythrorhynca* : 1 he male, 1 female, Tsessebe, Bechuanaland, South Africa (NU 2104); 2 ho males, 10 females, Tsessebe, Bechuanaland, South Africa (NU 3881); 2 he, 1

no males, 8 females, Lephepe, Bechuanaland, South Africa (NU 2106); 1 he
 male, 2 females, 1 N, Kanye, Bechuanaland, South Africa (NU 3654); 5
 females, 1 N, Lochnivar Ranch, N. Monze, Rhodesia (NU 4061). From *Anas
 tuligula tuligula* : 6 he males, 4 females, Everglades, East of Okeechobee,
 Florida (AMNH 749726, UGA 8361); 1 he, 1 ho males, 8 females, Everglades,
 East of Okeechobee, Florida (AMNH 749727, UGA 8360). From *Anas hottentota* :
 3 he, 3 ho males, 2 females, 1 N, Lochnivar Ranch, N. Monze, Rhodesia (NU
 4065). From *Anas laysanensis* : 10 he, 1 ho males, 10 females, 2 N, Laysan
 Island, Hawaiian Islands (UGA 10200). From *Anas querquedula* : 1 he, 1 ho
 males, Bharatpur, Rajasthan, India (UGA 885); 2 ho males, 7 females, 1 N,
 Bharatpur, Rajasthan, India (UGA 6790); 2 he, 7 females, 1 N, Bharatpur,
 Rajasthan, India (UGA 6809). From *Anas rhyncotis* : 2 he, 2 ho males, 5
 females, Richmond River, New South Wales, Australia (AMNH 732786, UGA 8566);
 2 he, 1 ho males, 5 females, Queensland, Australia (AMNH 732788, UGA 8567);
 2 he, 1 ho males, 6 females, North Queensland, Australia (AMNH 732787, UGA
 8571). From *Anas rubripes* : 2 he, 1 ho males, 2 females, Wallis, Wharton
 County, Texas (NU 1714); 2 he, 2 ho males, 2 females, Cove, Chambers County,
 Texas (NU 1715). From *Anas strepera* : 2 he males, 1 female, 2 N, Tarrant
 County, Texas (NU 1031); 2 he, 1 ho males, 2 females, Devils River, Val
 Verde, Texas (NU 1716); 1 ho male, Currituck Sound, Currituck County, North
 Carolina (AMNH 749739, UGA 8192). From *Anas undulata* : 3 ho males, 3
 females, Johannesburg, South Africa (NU 2096); 1 female, Bedford, Cape
 Province, South Africa (NU3590); 1 he male, 5 N, Isis Estates, Bononi,
 Transvaal, Africa (NU 4079). From *Anas penelope* : 1 he male, Bharatpur,
 Rajasthan, India (YSU 1036). From *Mareca (=Anas) americana* : 3 he males, 2
 females, 5 N, Dallas Lake, Dallas County, Texas (NU 1030); 2 he males, 4

females, 4 N, Dallas Lake, Dallas County, Texas (NU 1051); 1 female, Montauk Point, Suffolk County, New York (AMNH 350648, UGA 8192). From *Chaulelasmus (=Anas) streperus* : 2 females, Mobile Bay, Alabama (USNM 260179, UGA 2893). From *Spatula (=Anas) clypeata* : 5 ho males, 4 females, Eagle Lake, Colorado County, Texas (NU 1040); 4 he, 1 ho males, 10 females, Dallas Lake, Dallas County, Texas (NU 1041); 7 he, 2 ho males, 7 females, Lake Dallas, Dallas Co., Texas (NU 1042); 11 he, 2 ho males, 4 females, Dallas Lake, Dallas County, Texas (NU 1043). From *Spatula (=Anas) platalea* : 3 he, 3 ho males, 9 females, 1 N, Rio Salado, Sante Fe, Argentina (USNM 59132, UGA 2892). From *Salvadorina (=Anas) waiguensis* : 4 he males, 8 females, 4 N, Dutch New Guinea (USNM 518906, UGA 2899). From *Dendronessa galericulata* : 3 he males, Songdo, Korea (USNM 317815, UGA 2890). From *Pteronetta hartlaubii* : 7 he males, Avakubi, Ituri Province, Belgian Congo (AMNH 157650, UGA 8596); 1 he male, Niangara, Uele Province, Belgian Congo (AMNH 157658, UGA 8597); 2 he males, Niangara, Uele Province, Belgian Congo (AMNH 157645, UGA 8598).- From *Thalassornis leuconotos leuconotos* : 1 he male, Kagera River, Tanganyika--Ruanda-Urundi Border (AMNH 734049, UGA 2437); 1 female, Naivasha, Kenya (AMNH 734044, UGA 2439). From *Aix sponsa* : 2 he males, Dallas, Texas (NU 1049); 1 he male, Dallas, Texas (NU 1050); 1 ho male, 1 female, Saratoga Lake, Saratoga County, New York (UGA 8186); 1 female, Montuak Point, Suffolk County, New York (AMNH 64705, UGA 8187); 2 he males, Homosassa Springs, Florida (CM 610101-13); 5 he males, Sangamon River, Illinois (NU 4727).

Freyana casarcae Dubinin
(Figs. 52-56)

Dubinin, 1950a, Akad. Nauk USSR, Zool. Inst., Parazit. Sb., 12 : 35, 36, fig. 6, 6-10.

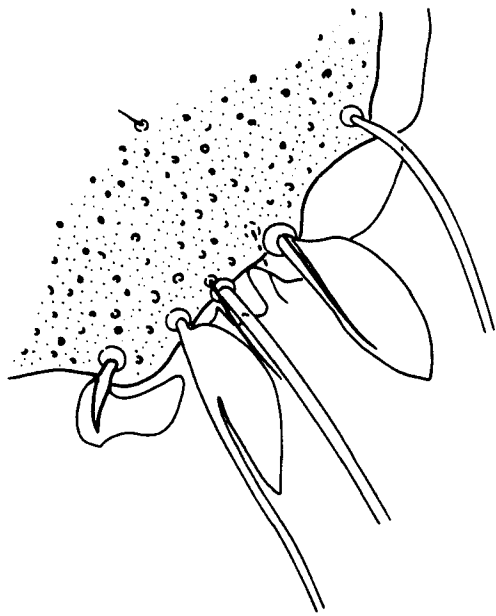
Dubinin, 1951b, Parazit. Sb., 13 : 213, 215.

Dubinin, 1953, Fauna of the USSR, 6(6) : 267, 268, fig. 90, 91, 110.

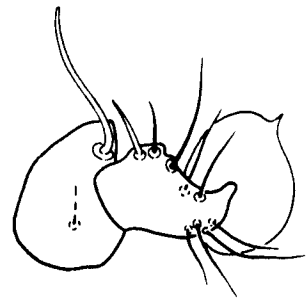
This species strongly resembles the previous species with differences noted in the shape and size of the caudal setae. These mites are restricted to birds of the genus *Tadorna* Fleming. These ducks have ranges extending throughout Europe, Asia, North America, and some Pacific Islands.

Male. Heteromorph. Length (incl. gnathosoma) 665 μ , width 465 μ . Idiosoma oval shaped, widely rounded posteriorly. Lateral hysterosomal membranes wide, extend from level of *sh* to *l4*, width 55 μ . Leg II with tibial expansions well developed dorsally, pointed at the tip, width 45 μ . *Dorsal idiosoma* : Propodosomal shield granular in appearance overall; transverse suture well defined; hysterosomal shield granular in appearance with small scattered lacunae overall. Dorsal setae relatively long; *d4* setiform, located anterior and slightly medial to *l5*, length 60 μ ; *d5* very long, setiform with large petal-like lateral expansions at the base, separated from the setae by a narrow space, expansion length 106 μ , width 43 μ . Setae *l3* thick, setiform, long; *l4* wide, petal shape, pointed at the tip with raised edges, length 117 μ , width 53 μ ; *l5* long, thick, setiform; *Pa1* arise from a terminal cleft, sickle shaped, with wide pointed inner membrane

Freyana casarcae (Dubinin, 1950). Fig. 52 : homeomorphic male, terminal setae. Fig. 53 : tarsus of leg II, homeomorphic male. Fig. 54 : heteromorphic male, terminal setae. Fig. 55 : tarsus of leg II, heteromorphic male. Fig. 56 : female, terminal setae.



52



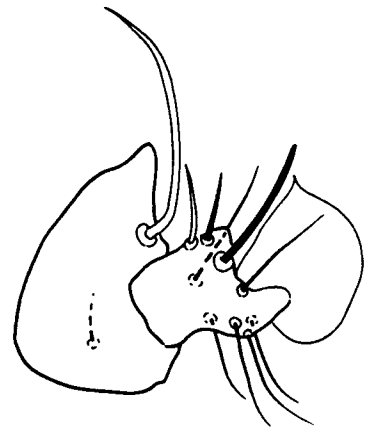
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53

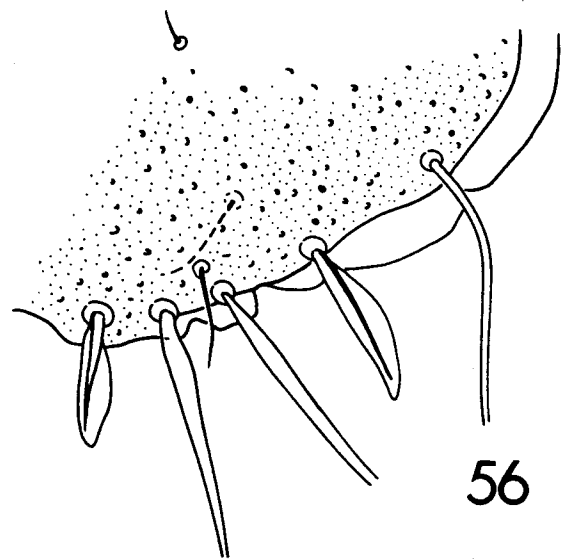
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55



56

and longer curved outer membrane, length 43 μ , width 70 μ . *Ventral idiosoma* : Strongly developed overall; coxal fields I-IV closed, epimerites I fused into a long sternum with small lateral sclerite at tip joined to epimerite II, epimerites II and IIA fused, III and IIIA fused in elongated circle shape, IV fused to IIIA; Y-shaped medial sclerite present. Setae *Pae* thin, setiform, positioned antero-medial to *14*.

Male. Homeomorph. Length (incl. gnathosoma) 535 μ , width 335 μ . Idiosoma widely oval, rounded posteriorly; lateral hysterosomal membranes less developed than in heteromorph, extending from level of base of legs IV to *14*, width 24 μ . Tibial expansions on leg II moderately developed dorsally, rounded at the tip, width 19 μ . *Dorsal idiosoma* : Resembles heteromorph in shield characteristics; *d4* anterior and slightly medial to *15*, length 22 μ ; *d5* very long, setiform with petal-like lateral expansion at the base, expansion length 61 μ , width 24 μ ; *13* thinner than heteromorph, long, setiform; *14* pointed with petal-like shape, with medial edge less rounded, length 78 μ , width 27 μ . Setae *15* long, thick, setiform; *Pae* resembles heteromorph with smaller dimensions, length 32 μ , width 46 μ . *Ventral idiosoma* : Epimerites I fused into short sternum, coxal field I open; epimerites II bent strongly at tip towards IIA; IIA straight, coxal field II open; III and IIIA fused in oval shape; IV fused to IIIA; Y-shaped sclerite fused to IIIA and positioned anterior to genital organ. Setae *Pae* as in heteromorph.

Female. Length (incl. gnathosoma) 580 μ , width 390 μ . Idiosoma widely oval, rounded posteriorly; lateral hysterosomal membranes narrow, extending from level of legs III to *14*, width 20 μ ; tibial expansions poorly developed dorsally, width 9 μ . *Dorsal idiosoma* : Resembles males in shield

pattern with larger numbers of small lacunae; *d4* thin, setiform, positioned anterior to *15*, length 24 μ ; *d5* long, setiform, with narrow membranes at the base; *13* thin, long, setiform; *14* lanceolate, curved slightly inward, length 64 μ ; *15* long, thick, setiform; *Pai* straight, lanceolate, rounded tip, length 52 μ . *Ventral idiosoma* : Sclerotization pattern of coxal fields resembles *Freyana largifolia*; setae *Pae* thin, setiform, located well anterior and lateral to *14*, length 38 μ .

Materials examined - Type host : From *Tadorna radjah radjah* : 1 he, 1 ho males, Ceram Island, S. Moluccas, Indonesia, 25-VIII-1911 (UGA 3377); 7 he males, No Data, (UGA 3380); 1 he male, Arfak Mountains, New Guinea, 15-IV-1931 (NU 5614). From *Tadorna tadorna* : 1 female, Sarpa Lakes, Stalingrad, Russia, 5-V-1909 (AMNH 407632, UGA 8621).

Freyana magnosetae Dubinin
(Figs. 57-62)

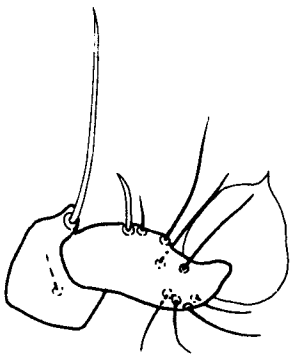
Dubinin, W. B., 1950a, Akad. Nauk USSR, Zool. Inst., Parazit. Sb., 12 : 36, fig. 6, 1-5.

This is the largest of the species of *Freyana* and strongly resembles the preceding species, differing in the shape and dimensions of the caudal setae and roundness of the idiosoma. These mites are found on the primary feathers and covert feathers of the wings of the Egyptian goose *Alopochen aegyptiaca* (Linnaeus).

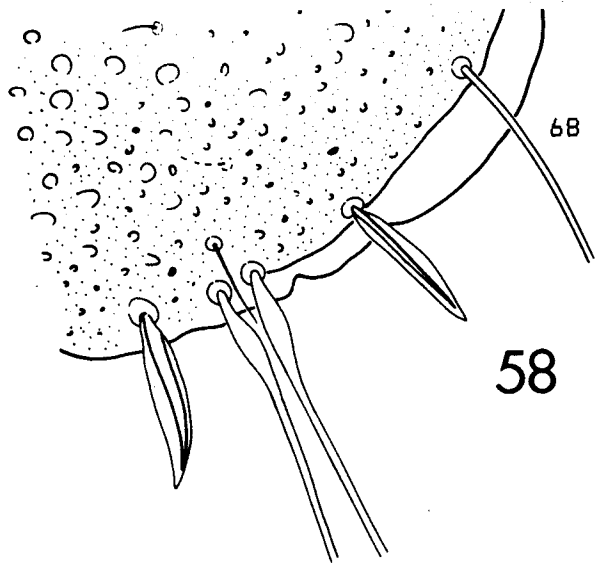
Male. Heteromorph. Length (including gnathosoma) 720 μ , width 530 μ . Idiosoma egg shaped, rounded posteriorly; lateral hysterosomal membranes

Freyana magnosetae, Dubinin, 1953. Fig. 57 : tarsus of leg II, female. Fig. 58 : female, terminal setae. Fig. 59 : homeomorphic male, terminal setae. Fig. 60 : tarsus of leg II, homeomorphic male. Fig. 61 : heteromorphic male, terminal setae. Fig. 62 : tarsus of leg II, heteromorphic male.

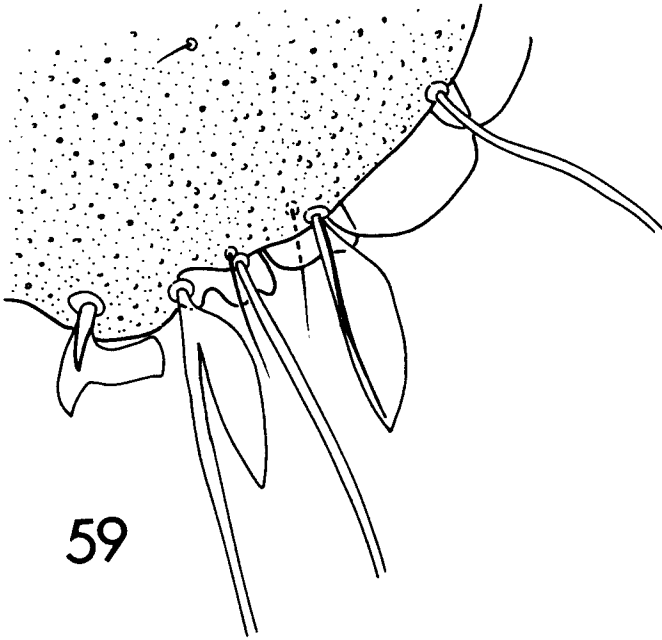
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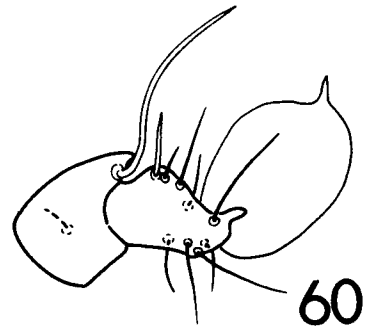
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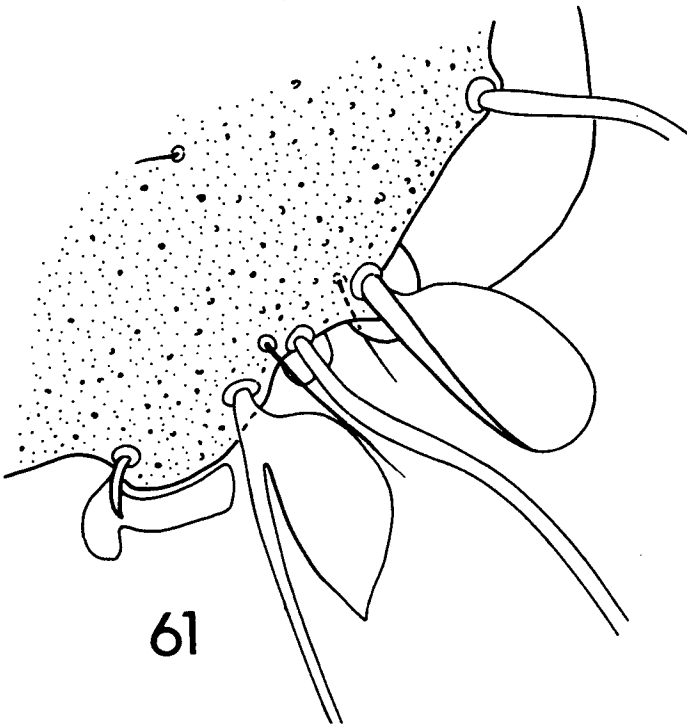
100μ



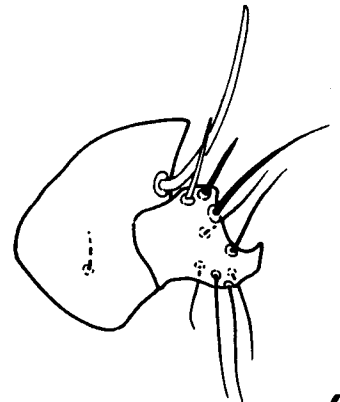
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61



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very wide, extending from level of *sh* to *l4*, width 46 μ ; leg II with tibial expansion well developed dorsally, pointed at tip, width 37 μ . *Dorsal idiosoma* : Propodosomal shield coarsely granular in appearance anterior to *sci*; transverse suture well defined: hysterosomal shield coarsely granular in appearance with scattered lacunae overall posterior to *d1*. Setae *d4* relatively long, thin, setiform, length 64 μ ; *d5* very long, thick with large rounded, petal-like expansion at the base, expansion length 86 μ , width 38 μ ; *l3* thick, setiform, long; *l4* wide, rounded, petal-like, with raised edges, length 106 μ , width 50 μ ; *l5* long, thick, setiform; *Pa2* arise from terminal cleft, sickle-shaped, elongate, with rounded inner expansions and long, curved outer expansions, length 48 μ , width 60 μ . *Ventral idiosoma* : All coxal fields closed; heavily sclerotized overall. Setae *Pa2* thin, setiform, originates anteromedial to *l4*.

Male. Homeomorph. Length (incl. gnathosoma) 600 μ , width 420 μ . Idiosoma egg shaped, rounded posteriorly; lateral hysterosomal membranes narrow, extending from level of top of base of legs III to *l4*, width 31 μ ; tibial expansions on legs II poorly developed, with pointed tip, width 10 μ . *Dorsal idiosoma* : Propodosomal shield granular in appearance overall; hysterosomal shield granular in appearance and covered with small, scattered lacunae. Setae *d4* thin, setiform, positioned directly anterior to *l5*; *d5* very long, thin, setiform with leaf-like lateral expansion at base, expansion length 68 μ , width 19 μ . Setae *l3* long, thin, setiform; *l4* blade-like, wide, pointed, with raised inner edges, length 84 μ , width 22 μ ; *l5* long, thick, setiform; *Pa2* broad, with squared-off lateral expansion and lengthened inner expansion, length 46 μ , width 38 μ . *Ventral idiosoma* : Epimerites I fused into sternum; II bent at tip; IIA straight; III and IIIA

fused in oval shape; coxal fields I and II open, coxal field III closed; small Y-shaped sclerite present at posterior of sternum. Setae *Pae* located antero-medial to *l4*, thin, short, setiform.

Female. Length (incl. gnathosoma) 655 μ , width 460 μ . Large rounded oval idiosoma; lateral hysterosomal membranes narrow, extend from level of bottom of base of legs III to *l4*, max. width 19 μ . Tibial expansions of legs II almost non-existent, rounded tip, width 9 μ . *Dorsal idiosoma* : Propodosomal shield granular in appearance, anterior to *sce*; transverse suture well defined; hysterosomal shield granular in appearance overall. Posterior to level of *d1* with numerous small lacunae around the border and large lacunae at the mid-region. Setae *d4* short, thin, setiform, positioned anterior and between *l5* and *d5*; *l3* long, thin, setiform; *l4* short, lanceolate, pointed, length 62 μ ; *l5* and *d5* long, thin, setiform, slightly wider in the base; *Pai* short, lanceolate, length 53 μ . *Ventral idiosoma* : Epimerites I fused into short sternum; epimerites II bent at tip; IIA - straight; III and IIIA in C-shaped configuration; IV fused to IIIA; coxal fields I, II, and III open. Setae *Pae* short, setiform, located well anterior to *l5*.

Materials examined - Type host : From *Alopochen aegyptiaca* : 8 he, 1 ho males, 3 females, Nyiro River, Sotik District, Kenya, 23-VI-1909 (USNM 213876, NU 9533); 6 he, 1 ho males, 5 females, Plains of Kilimanjaro, Kenya, 22-VIII-1888 (USNM 117773, NU 9534); 2 he males, Western Somaliland, 20-IX-1894 (AMNH 731278, UGA 2426); 1 he male, 1 female, Nairobi, Kenya, 9-IX-1921 (AMNH 202525, UGA 5612); 1 he male, 2 females, 3 N, Dana River, Maica Murri, Northern Kenya, 8-XI-1951 (NU 8354 [BMNH]); 1 he male, Shendi, Northern Province, Sudan, 18-III-1901 (AMNH 731280, UGA 2424); 2 he males,

Shendar, Blue Nile Province, Sudan, 17-IX-1850 (AMNH 731282, UGA 2425); 3 he
 males, 2 females, Hoache River, Southern Ethiopia, 11-III-1915 (AMNH 731270,
 UGA 8613).

Freyana secundus Dubinin
 (Figs. 63-66)

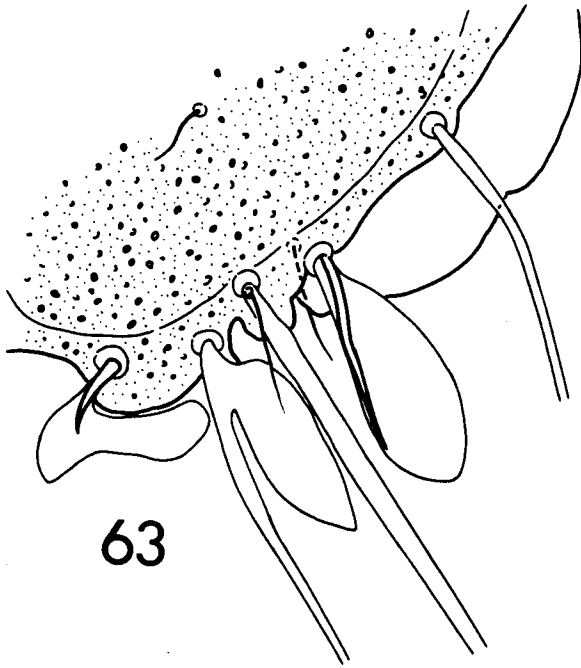
Dubinin, W. B., 1950a, Akad. Nauk USSR, Zool. Inst., Parazit.
 Sb., 12 : 37, 38, fig. 7, 5-8.

Dubinin (1950a) reports that the heteromorphic males are unknown and
 continued only to describe the homeomorphic form. the following
 descriptions are from numerous heteromorphs since the homeomorphic forms are
 rare in this collection. The description of the latter type is based on
 Dubinin's original descriptions.

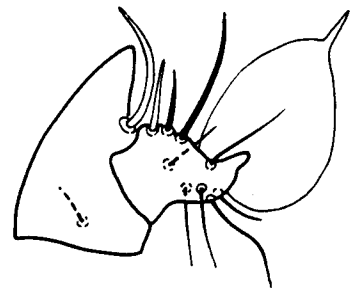
The heteromorph male is differentiated by the dimensions of the
 caudal setae and the lateral membranes, the shape of the leg II tibial
 expansions and the sclerotization patterns of the idiosoma. This species is
 recorded only from *Sarkidiornis melanotos* Pennant which ranges from Africa
 to southern Asia.

Male. Heteromorph. Length (incl. gnathosoma) 620 μ , width 450 μ .
 Idiosoma large, widely rounded; pronounced terminal cleft; lateral
 hysterosomal membranes wide, extending from level of *sh* to *l4*, with slight
 groove at level of leg III, width 60 μ . Tibial expansions of legs II well
 developed dorsally, pointed at tip, width 36 μ . *Dorsal idiosoma* :
 Propodosomal shield granular in appearance overall; transverse suture well

Freyana secundus (Dubinin, 1950). Fig. 63 : heteromorphic male, terminal setae. Fig. 64 : tarsus of leg II, heteromorphic male. Fig. 65 : female, terminal setae. Fig. 66 : tarsus of leg II, female.

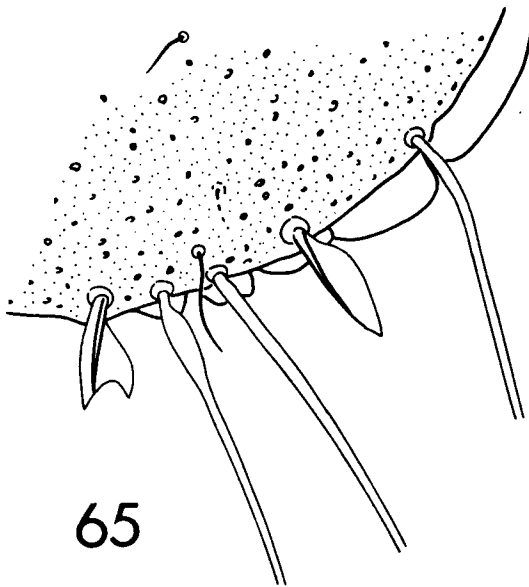


63

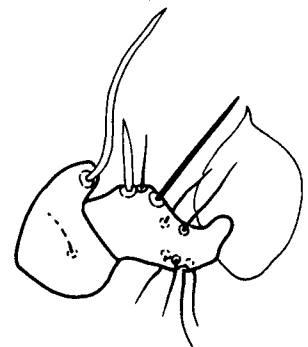


64

100μ



65



66

defined followed by narrow striated region; hysterosomal shield finely granular in appearance. Setae $d4$ relatively long, thin, setiform, positioned anterior to $l5$; $d5$ very long, thick, setiform, with long leaf-like expansion at the base, pointed at tip, expansion length 78μ , width 27μ . Setae $l3$ long, thick, setiform; $l4$ large, pointed, petal-like shaped with raised edges, length 101μ , width 34μ ; $l5$ long, thick, setiform; $Pa2$ positioned within terminal cleft, boot-shaped, with pointed inner expansion, and with long, narrow, lateral expansions, length 50μ , width 65μ . *Ventral idiosoma* : Strongly sclerotized; all coxal fields closed; coxal field III oval shaped; large Y-shaped sclerite present; $Pa6$ relatively long, thin, setiform, arises anterior to $l4$.

Male. Homeomorph. (From Dubinin, 1950a) Length 460μ , width 390μ . The length of $Pa2$ nearly equals its width, the setae is triangular in shape. The leaf-like expansions of $d5$ are small, narrow, pointed at tip; $l3$ and $l5$ are setiform; $l4$ are narrow, pointed. Medial sclerite is stick-like, somewhat split on the end. Tibial expansions of legs II bluntly truncate distally.

Female. Length (incl. gnathosoma) 560μ , width 380μ . Idiosoma widely rounded, with oval shape; lateral hysterosomal membranes narrow, extend from bottom of base of legs III to $l4$; leg II tibial expansions slightly developed dorsally, with rounded tip, width 14μ . *Dorsal idiosoma* : Propodosomal shield granular in appearance overall; transverse suture well defined; hysterosomal shield granular in appearance. Setae $d4$ short, thin, setiform, anterior and slightly medial to $l5$; $d5$ long, thin, setiform with narrow outer expansion at the base, width 8μ ; $l3$ long, thick, setiform; $l4$ short, lanceolate, length 53μ ; $l5$ long, thick, setiform; $Pa2$ short,

double-tipped, with setal shaft traversing the larger inner expansion, length 40 μ , width 19 μ . *Ventral idiosoma* : Epimerites I fused into long sternum; II bent at tip; IIA straight; III and IIA fused into circular shape; coxal fields I and II open; coxal field III closed; epimerite IV fused to IIIA. Epigynium semicircular, between tips of epimerite IIA. Setae *Pae* relatively long, thin, setiform, positioned well anterior to 15.

Materials examined - Type host : From *Sarkidiornis melanotos* : 7 female, 6 N, Tsessebe, Bechuanaland, South Africa, 2-I-1956 (NU 3898); 1 he male, 1 female, Tsessebe, Bechuanaland, South Africa, 2-I-1956 (NU 2103).

Additional materials : From *Sarkidiornis melanotos* : 2 he males, 1 female, Faradje, Eastern Province, Belgian Congo (AMNH 157634, UGA 2427); 2 he males, 1 female, Mawere, Tanganyika (AMNH 428578, UGA 2429); 1 he male, 8 females, Bharatpur, Rajasthan, India (UGA 6375); 2 he males, 2 females, Faradje, Eastern Province, Belgian Congo (AMNH 157636, UGA 2428); 2 he males, 2 females, Faradje, Eastern Province, Belgian Congo (AMNH 157633, UGA 2430); 3 he males, Kyabe District, South Chad Territory, French Equatorial Africa (USNM 458208, NU 9535).

Freyana aythinae Dubinin
(Figs. 67-71)

Dubinin, W. B., 1950a, Akad. Nauk USSR, Zool. Inst., Parazit. Sb., 12 : 38, fig. 7, 9-13.

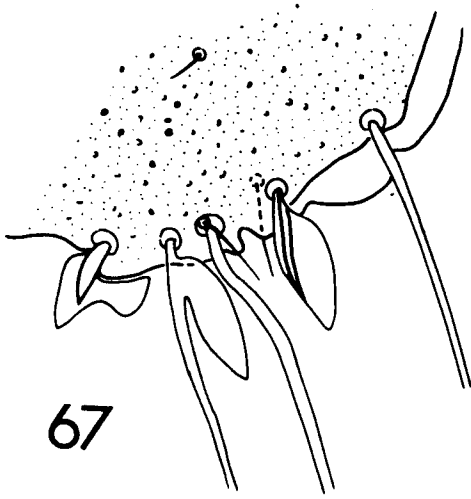
Dubinin, W. B., 1951b, Parazit. Sb., 13 : 213-215.

Dubinin, W. B., 1953, Fauna of the USSR, 6(6) : 268, 269, fig 111.

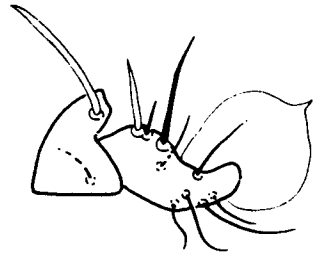
This species is differentiated by the shape and dimensions of the terminal setae, the appearance of the coxo-sternal skeleton and the tibial expansions of legs II. Both morphological forms of the male are present. This mite inhabits the primary feathers and wing covert feathers of ducks of the genus *Netta* Kaup and *Aythya* Boie (= *Nyroca* Fleming). They are found along with *Freyana nyrocae* on the same bird and have a worldwide distribution.

male. Heteromorph. Length (incl. gnathosoma) 540 μ , width 380 μ . Idiosoma widely oval; lateral hysterosomal membranes wide, extending from level of *d1* to *l4*, width 39 μ ; tibial expansions leg II well developed dorsally, pointed at tip, width 44 μ . *Dorsal idiosoma* : Propodosomal shield finely granular in appearance; transverse suture well defined; entire hysterosomal shield finely granular in appearance, covered with small lacunae; *d4* very thin, setiform, positioned anterior to *l5*; *d5* thin, setiform, with long, pointed, leaf-like lateral expansions at the base, expansion length 94 μ . Setae *l3* long, thick, setiform; *l4* long, rounded, with petal-like shape, length 88 μ , width 31 μ ; *l5* long, thick, setiform; *Pa2* positioned on terminal cleft, with pointed inner expansion and rounded outer

Freyana aythinae (Dubinin, 1951). Fig. 67 : homeomorphic male, terminal setae. Fig. 68 : homeomorphic male, tarsus of leg II,. Fig. 69 : female terminal setae. Fig. 70 : heteromorphic male, terminal setae. Fig. 71 : heteromorphic male, tarsus of leg II.

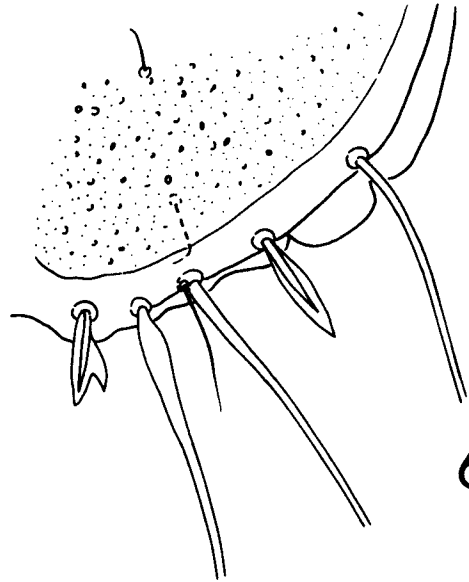


67

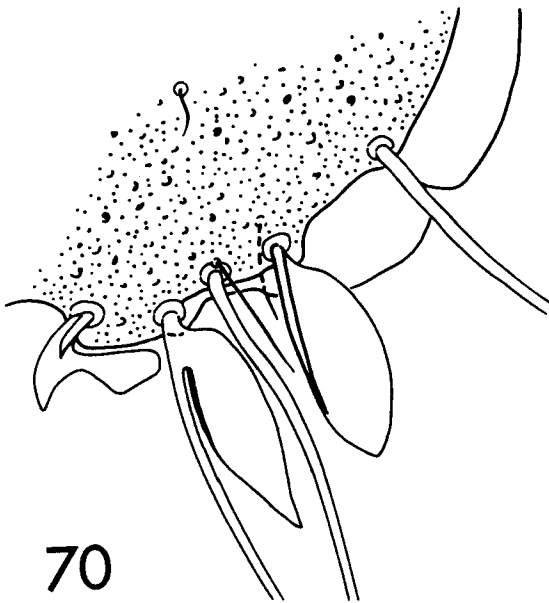


68

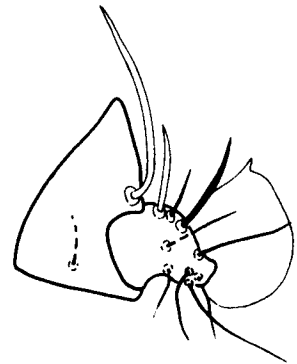
100μ



69



70



71

expansion, length 45 μ , width 43 μ . *Ventral idiosoma* : Strongly sclerotized overall; closed coxal fields; large medial sclerite; *Pae* thin, short, setiform.

Male. Homeomorph. Length (incl. gnathosoma) 490 μ , width 320 μ . Idiosoma smaller than previous species, rounded oval shape; lateral hysterosomal membranes narrow, extending from level of bottom of base of legs III to *I4*, width 17 μ ; leg II with tibial expansion slightly dorsal, with squared-off tip, width 17 μ . *Dorsal idiosoma* : Propodosomal shield finely granular in appearance; transverse suture well defined; entire hysterosomal shield finely granular in appearance with numerous evenly spaced small lacunae; *d4* short, thin, setiform, positioned anterior to *I5*. Setae *d5* long, thin, setiform with narrow, pointed, lateral leaf-like expansions at the base, expansion length 48 μ , width 14 μ ; *I3* long, thick, setiform; *I4* pointed, leaf-like, raised inner and rounded outer edges, length 57 μ , width 17 μ ; *I5* long, thick, setiform, wider at the base; *Pae* positioned on terminal cleft, with longer pointed medial expansion and wider truncate lateral expansions, length (to point) 39 μ , width 36 μ . *Ventral idiosoma* : Epimerites I fused into short sternum; II bent at tip; IIA straight; III and IIIA fused into oval shape; IV fused to IIIA; small weakly developed medial sclerite present; coxal fields I, II open; coxal field III closed. Setae *Pae* very thin, setiform, positioned anterior to *d4*.

Female. Length (incl. gnathosoma) 490 μ , width 345 μ . Idiosoma rounded, relatively small; lateral hysterosomal membranes narrow, extending from level of base of legs IV to *I4*, width 10 μ ; tibial expansions of legs II weakly developed dorsally, with rounded tip, width 12 μ . *Dorsal idiosoma* : Propodosomal shield finely granular in appearance; transverse suture well

defined; hysterosomal shield finely granular in appearance overall with few small scattered lacunae posterior to legs IV; $\sigma 4$ thin, setiform, positioned anterior to 15. Setae $\sigma 5$ long, setiform with small expansions at the base; 13 long, setiform; 14 lanceolate, short, length 43 μ ; 15 long, setiform; *Pa* double tipped, length 35 μ , width 14 μ . *Ventral idiosoma* : As in homeomorph except without medial sclerite; *Pa*e thin, setiform, short, positioned well anterior to 15.

Material examined - Type host : From *Nyroca (=Aythya) nyroca* : 3 females, Egypt, 1-II-1917 (AMNH 4224537, UGA 2434); 4 he, 1 ho males, 4 females, Inchas, Egypt, 12-II-1916 (AMNH 424535, UGA 2436).

Additional material examined : From *Aythya affinis* : 2 ho males, 3 females, Burlington, Iowa (AMNH 733402, UGA B350); 1 female, Lake Dallas, Texas (NU 1052, DM 1480); 1 female, Lake Dallas, Texas (NU 1053, DM 1298); 2 females, Paso Real Ranch, Texas (NU 1054, DM B2); 1 he male, 2 females, 9 K Ranch, Delaware River, Texas (NU 1708, TAM 2766); 2 he, 9 ho males, 12 females, Coldstream, Ontario (UGA B351, AMNH 749879); 1 female, Mastic, Suffolk County, New York (AMNH 149300, UGA B185). From *Aythya australis* : 3 he, 1 ho males, 10 females, Australia (AMNH 733284, UGA B627); 2 he, 2 ho males, 9 females, 1 N, West Irian (AMNH 703557, UGA B624); 1 he male, 1 female, 2 N, Lindu River, Celebes (USNM 250634, UGA 2898); 1 ho male, 6 female, 9 N, Dawson River, S.E. Queensland, Australia (AMNH 733270, UGA B626). From *Aythya baeri* : 3 he, 1 ho males, 7 females, Linchuan, Anhwei, China (NU 1707); 2 he males, 4 females, Manchuria (AMNH 733253, UGA B623); 2 ho males, Ningpo, Chekiang, China (AMNH 733254, UGA B622). From *Aythya collaris* : 2 he males, 2 females, Eagle Lake, Texas (NU 1045); 1 he male, 1 female, Colorado County, Texas (NU 1046); 1 female, Eagle Lake, Texas (NU

1047); 7 females, Eagle Lake, Texas (NU1048); 4 he, 1 ho males, 5 females, New York, New York (UGA 8183). From *Aythya erythroptalpa* : 8 females, Cape Town, South Africa (NU 4116); 2 he, 1 ho males, 6 females, Transvaal, South Africa (USNM 433501, UGA 2897); 3 he, 1 ho males, 2 females, Cali, Valle del Cauca, Colombia (AMNH 111374, UGA 8629); 3 he males, 7 females, Quito, Peru (AMNH 151159, UGA 8630). From *Aythya novaseelandiae* : 2 he males, 2 females, New Zealand (UGA 8633); 4 he males, 5 females, New Zealand (UGA 8634). From *Aythya nyroca* : 1 he male, 5 females, Seistan, Iran (AMNH 733227, UGA 2433); 1 he male, 3 females, Cairo, Egypt (AMNH 424534, UGA 2435). From *Aythya valisineria* : 1 he male, 3 females, Hackberry Lake, Nebraska (AMNH 95396, UGA 8353). From *Netta rufina* : 2 he, 1 ho males, Salonika, Greece (NU 8355); 1 female, Rome, Italy (NU 8356); 3 female, Calcutta, India (NU 8357); 1 female, Hassan-Cadé, Iran (NU 11855, AMNH 73306).

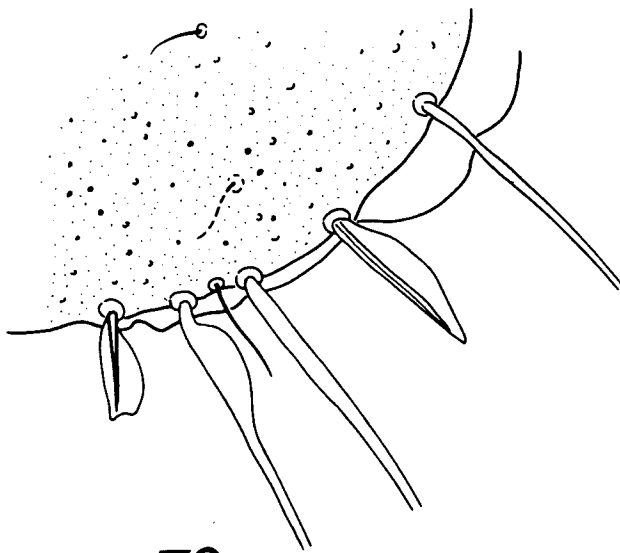
Freyana tadornae Dubinin
(Fig. 72)

Dubinin, W. B., 1950a, Akad. Nauk USSR, Zool. Inst., Parazit. Sb., 12 : 38, fig. 7, 14-15.

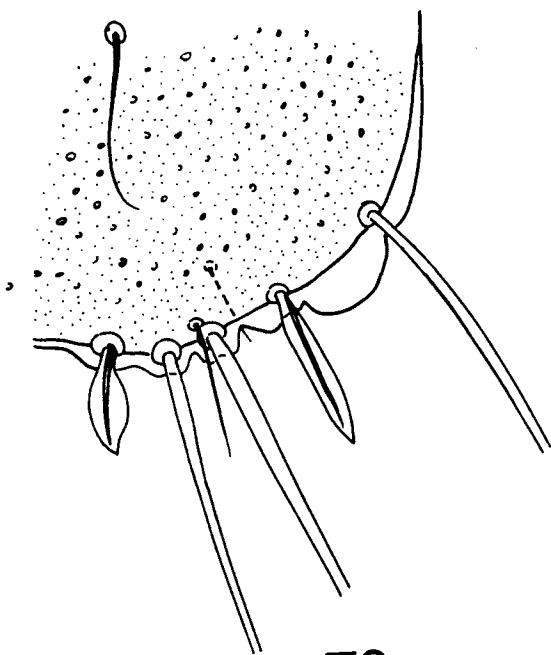
Only female specimens of this species have been found. They are differentiated by the shape of the caudal setae and the appearance of the coxo-sternal skeleton. This species is recorded only from *Tadorna radjah radjah* (Lesson) from the South Pacific.

Freyana tadornae (Dubinin, 1950). Fig. 72 : female, terminal setae.

Freyana nettapina (Frouessart et Megnin, 1885; Dubinin, 1950). Fig. 73 : female, terminal setae. Fig. 74 homeomorphic male, terminal setae.



72



73



74

Female. Length (incl. gnathosoma) 585 μ , width 380 μ . Idiosoma widely oval; lateral hysterosomal membranes extending from level of base of legs III to 14, width 10 μ ; leg II with tibial expansions poorly developed, with rounded tip, width 15 μ . *Dorsal idiosoma* : Propodosomal shield appears finely granular; transverse suture well defined; hysterosomal shield finely granular in appearance with numerous small scattered lacunae overall. Setae *d4* thin, setiform; 14 lanceolate, length 67 μ , width 14 μ ; 15 thick, long, setiform; *Pa2* oval with grooved tip, wide outer expansions, length 38 μ , width 17 μ . *Ventral idiosoma* : Epimerites I fused into short sternum; II bent at tip; IIA straight; III and IIIA fused into circular shape; IV fused to IIIA; open coxal fields I and II; closed coxal field III. Setae *Pa6* short, setiform, positioned anterior to 15.

Materials examined - *Type host* : From *Tadorna radjah radjah* : 3 female, 1 N, Ceram Island, S. Moloccas, Indonesia, 25-VIII-1911 (UGA 3377), 3 female, No Data, (UGA 3380).

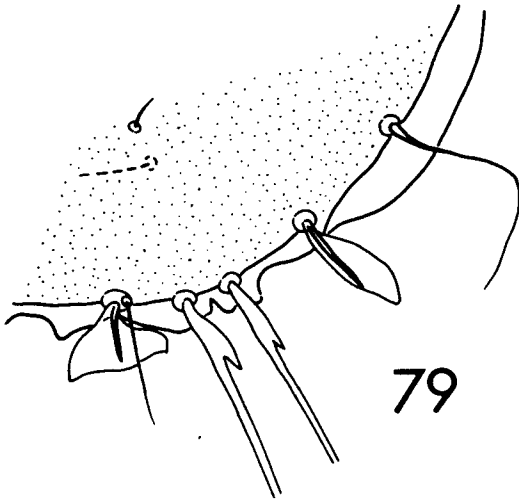
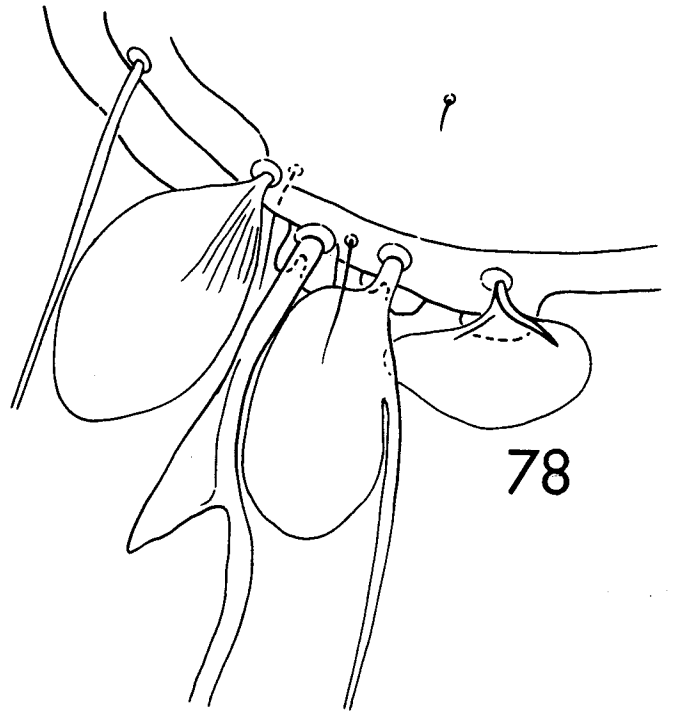
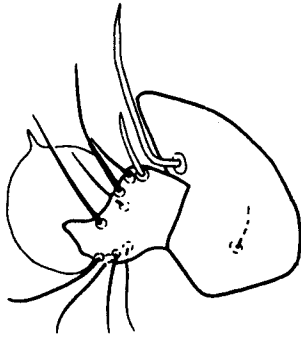
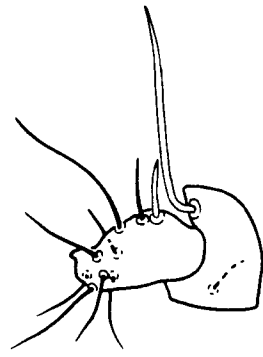
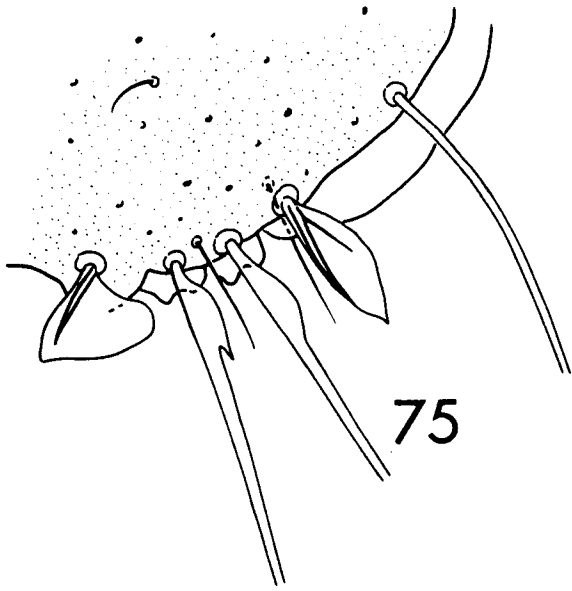
Freyana dendrocygni Dubinin
(Figs. 75-79)

Dubinin, W. B., 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb., 12 : 39-41, fig. 8 : 1-4.

This species is recognized by the shape of the terminal setae, particularly the horn-like growth on setae 15 of the heteromorphic male and the outer expansions on setae 15 and *d5* of the female.

Freyana dendrocygni Dubinin is parasitic on various species of

Freyana dendrocygni (Dubinin, 1950). Fig. 75 : homeomorphic male, terminal setae. Fig. 76 : homeomorphic male, tarsus of leg II,. Fig. 77 : heteromorphic male, tarsus of leg II,. Fig. 78 : heteromorphic male, terminal setae. Fig. 79 : female, terminal setae.



100μ

ducks of the genus *Dendrocygna* Swanson. The majority of these ducks are from the Southern Hemisphere with two species ranging into southern North America.

Male. Heteromorph. Length (incl. gnathosoma) 590 μ , width 475 μ . Idiosoma widely oval to pear-shaped, rounded posteriorly, tapered anteriorly; lateral hysterosomal membranes wide, extending from level of setae *sh* to *14*, width 33 μ . Tibial expansions of leg II well developed dorsally along entire length of segment, with rounded point, width 30 μ . *Dorsal idiosoma* : Heavily sclerotized overall; propodosomal shield densely granular in appearance; transverse suture well-defined; hysterosomal shield very densely granular in appearance with covering of small evenly spaced lacunae along posterior half; *d1*, *d2*, *d3* short, setiform; *d4* slightly longer, thin, setiform, with origin along edge of hysterosomal shield anterior to and between *15* and *d5*, length 44 μ ; *d5* very long, thick, setiform, with rounded, petal-like lateral expansion attached along the base, expansion length 93 μ , width 39 μ . Setae *13* long, thick, setiform; *14* large, rounded, oval shaped, length 117 μ , width 73 μ ; *15* long, thick, setiform with lanceolate lateral projection attached, lateral projection length 70 μ , width 25 μ . Setae *Pa2* wide, fan shaped, length 47 μ , width 82 μ . Small hysterosomal cleft present. *Ventral idiosoma* : Coxo-sternal skeleton well-developed; all coxal fields appear closed; epimerites I fused into long sternum; II straight; IIA straight and fused to III; III and IIIA fused in oval shape; IV fused to IIIA; posterior medial Y-shaped sclerite present enclosing posterior region of sternum. Genital organ short, located between bases of legs IV. Setae *Pa6* thin, setiform, located slightly anteromedial to *14*, length 48 μ .

Male. Homeomorph. Length (incl. gnathosoma) 555 μ , width 415 μ . Idiosoma widely oval, rounded posteriorly; lateral hysterosomal membranes extending from level of base of legs III to 14, width 21 μ . Dorsal tibial expansions of legs II less developed than in heteromorph, with rounded tip, width 14 μ . *Dorsal idiosoma* : Propodosomal and hysterosomal shields appear as in heteromorph; *d4* thin, short, setiform, positioned anterior to *d5* and 15; *d5* very long, setiform with small, pointed, lanceolate lateral expansion at the base, expansion length 41 μ , width 7 μ . Setae 13 long, thin, setiform; 14 lanceolate, rounded tip, length 72 μ , width 21 μ ; 15, thick, long, setiform, expanded laterally at the base 4 μ . Setae *Pa1* appear as in heteromorph with smaller dimensions, length 38 μ , width 60 μ . Small hysterosomal cleft present. *Ventral idiosoma* : Less sclerotized than heteromorph; epimerites I fused into long straight sternum; II and IIA straight; III and IIIA approach oval configuration, not fused; IV fused to IIIA. Posterior medial sclerite lacking with less demarcation of coxal field IV. All coxal fields open. Genital organ short, between base legs IV. Setae *Pae* as in heteromorph, length 50 μ .

Female. Length (incl. gnathosoma) 560 μ , width 390 μ . Idiosoma widely oval; lateral hysterosomal membranes extending from level of *d2* to 14, width 7 μ . *Dorsal idiosoma* : Propodosomal and hysterosomal shields as in males of the species. Setae *d1*, *d2*, *d3* short, setiform, positioned anterolateral to *Pa1*; *d5* as in homeomorphic male, expansion length 14 μ , width 7 μ . Setae 13 long, thin, setiform; 14 lanceolate, rounded at tip, small, length 45 μ , width 14 μ ; 15 identical to *d5*; *Pa1* appears as in the males except smaller in size, length 26 μ , width 37 μ . Small hysterosomal cleft present. *Ventral idiosoma* : Epimerites I fused into short sternum; II

and IIA straight; III slightly curved; IIIA bends sharply anterior to meet III after fusing to epimerite IV. Coxal field I and II open, coxal field III closed. Setae *Pae* located away from edge of hysterosoma, anterior to *o5*.

Materials examined - Type Host : From *Dendrocygna autumnalis autumnalis* : 2 ho males, 9 females, Lometa, Texas, 4-VIII-1880 (UGA 8362); 4 females, 2 N, Lometa, Texas, 18-VIII-1880 (AMNH 79613, UGA 8364); 1 he, 2 ho males, 7 females, 3 N, Nicoya, Costa Rica, no date (AMNH 123660, UGA 8365). From *Dendrocygna bicolor helva* : 8 he males, 4 females, 5 N, Eagle Lake, Texas, 2-I-1942 (NU 1056); 1 female, 19 N, Calcasien Co., Louisiana, 2-XII-1907 (NU 4834); 1 he male, 3 N (NU 4873); 2 he males, 2 females, Cameron Co., Texas (CM 610101-11); 1 female, 1 N, Calcasien Co., Louisiana (CM 610101-12). From *Dendrocygna javanica* : 7 females, Chiangmai Province, N. Thailand, 5-V-1936 (UGA 2572); 1 he, 1 ho males, 7 females, Goalpara, Assam, India, 5-VII-1905 (UGA 8602); 6 he males, 4 females, 3 N, Toentsingan, N. E. Sumatra, 5-IX-1918 (UGA 8606); 2 females, Muang Fang, Chiangmai Province, China (USNM 349706, UGA 571). From *Dendrocygna viduata* : 8 females, 5 N, Tsessebe, Bechuanaland, Africa, 9-I-1956 (NU 3894); 4 females, 1 N, Tsessebe, Bechuanaland, Africa, 9-I-1956 (NU 3895); 5 females, 1 N, Tsessebe, Bechuanaland, Africa, 26-XII-1955 (NU 3912); 2 females, 2 N, Maun, Bechuanaland, Africa, 9-IX-1958 (NU 4036); 1 ho male, 1 female, 2 N, Senaar, Blue Nile Province, Sudan (AMNH 731070, UGA 2420); 1 he male, 6 females, Usumbura, Lake Tanganyika, Kuanda-Urundi, 21-IV-1908 (UGA 2421); 6 females, Mbala-Jinja, Eastern Province, Uganda (AMNH 731062, UGA 2422); 9 females, Tananarive, Madagascar, 23-III-1929 (AMNH 410775, UGA 2423); 5 he males, 3 females, 4 N, Upper Nile Province, Sudan, 6-III-1928 (USNM 309137,

UGA 2570); 2 he, 1 ho males, 3 females, 2 N, Lake No, Blue Nile Province, Sudan, 4-III-1910 (USNM 216953, UGA 2903); 2 he males, 4 females, 7 N, Piracicaba, Sao Paulo, Brazil, 26-XI-1970 (UGA 3223).

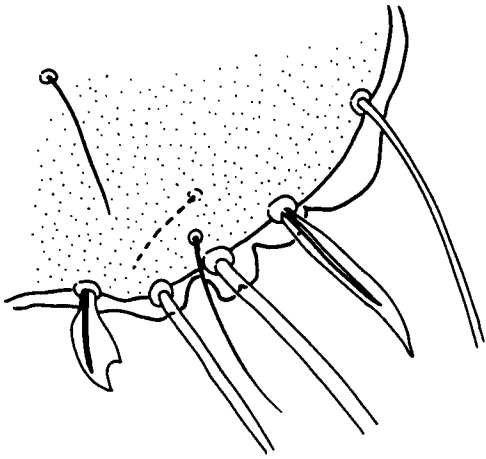
Freyana australis Dubinin
(Figs. 80-83)

Dubinin, W. B., 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb., 12 : 41-43, fig. 10 : 1-5.

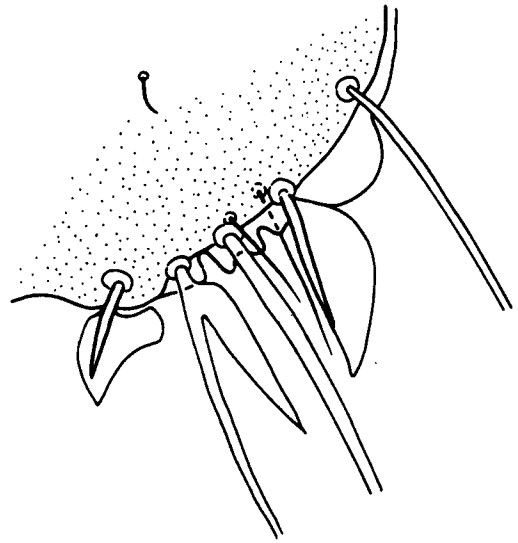
This species has two types of males and one female. It is easily recognized by the shape of the idiosoma, the shape of the terminal setae and the wide dorsal expansions of the tibia of legs II in the heteromorphic male. *Freyana australis* is parasitic on the "Coromandel Teal" *Nettapus (=Cheniscus) coromandelianus* (Gmelin). This bird has a distribution throughout southern Asia and the South Pacific islands.

Male. heteromorpn. Length (incl. gnathosoma) 570 μ , width 325 μ . Idiosoma rectangular, widest at the humeral projections and tapering posteriorly; pronounced hysterosomal cleft present between the opisthosomal projections. Lateral hysterosomal membranes narrow, poorly developed, extending from 12 to 14, width 33 μ . Tibial expansions on leg II well developed, large, triangular in shape, with pointed tip, width 58 μ . *Dorsal idiosoma* : Propodosomal and hysterosomal shields both densely granular in appearance; transverse suture well-defined; setae *d1* short, setiform, located close to lateral margin; *d2* and *d3* short, setiform; *d4* setiform, positioned anteromedial to 15, length 52 μ ; *d5* long, setiform,

Freyana australis (Dubinin, 1950). Fig. 80 : female, setae. Fig. 81 : homeomorphic male, terminal setae. Fig. 82 : heteromorphic male, terminal setae. Fig. 83 : heteromorphic male, tarsus of leg II.

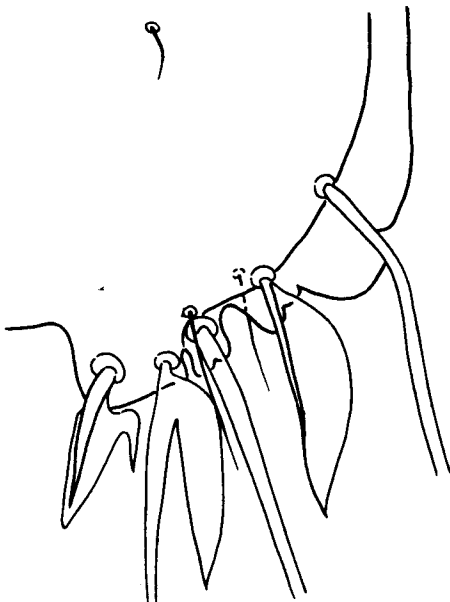


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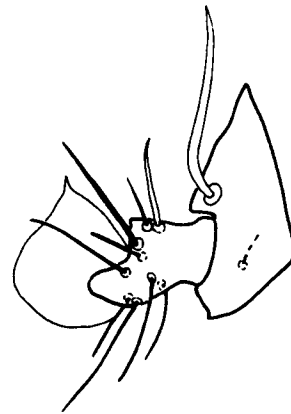


81

100μ



82



83

with lanceolate lateral expansion away from the setal axis, expansion length 79 μ , width at base 14 μ . Setae 13 long, setiform; 14 long, lanceolate, length 85 μ , width 23 μ ; 15 long, thick, setiform. Setae *Pa2* of characteristic shape, double tipped, with wide medial expansion and short, narrow lateral expansion, length (to medial tip) 61 μ , width (at base) 25 μ .
Ventral idiosoma : Strongly developed coxo-sternal skeleton; all coxal fields closed; epimerites I form a long sternum, fused at tip to epimerite II; II and IIA straight; III and IIIA fused in oval shape; IV fused with IIIA; small medial sclerite present, positioned anterior to genital organ. Genital organ between base of legs IV. Setae *Pa6* thin, setiform, anterior to 14, length 41 μ .

Male. Homeomorph. Length (incl. gnathosoma) 580 μ , width 370 μ . Idiosoma widely oval; small hysterosomal cleft present. Lateral hysterosomal membranes narrow, poorly developed, extending from level of legs IV to 14, width 23 μ . Tibial expansions of leg IV small, width 7 μ .
Dorsal idiosoma : Propodosomal shield densely granular in appearance overall; transverse suture well-defined; hysterosomal shield densely granular with small lacunae overall; *d1*, *d2*, *d3* short, setiform. Setae *d4* thin, setiform, positioned anterior to 15, length 43 μ ; *d5* as in heteromorphic male, expansion length 72 μ , width at base 19 μ . Setae 13 long, thin, setiform; 14 as in heteromorphic male, length 77 μ , width 24 μ ; 15 long, thick, setiform; *Pa2* resembles heteromorphic male with lateral top more rounded, length 43 μ , width 31 μ .
Ventral idiosoma : Epimerites I fused into short sternum; II bent at tip; IIA straight; III and IIIA in oval configuration with small gap between the tips; IV fused to IIIA. Posterior medial sclerite absent; coxal fields I, II, III open; setae *Pa6* thin,

setiform, positioned slightly anteromedial to *l4*, length 48 μ .

Female. Length (incl. gnathosoma) 520 μ , width 345 μ . Idiosoma widely oval; lacking hysterosomal cleft; lateral hysterosomal membranes poorly developed, extending from level of *d3* to *l4*, width 10 μ . *Dorsal idiosoma* : Propodosomal and hysterosomal shields densely granular in appearance; transverse suture well-defined; setae *d1*, *d2* short, setiform; *d3* setiform, longer than typical, length 58 μ ; *d4* setiform, positioned above *l5*; *d5* long, thin, setiform, slightly wider at the base; *l3* long, setiform; *l4* lanceolate without projecting edges, length 72 μ ; *l5* long, thick, setiform. Setae *Pa1* double-tipped, closely resembling the female of *Freyana largifolia*, with smaller width and smaller lateral tip, length 37 μ , width 14 μ . *Ventral idiosoma* : Coxo-sternal skeleton resembles homeomorphic male with additional small pointed spur at the point of fusion of IV to IIIA. Setae *Pae* thin, setiform.

Materials examined - Type Host : From *Nettapus auritus* : 2 he males, Sakales River, E. Madagascar, 15-V-1895 (USNM 151137, NU 9530); 4 he males, Sakales River, E. Madagascar, 13-V-1895 (USNM 151136, NU 9529); 2 he males, Tamatave Province, Madagascar, no date (USNM 148146, NU 9531); 4 he males, Capelongo, Huia Province, Angola, 23-VII-1925 (AMNH 259122, NU 11851); 3 he males, Kalahari, Bechuanaland, Africa, 5-V-1930 (AMNH 414605, NU 11852); 1 he male, Lake Ngami, Bechuanaland, Africa, VI-1909 (AMNH 424434, NU 11853). From *Nettapus (=Cheniscus) coromandelianus coromandelianus* : 3 he, 4 ho males, 6 females, Upper Assam, India, 1945 (NU 1712); 1 ho male, 1 female, Kaukarit, Houndrau Rou, Thailand, 5-VI-1879 (USNM 95525, UGA 2886); 1 ho male, 1 female, 1 N, Bang Borapet, Thailand, 25-VI-1925 (USNM 331808, UGA

2888); 1 N, Nan Mong, Maung Krabin, Thailand (USNM 306722, UGA 2889); 2 he, 6 ho males, 6 females, Bharatpur, Rajasthan, India, 17-11-1971 (UGA 7297); 1 he, 5 ho males, 3 females, 1 N, Mengtsh, Yunnan Province, China, 6-V-1910 (AMNH 732864, UGA 6583).

Freyana celebensis Dubinin
(Figs. 84-87)

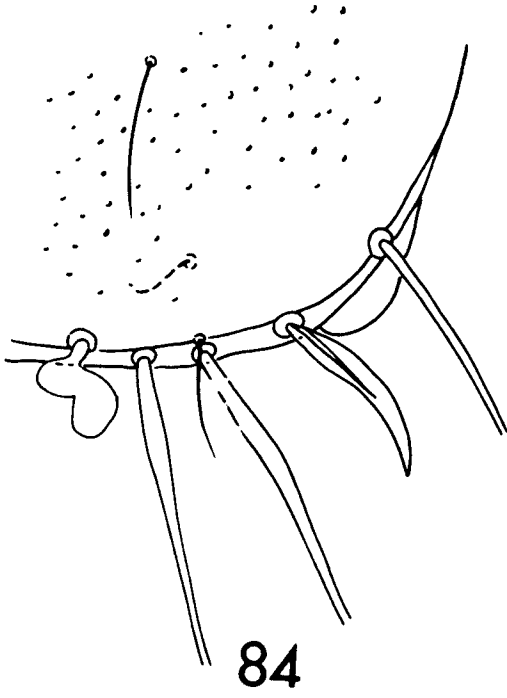
Dubinin, W. B., 1950a, Akad. Nauk USSR, Zool. Inst., Parazit. Sb., 12 : 43-44, fig. 11: 1-5.

This species has two male types and one female. It is differentiated by the shape of the terminal setae, the tibial expansions of leg II and the surface appearance of the hysterosomal shield. Setae *Pa2* in the female is unique.

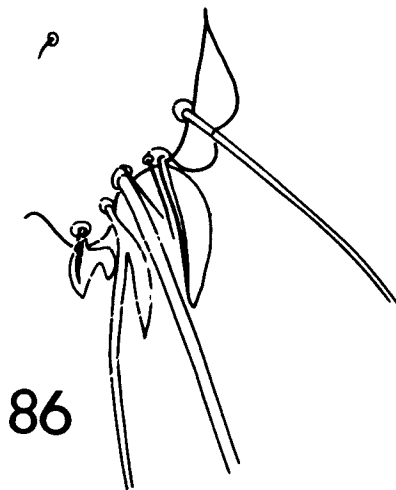
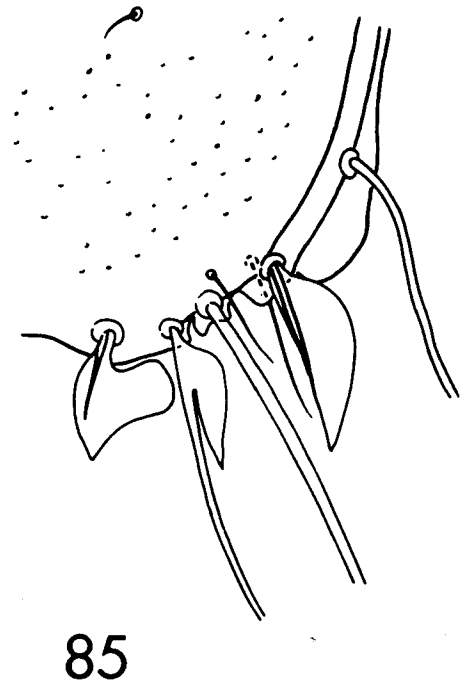
Freyana celebensis is parasitic on the flight feathers of *Nettapus pulchellus* Gould. The distribution of this host is restricted to Australia and certain neighboring islands.

Male. Heteromorph. Length (incl. gnathosoma) 635 μ , width 410 μ . Idiosoma widely oval, tapering posteriorly, with pronounced hysterosomal cleft present; lateral hysterosomal membranes poorly developed, extending from level of *o3* to *l4*, width 28 μ ; tibial expansions of legs II well developed, pointed, tapering slightly toward the tip, width 57 μ . *Dorsal idiosoma* : Propodosomal shield densely granular in appearance; transverse suture well-defined; hysterosomal shield with small randomly scattered lacunae posterior to *o1*. Setae *o1*, *o2*, *o3* short, setiform; *o4* thin,

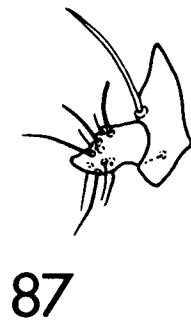
Freyana celebensis (Dubinin, 1950). Fig. 84 : female, terminal setae. Fig. 85 : homeomorphic male, terminal setae. Fig. 86 : heteromorphic male, terminal setae. Fig. 87 : heteromorphic male, tarsus of leg II.



100μ



100μ



setiform, positioned anterior and slightly lateral to *I5*; *d5* long, setiform with long, lanceolate lateral expansion, length 80 μ . Setae *I3* long, setiform; *I4* lanceolate with straight medial and rounded margins, length 105 μ ; *I5* long, thick, setiform. Setae *Pa2* double-tipped, both approximately the same length, with lateral tip more narrow, length 45 μ , width (at base) 28 μ . *Ventral idiosoma* : Coxo-sternal skeleton strongly sclerotized; all coxal fields closed; all epimerites fused at tips; Y-shaped posterior sclerite present anterior to genital organ; setae *Pae* positioned anterior to *I4*, setiform.

Male. Homeomorph. Length (incl. gnathosoma) 535 μ , width 315 μ . Idiosoma widely oval, less tapered than heteromorph; hysterosomal cleft less pronounced; lateral hysterosomal membranes poorly developed, extending from level of *d3* to *I4*, width 19 μ ; tibial expansions of leg II small, rounded, width 8 μ . *Dorsal idiosoma* : Propodosomal shield densely granular in appearance; transverse suture well-developed; hysterosomal shield densely granular with small widely scattered lacunae. Setae *d1* thin, setiform, positioned close to lateral edge; *d2*, *d3* setiform, short; *d4* setiform, positioned anterior to *I5*; *d5* long, setiform with lanceolate lateral expansions at the base, expansion length 50 μ , width 12 μ . Setae *I3* long, setiform; *Pa2* shaped similar to heteromorph with setal axis along medial tip, lateral membrane squared off into a plate, lacking a pointed tip. *Ventral idiosoma* : Coxo-sternal skeleton less developed. Epimerites I fused into short sternum; II and IIA straight, fused at tip; III and IIIA in oval configuration, not fused; IV fused to IIIA; coxal fields I and III open; coxal field II closed; Y-shaped sclerite absent. Setae *Pae* located anteromedial to *I4*, setiform.

Female. Length (incl. gnathosoma) 550 μ , width 335 μ , Idiosoma widely oval with squared off posterior; hysterosomal cleft lacking; lateral hysterosomal membranes small, extending from level of 13 to 14, width 19 μ ; tibial expansions of legs II small, rounded, width 7 μ . *Dorsal idiosoma* : Propodosomal shield densely granular in appearance; transverse suture well defined; hysterosomal shield densely granular with small lacunae along lateral borders and over entire surface posterior to $d3$; setae $d1$ setiform; $d2$ short, setiform; $d3$ long, setiform, length 48 μ . Setae $d4$ thin, setiform, positioned anterior to 15, length 44 μ ; $d5$ long, setiform, slightly wider at base; 13 setiform; 14 lanceolate with rounded lateral margin, length 69 μ ; 15 long, setiform; $Pa2$ has unique bean-shaped configuration, length 36 μ , width 31 μ . *Ventral idiosoma* : Epimerites I fused into short sternum; II curved slightly at tip; IIA straight; III short, slightly curved; IIIA curves anteriorly and approaches III; IV fused to IIIA. All coxal fields open. Setae $Pa2$ setiform, positioned anterior to 15, distant from the idiosomal border.

Materials examined - Type Host : From *Cheniscus pulchellus* : 1 he, 1 ho males, 1 female, Oenpelli, Northern Territory, Australia, 9-X-1948 (USNM 405580, NU 9532).

Freyana stictonettae Dubinin
(Figs. 88-91)

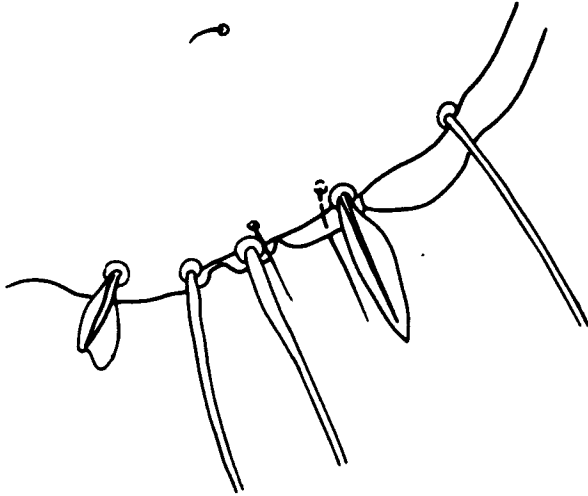
Dubinin, W. B., 1950a, Akad. Nauk USSR, Zool. Inst., Parazit. Sb., 12 : 44,45, fig. 12 : 1-8.

This species is differentiated by the shape of the terminal setae, dimensions and shape of the tibial expansions on legs II and the presence of large lacunae on the dorsal hysterosomal shield. It is host specific on the Australian duck *Stictonetta naevosa* (Gould).

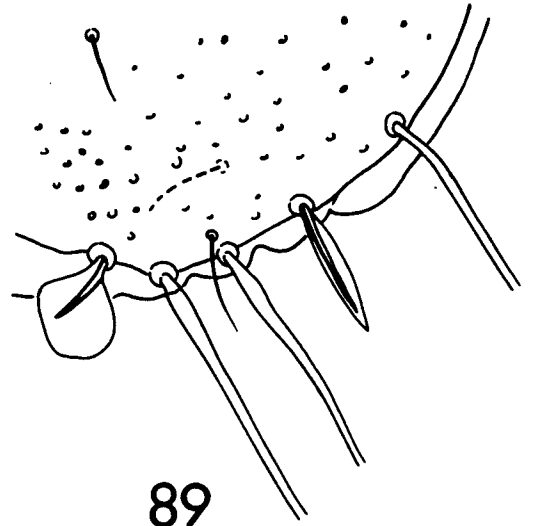
Male. Heteromorph. Length (incl. gnathosoma) 570 μ , width 385 μ . Idiosoma widely oval with rounded border; lateral hysterosomal membranes extending from 12 to 14, width 23 μ ; terminal hysterosomal cleft present; tibial expansions legs II large, triangular, pointed at tip and reflected back slightly, width 60 μ . *Dorsal idiosoma* : Propodosomal shield densely granular in appearance; transverse suture well defined; hysterosomal shield covered with lacunae of variable sizes; setae *d1*, *d2*, *d3* short, setiform with lanceolate, pointed lateral expansions at base; *d3* long, setiform; *d4* lanceolate, projecting rounded lateral border, length 68 μ , width 19 μ . Setae *d5* long, thick, setiform; *Pae1* hooked-shaped, double-tipped, lateral tip is longer and narrower than medial tip. *Ventral idiosoma* : All epimerites fused at ends in sternal region enclosing center sternum; all coxal fields closed; setae *Pae* setiform, originating anterior to 14.

Male. Homeomorph. Length (incl. gnathosoma) 495 μ . Idiosoma widely oval, rounded edges; tibial expansions of legs II poorly developed, rounded tip, width 10 μ ; hysterosomal cleft lacking; lateral hysterosomal

Freyana stictonettae (Dubinin, 1950). Fig. 88 : homeomorphic male, terminal setae. Fig. 89 : female, terminal setae. Fig. 90 : heteromorphic male, terminal setae. Fig. 91 : heteromorphic male, tarsus of leg 11.

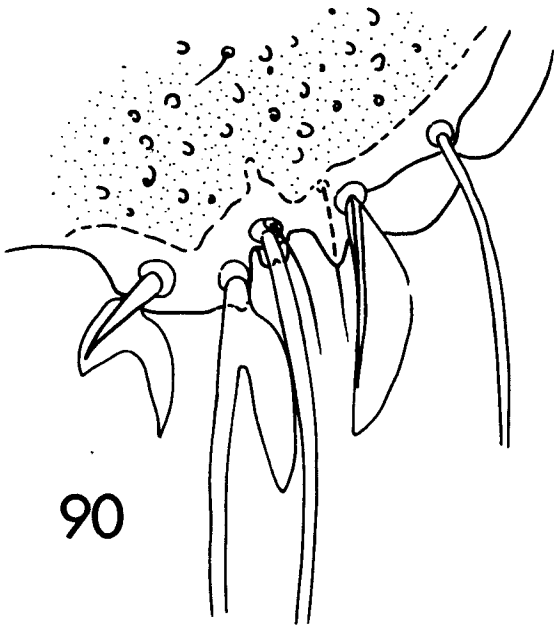


88

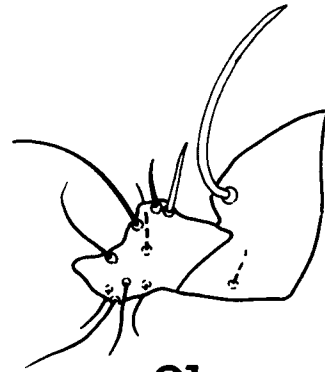


89

100μ



90



91

membranes narrow, extending from 12 to 14, width 14 μ . *Dorsal idiosoma* : Propodosomal shield densely granular in appearance; transverse suture well defined; hysterosomal shield densely granular with lacunae over entire surface. Setae *d1*, *d2*, *d3* short, setiform; *d4* setiform positioned above 15; *d5* long, setiform, without lateral expansions; *l3* long, setiform; *l4* lanceolate, pointed, length 62 μ ; *l5* long, setiform; *Pa1* lanceolate, rounded at tip, length 38 μ , width 16 μ . *Ventral idiosoma* : Epimerites I fused into short sternum; II curved posteriorly to almost meet IIA; IIA straight; III and IIIA fused in oval configuration; IV fused to IIIA; Y-shaped sclerite absent; coxal fields I and II open; coxal field III closed; setae *Pae* lanceolate, positioned anterior to 14.

Female. Length (incl. gnathosoma) 520 μ , width 360 μ . Idiosoma widely oval with rounded edges; lateral hysterosomal membranes narrow, extending from 12 to 14, width 14 μ ; tibial expansions on legs II rounded, small, width 22 μ . *Dorsal idiosoma* : Propodosomal shield densely granular in appearance; transverse suture well defined; hysterosomal shield densely granular in appearance with small lacunae overall with larger lacunae in the posterior mid-region; setae *d1* and *d2* setiform; *d3* positioned near midline, setiform; *d4* setiform, short, positioned above 15; *d5* long, setiform; *l3* long, setiform; *l4* lanceolate, pointed at tip, length 56 μ ; *l5* long, setiform; *Pa2* with rounded elliptical shape, positioned away from terminal end in small groove, nearly covered by overlapping edge of opisthosomal shield. *Ventral idiosoma* : Epimerites I fused into short sternum; II curved back at tip to IIA; IIA straight; III and IIIA approach oval shape, not fused at tip; IV fused to IIIA; coxal fields I, II and III open. Setae *Pae* short, setiform arise away from terminal end above 15.

Material examined - Type Host : From *Stictonetta naevosa* : 4 ho males, 7 females, Springfield, N. S. W., Australia, no date, (AMNH 132546, UGA 2573); 4 he, 1 ho males, 5 females, South Alligator River, Northern Territory, Australia, 10-X-1902 (AMNH 731415, UGA B615); 3 he, 1 ho males, 6 females, 1 N, Point Cloates, Western Australia, 23-VII-1900 (AMNH 731414, UGA B616); 5 ho males, 7 females, Victoria, Australia, no date (AMNH 731416, UGA B617); 1 he, 4 ho males, 4 females, Point Cloates, Western Australia, 23-VII-1900 (AMNH 731413, UGA B618); 2 he, 3 ho males, 6 females, Melbourne Market, Australia, 1874 (AMNH 731422, UGA B619).

Freyana nettapina Dubinin
(Figs. 73,74)

Megnin et Trouessart, 1884a, Le Naturaliste, 6 : 404.

Megnin et Trouessart, 1884b, Journ. Microgr., 8, 2 : 100.

Canestrini, G. and P. Kramer, 1899, Das Tierreich, 7 : 34.

Dubinin, W. B., 1950a, Akad. Nauk. USSR, Zool. Inst. Parazit. Sb., 12 : 46, 47, fig. 13 : 1-2.

To date, the heteromorphic form of this species is unknown. With more extensive collecting from the type host, it presumably will be found. The homeomorph of this species has more parallel borders of the idiosoma than other species and there is a pronounced hysterosomal cleft. The terminal setae are uniquely shaped. *Freyana nettapina* is parasitic on the feathers of *Nettapus auritus* (Boddaert). This bird's range is limited to equatorial Africa and Madagascar.

Male. Homeomorph. Length (incl. gnathosoma) 730 μ , width 345 μ .

Idiosoma oval shaped with parallel sides and rounded terminus; with pronounced hysterosomal cleft; idiosoma weakly sclerotized; lateral hysterosomal membranes narrow, extending from level of *d3* to setae *14*; width 14 μ . Tibial expansions of leg II poorly developed dorsally with rounded tip, width 7 μ . *Dorsal idiosoma* : Propodosomal shield densely granular in appearance over entire surface; transverse suture well-defined; hysterosomal shield densely granular in appearance overall at level posterior to *d1*. Setae *d1* long, length 38 μ ; *d2* and *d3* short, setiform; *d4* thin, setiform, positioned at hysterosomal border above *15*, length 38 μ . Setae *d5* long, thin, setiform with narrow tapered, pointed, lateral leaf-like expansions at the base, expansion length 63 μ , width 12 μ . Setae *13* long, setiform; *14* pointed, lanceolate, with wide curved lateral margins, length 94 μ ; *15* long, setiform. Setae *Pa1* lanceolate with a smaller pointed outer expansion, length to tip 51 μ , width at base 23 μ . *Ventral idiosoma* : Epimerites I fused into long sternum; coxal field I open; epimerites II have additional small bent sclerite at tip; IIA straight; coxal field II open; epimerite III curved slightly; IIIA fused to IV but small gap between III and IIIA; coxal field III open. Genital organ positioned just anterior to level of legs IV. Setae *Pa6* longer, setiform, length 45 μ , originates just anterior to *14*.

Female. Length (incl. gnathosoma) 500 μ , width 290 μ . Idiosoma oval-shaped with parallel sides and widely rounded terminus; hysterosomal cleft less pronounced; lateral hysterosomal membranes narrow, width 11 μ , extending from level of base of legs IV to setae *14*. Dorsal tibial expansions of leg II poorly developed. *Dorsal idiosoma* : Propodosomal shield densely granular in appearance; transverse suture well defined;

hysterosomal shield densely granular in appearance with large lacunae covering posterior region of shield to level of legs IV and along the outer edges to level of *d1*. Setae *d3* uncharacteristically long, setiform, positioned close to midline below level of the base of legs IV, length 95 μ . Setae *l3* long, thick, setiform; *l4* lanceolate, pointed, length 63 μ ; *l5* long, thick, setiform; *d4* positioned anteromedial to *l5*, thin, setiform, length 47 μ ; *d5* long, setiform, slightly expanded at the base. Setae *Pai* short, lanceolate with somewhat rounded tips, length 38 μ , width 14 μ . *Ventral idiosoma* : coxo-sternal skeleton resembles male; epigynum crescent shaped, at level of *l1*; setae *Pae* setiform, positioned anterior to *l5*, length 33 μ .

Material examined - *Type Host* : From *Nettapus auritus* : 5 ho males, 5 females, Sakalés River, E. Madagascar, 15-V-1895 (USNM 151137, NU 9530); 4 ho males, 12 females, Lake Ngami, Bechuanaland, Africa, VI-1909 (AMNH 434432, NU 11850); 2 ho males, 3 females, 1 N, Maun, Bechuanaland, Africa, 30-XII-1954 (NU 3755); 1 ho male, 5 females, 1 N, Sakales River, Madagascar, 13-V-1895 (NU 9529); 1 ho male, 5 females, Tamatave Province, Madagascar, no date (USNM 148146, NU 9531); 7 ho males, 8 females, Tala Kilan, Dongwenna, Angola, 13-III-1906 (AMNH 732945, NU 11849); 5 females, Capelongo, Huis Province, Angola, 23-VII-1925 (AMNH 259122, NU 11851); 5 ho males, 3 females, Kalahari, Bechuanaland, Africa, 5-V-1930 (AMNH 414605, NU 11852).

Freyana plectropteri Dubinin
(Figs. 92, 93)

Dubinin, W. B., 1950a, Akad. Nauk USSR, Zool. Inst., Parazit. Sb.,
12 : 47-48, fig. 14 : 1-3.

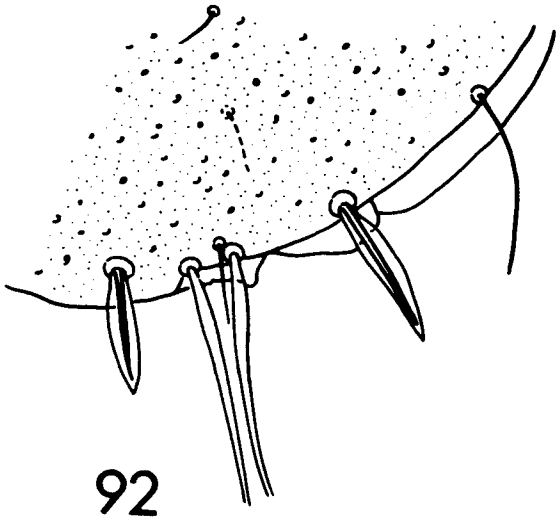
Freyana plectropteri is known only from the heteromorphic form.

This species is recognized from related species by the shape of the terminal setae, the smaller tibial expansions on leg II and the rounded shape of the idiosoma. This species is host specific on the African goose *Plectropterus gambensis* (Linnaeus). The bird ranges throughout Africa.

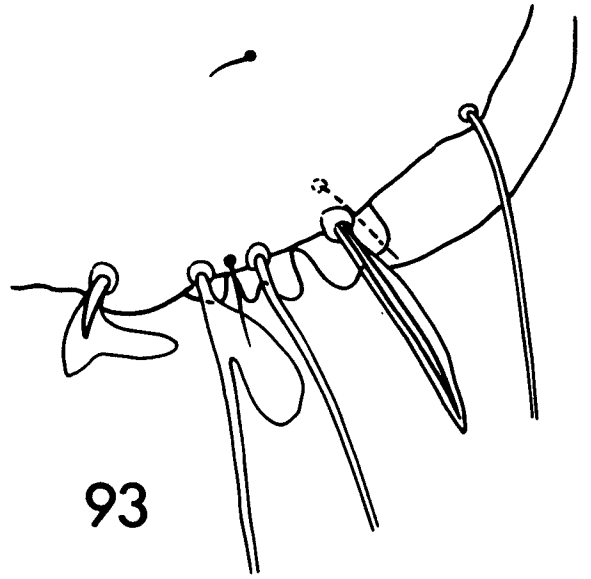
Male. Heteromorph. Length (incl. gnathosoma) 610 μ , width 395 μ . Idiosoma egg-shaped, rounded posteriorly, tapered anteriorly; lateral hysterosomal membranes extending from below level of the base of legs III to setae *l4*, width 33 μ ; tibial expansions leg II weakly developed, small, pointed at tip, width 10 μ . *Dorsal idiosoma* : Propodosomal shield finely granular in appearance anterior to *sce*; transverse suture well defined with surrounding tissue weakly sclerotized; hysterosomal shield finely granular posterior to *d1* with many small lacunae around border. Setae *d1*, *d2*, *d3* small, setiform; *d4* slightly longer, thin, setiform, positioned between and above *l5* and *a5*; *a5* long, setiform with rounded leaf-like lateral expansions, length 68 μ , width 22 μ ; *l3* long, setiform; *l4* lanceolate, pointed, length 92 μ , width 14 μ ; *l5* long, setiform; *Pa2* boot-shaped, length 40 μ , width 43 μ . *Ventral idiosoma* : Weakly sclerotized overall. Epimerites I fused into long sternum; epimerite II bends at tip to fuse to IIA; IIA straight; III and IIIA fused into oval coxal field; IV fused to IIIA; with small degree of additional chitin present anterior to genital organ, medial

Freyana plectropteri, Dubinin, 1950. Fig. 92 : female, terminal setae. Fig. 93 : homeomorphic male, terminal setae.

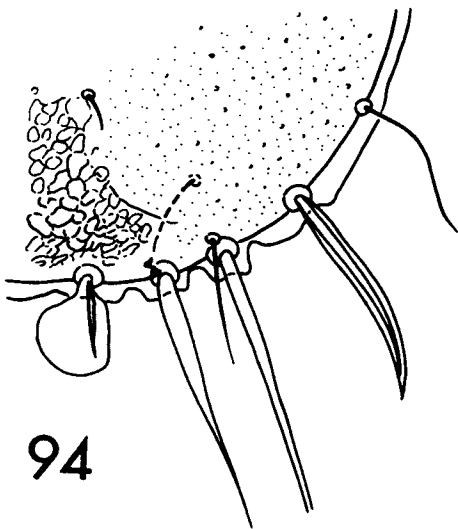
Freyana undulativentris, Dubinin, 1950. Fig. 94 : female, terminal setae. Fig. 95 : male, terminal setae.



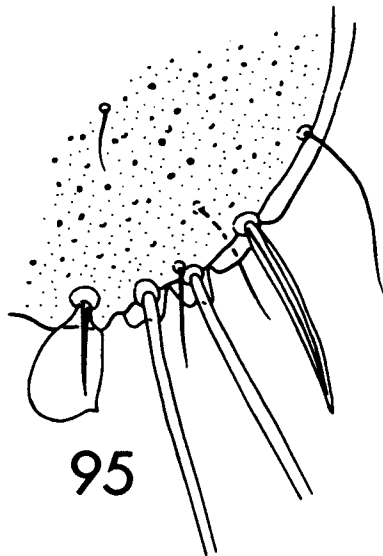
92



93



94



95

sclerite is lacking. Coxal field I open, coxal fields II and III closed. Setae *c1*, *c2* and *c3* set slightly further apart than typical; *Pae* thin, setiform, positioned just anterior to *l4*.

Female. Length (incl. gnathosoma) 625 μ , width 435 μ . Idiosoma widely oval, rounded; lateral hysterosomal membranes narrow, extending from just below level of base of legs II to *l4*, width 14 μ ; tibial expansions of legs II small, pointed, width 5 μ . *Dorsal idiosoma* : Propodosomal shield densely granular anterior to *sce*; transverse suture well defined with narrow area of weakly sclerotized integument posterior to level of *d1*. Hysterosomal shield densely granular in appearance with small lacunae over entire surface. Setae *d1*, *d2*, *d3* short, setiform; *d4* setiform, positioned anterior and between *l5* and *d5*. Setae *d5* and *l5* long, setiform, slightly wider at the base. Setae *l3* thin, setiform; *l4* lanceolate, pointed, length 60 μ , width 12 μ ; *Pa1* lanceolate, pointed, length 50 μ , width 11 μ . *Ventral idiosoma* : Epigynium at level of *l1*; epimerites I fused into short sternum; II, IIA, III straight; IIIA curves slightly anterior; IV fused to IIIA; all coxal fields open; setae *Pae* arises anterior to *l5* below level of *l3*.

Material examined - *Type Host* : From *Plectropterus gambensis* : 6 males, 6 females, 6 N, Mabelikwa, N. Transvall, Africa (NU 3948).

Freyana undulativentris Dubinin
(Figs. 94, 95)

Dubinin, W. B., 1950a, Akad. Nauk USSR, Zool. Inst., Parazit. Sb.,
12 : 49-50, fig. 16 : 1-2.

Freyana undulativentris has one male and female type. The heteromorphic form has not been collected in this species. This species is easily characterized by the unique shape of the terminal setae and the reduced size of the idiosoma. The type host is *Nomonyx (=Oxyura) dominicus* (Linnaeus), a duck with a geographical range including southern North America, Central America, northern South America and the West Indies.

Male. Homeomorph. Length (incl. gnathosoma) 545 μ , width 325 μ . Idiosoma oval, tapering posteriorly, widest at humeral projections; lateral hysterosomal membranes narrow, extending from level of base of legs IV to setae 14, width 7 μ . Tibial expansions of legs II weakly developed, rounded, width 5 μ . *Dorsal idiosoma* : Propodosomal shield finely granular in appearance overall; transverse suture well defined; hysterosomal shield finely granular with small lacunae over entire surface. Setae *d1*, *d2*, *d3* short, setiform; *d4* setiform positioned slightly medial to 15, length 22 μ ; *d5* long, setiform with narrow bilateral expansions at the base. Setae 13 thin, setiform; 14 lanceolate, narrow, length 86 μ ; 15 long, setiform; *Pa2* with narrow lateral and widely rounded medial expansions, length 50 μ , width 31 μ . *Ventral idiosoma* : Weakly sclerotized overall; all coxal fields open. Epimerites I fused into short sternum; II and IIA straight; III and IIIA approach C-shaped

configuration; IV fused to IIIA. Setae *Pae* thin, setiform, positioned between 14 and 15 distant from idiosoma border, length 45 μ .

Female. Length (incl. gnathosoma) 530 μ , width 330 μ . Idiosoma oval, tapering posteriorly, widest at humeral projections; lateral hysterosomal membranes narrow, width 4 μ ; tibial expansions of legs II poorly developed. *Dorsal idiosoma* : Similar to homeomorphic male, with finely granular appearance with small lacunae covering the hysterosomal shield. Posterior region of shield with furrows creating a scaly appearance. Setae *d1*, *d2*, *d3* short, setiform; *d4* setiform, anteromedial to 15. Setae 15 and *d5* long, setiform, slightly wider at base; 13 thin, setiform; 14 lanceolate, length 90 μ . Setae *Pai* as in male, with thin lateral and widely rounded medial expansions, length 39 μ , width 28 μ . *Ventral idiosoma* : All coxal fields open, all epimerites straight and free at tips. Body surface posterior to setae *c2* has wavy furrowed appearance; setae *Pae* short, setiform, positioned anterior to 15.

Materials examined - Type host : From *Oxyura* (= *Nomonyx*) *dominica* : 2 males, 6 females, Cali, Valle del Cauca, Colombia, 26-I-1912 (AMNH 750059, UGA 8636); 3 males, 6 females, 1 N, Chaco, Paraguay, 27-XII-1973 (AMNH 8113224, UGA 8641); 2 males, 10 females, Cuba, XII-1917 (AMNH 750058, UGA 8637); 3 males, 6 females, 1 N, Cuba, 29-I-1920 (AMNH 424780, UGA 8638); 4 males, 6 females, 1 N, Huarandosa, Valley Rio Chinchipe, N. Peru, 24-IX-1923 (AMNH 181863, UGA 8639); 1 male, 9 females, Cali, Valle del Cauca, Colombia (AMNH 111390, UGA 8640); 2 males, 6 females, Chone, Manabi, Ecuador, 18-XII-1912 (AMNH 119648, UGA 7581); 4 males, 3 females, Brownsville, Texas, 18-VII-1891 (AMNH 750060, UGA 7582); 4 males, 5 females, Ariguanabo Marsh, Cuba, 29-I-1920 (AMNH 424780, UGA 7583).

Freyana microchaeta Dubinin
(Figs. 96, 97)

Dubinin, W. B., 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb.,
12 : 50-51, fig. 17 : 1-3.

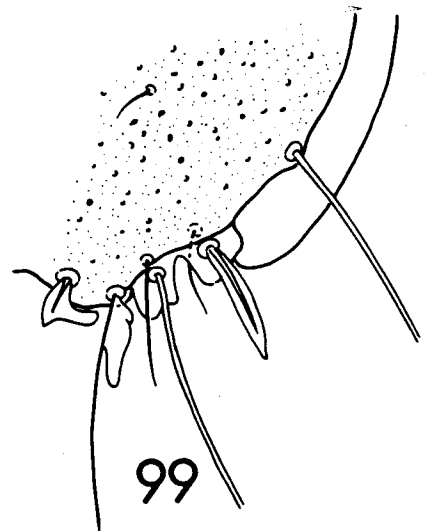
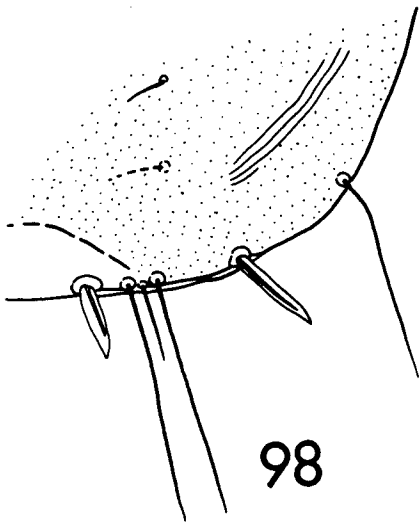
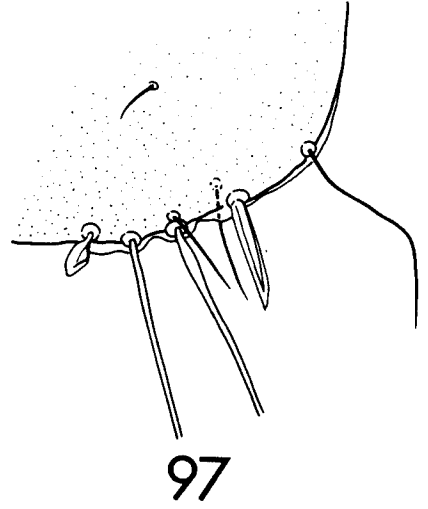
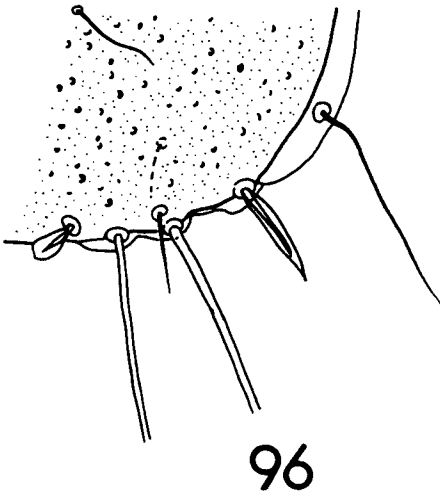
Freyana microchaeta is characterized by the small dimensions of the idiosoma; the small size of the terminal setae and having thinner legs than related species. The species is recorded from the Australian duck *Malacorhynchus membranaceus* (Latham). Only the homeomorphic form of the male is known in this species.

Male. Homeomorphic. Length (incl. gnathosoma) 420 μ , width 270 μ . Idiosoma widely oval with parallel sides and squared off terminus. Lateral hysterosomal membranes narrow, width 4 μ ; tibial expansions of legs II small, with pointed tip, width 8 μ . *Dorsal idiosoma* : Propodosomal and hysterosomal shields finely granular in appearance. Setae *d1*, *d2*, *d3* short, setiform; *d4* thin, setiform, positioned above and slightly lateral to *d5*; *l3*, *l5*, and *d5* long, thin, setiform; *l4* short, lanceolate, pointed at tip, length 48 μ . Setae *Pa1* small, oval shape, appearing tri-bladed, length 19 μ , width 7 μ . *Ventral idiosoma* : Epimerites I fused into short sternum; II curve posteriorly at tip to almost fuse to IIA; IIA straight; III and IIIA in C-shaped configuration; epimerites IV fused to IIIA. All coxal fields open. Setae *Pa2* thin, setiform, positioned slightly anteromedial to *l4*, length 44 μ .

Female. Length (incl. gnathosoma) 500 μ , width 300 μ . Idiosoma widely oval with parallel sides and rounded terminus. Lateral hysterosomal membranes narrow and short, width 3 μ ; tibial expansions of legs II weakly

Freyana microchaeta, Dubinin, 1950. Fig. 96 : female, terminal setae and enlarged *Pai*. Fig. 97 : male, terminal setae.

Freyana anserina (Trouessart et Megnin, 1884). Fig. 98 : female, terminal setae. Fig. 99 : male, terminal setae.



developed, rounded, width 9 μ . *Dorsal idiosoma* : Propodosomal shield appears finely granular; hysterosomal shield appears finely granular overall with area of large lacunae scattered posterior to *d3*. Setae *d1*, *d2*, *d3* short, setiform; *d4* short, setiform, anterior to *l5*; *l3* thin, setiform; *l4* short, lanceolate, pointed, length 47 μ ; *l5* and *d5* long, setiform with broadly appearing bases; *Pai* small, oval, tri-bladed as in corresponding male, length 19 μ , width 9 μ . *Ventral idiosoma* : Similar to corresponding male, all coxal fields open. Setae *Pae* short, setiform, positioned anterior to *l5* distant from idiosoma border, length 37 μ .

Material examined - *Type host* : From *Malacorhyncus membranaceus* : 1 male, 7 females, 1 N, Farina, S. A., Australia (USNM 278785, UGA 2891).

Freyana anserina Megnin et Trouessart
(Figs. 98, 99)

- Megnin et Trouessart, 1884a, Le Naturaliste, 6 : 404.
- Trouessart et Megnin, 1885, Bull. Soc. Angers, 14 : 40.
- Trouessart, 1886, Bull. Soc. Angers, 16 : 97.
- Berlese, 1898a, A. M. S. ital. : fasc. 85, No. 1.
- Canestrini, and Kramer, 1899, Das Tierreich, 7 : 32.
- Vitzthum, 1929, Tierwelt Mitteleur. 3(7) : 85, t. 7, fig. 58.
- Dubinina, M., 1948, Parasitological Collected Works of the Akad. Sciences USSR, 10 : 177-178, fig. 6.
- Dubinina, W. B., 1950d, Works of the Institute of Zoology in the Akad. Sciences in Azerbaijan USSR, 14 : 61.
- Dubinina, W. B., 1951a, Fauna of the USSR, 6 (5) : 1-382.
- Dubinina, W. B., 1951b, Parazit. Sb., 13 : 210-211, 214.
- Turk, 1953, Ann. Mag. Nat. Hist., 6 (62) : 83.
- Radford, 1953, Parasitology, 42 (3-4) : 199.

Freyana anserina is represented only by the heteromorphic male and the female. This species is distinguished by the large idiosomal dimensions, the shape of the terminal setae and the poor development of the lateral hysterosomal membranes in the female.

Freyana anserina is parasitic on geese of the genera *Anser* Brisson and *Chen* Boie; on swans of the genus *Cygnus* Bechstein and on casarcs of the genera *Branta* Scopoli and *Rufibrenta* Bonaparte. These genera of anatids have a worldwide distribution.

Male. Heteromorph. Length (incl. gnathosoma) 440 μ , width 310 μ .

Idiosoma widely oval, rounded anteriorly and posteriorly; lateral hysterosomal membranes wide, extending from level of epimerites IIIA to I4, width 50 μ ; tibial expansions of legs II well developed, rounded at tip, with small horn-like expansions, width 15 μ . *Dorsal idiosoma* : Propodosomal shield finely granular in appearance; transverse suture poorly defined, hysterosomal shield coarsely granular in appearance with small lacunae; small hysterosomal cleft present. Setae *d1*, *d2*, *d3* short, setiform, positioned directly above *I5*; *d5* long, thin, setiform, with small leaf-like lateral expansion at the base, expansion length 34 μ , width 9 μ . Setae *I3* long, setiform; *I4* lanceolate, rounded at tip, length 53 μ , width 10 μ ; *Pa1* small, boot-shaped, length 19 μ , width 24 μ . *Ventral idiosoma* : All coxal fields closed. Epimerites I fused into long sternum; II and IIA fused at tips; III and IIIA fused in oval shape; IV fused to IIIA; Y-shaped medial sclerite present enclosing asymmetrical sternal plate. Setae *Pae* short, setiform, positioned slightly anterior to *I4*.

Female. Length (incl. gnathosoma) 580 μ , width 350 μ . Idiosoma widely oval, rounded anteriorly and posteriorly, widest at level of legs III; lateral hysterosomal membranes absent; leg II with tibial expansions small, rounded, width 7 μ . *Dorsal idiosoma* : Propodosomal and hysterosomal shields finely granular in appearance with few small lacunae on the posterior mid-region of the hysterosoma. Setae *d1*, *d2*, *d3* short, thin, setiform; *d4* short, setiform, arises between *I5* and *d5* 20 μ anterior from posterior hysterosomal border. Setae *d5* and *I5* long, thin, setiform, positioned close together; *I3* long, thin, setiform; *I4* short, pointed, lanceolate, length 38 μ ; *Pa1* short, lanceolate, slightly rounded tips, length 31 μ , width 5 μ . *Ventral idiosoma* : Epimerites I fused into short sternum; II

short, straight; IIA greatly reduced in size; III and IIIA in C-shaped configuration; IV fused to IIIA; coxal fields I, II and III open. Setae *Pae* short, thin, setiform, positioned at level of 13 anterolateral to 15.

Material examined - *Type host* : From *Chen caerulescens* : 4 females, 2 N, Cameron Co., Louisiana (AMNH 748671, UGA 8371). From *Chen hyperborea* : 2 female, 11 N, Marshall Co., N. W. Minnesota (AMNH 350255, UGA 8320). From *Branta bernicla hrota* : 5 males, 6 females, Barnegat, Ocean Co., New Jersey (AMNH 436100, UGA 8369). From *Anser albifrons frontales* : 2 N, Grant Co., Minnesota (AMNH 79565, UGA 8372).

The following species which have been described by Dubinin (1950a, 1953) are listed along with the synonymy. Repeated attempts to recollect these species from the type host have been unsuccessful.

Freyana marmaronettae Dubinin

Dubinin, W. B., 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb., 12 : 39, fig. 6, 11-15.

Dubinin, W. B., 1953. Fauna of the USSR. 6 (6) : 269, 270, fig. 112.

This species of *Freyana* is described by Dubinin as having two male and one female type. It closely resembles *Freyana largifolia*, but can be recognized by the shape and dimensions of the terminal setae. In Russia this species was collected from *Marmaronetta angustirostris* (Menetries) which ranges from northern Africa to southern Europe and Asia.

Freyana furculasetae Dubinin

Dubinin, W. B., 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb., 12 : 41, fig. 9.

This species closely resembles the related *Freyana dendrocygni*. It can be distinguished, however, on the basis of comparisons of the shape of the terminal setae. *Freyana furculasetae* is recorded by Dubinin from *Dendrocygna guttata* Schlegel. This bird is found among the islands of the South Pacific. To date recollection of the species from the type host has not been possible.

Freyana leucophrysi Dubinin

Dubinin, W. B., 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb., 12 : 50, 52, fig 18.

Based on Dubinin's illustrations and descriptions, this species can be recognized easily by the large idiosoma and the terminal setae which are well developed and unique. *Freyana leucophrysi* is parasitic on the flight feathers of *Callonetta leucophrys* (Vieillot). This host has a South American distribution.

Freyana furcata Dubinin

Dubinin, W. B., 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb., 12 : 52, 53, fig.19.

This species is recognized by the shape and dimension of the terminal setae and the appearance of the dorsal idiosoma in the female. The species is host specific on *Amazonetta brasiliensis* (Gmelin), a bird with an exclusively South American distribution.

Freyana subanatina Dubinin

Dubinin, W. B., 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb., 12 : 53, 54, fig. 20.

This species resembles *Freyana anatina* but can be differentiated by the shape of the terminal setae and the idiosoma of the male. There is one morpho type of male and female. Specimens of this species were not available for study. *Freyana subanatina* is a parasite recorded only from *Cairina moschata* (Linnaeus). This bird has a Central and South American distribution.

Freyana cairinae Dubinin

Dubinin, W. B., 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb., 12 : 54, 55, fig. 21.

This species resembles *Freyana largifolia*, however, it can be recognized by the expansions of the tibia of legs II, the integuments of the opisthosomal region of the shield and the terminal setae. *Freyana cairinae* is an exclusive parasite of the flight feathers of *Cairina moschata* (Linnaeus). This bird has a Central and South American range.

Freyana alopocheni Dubinin

Dubinin, W. B., 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb., 12 : 23, fig. 4 : 1,2.

This species is differentiated by the pointed tibial expansions of legs II and the shape of the terminal setae. Only one homeomorphic male specimen of *Freyana alopocheni* has been collected from an Egyptian goose *Alopochen aegyptiaca* (Linnaeus) from Abyssinia. Females are not known.

Freyana lophodytes Dubinin

Dubinin, W. B., 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb., 12 : 31, fig. 4 : 6,7.

This species is recognized by the shape of the terminal setae and the lateral hysterosomal membranes. One homeomorphic male and three females were collected by Dubinin from *Lophodytes (=Mergus) cucullatus* (Linnaeus). This host has a North American distribution.

Freyana cyanocheni Dubinin

Dubinin, W. B., 1950a, Akad. Nauk. USSR, Zool. Inst., Parazit. Sb., 12 : 25, fig. 7 : 1-4.

This species has two male forms and one female that resemble *Freyana sarkidiornis*. *Freyana cyanocheni* is differentiated by the shape of the terminal setae and the structure of the tibia of legs II. This species is recorded from *Cyanochen cyanopterus* (Ruppell) whose range extends above 2100 meters in the highlands of Ethiopia.

BIBLIOGRAPHY

- Atyeo, W. T., and J. Gaud, 1966. The chaetotaxy of sarcoptiform feather mites (Acarina, Analgoidea). *J. Kansas ent. Soc.*, 39 (2) : pp. 337-346.
- Berlese, A., 1886. Acari, Myriopoda et Scorpiones hucusque in Italia reperta, Padova, fasc. 24, No. 1.
- , 1898a. Acari, Myriopoda et Scorpiones hucusque in Italia reperta, Padova, fasc. 85, No. 1.
- , 1898b. Acari, Myriopoda et Scorpiones hucusque in Italia reperta, Padova, fasc. 91, No. 13.
- Canestrini, G., 1886. Famiglia degli Analgesini. *Prosp. Acarof. ital.*, 2 : pp. 241-311.
- Canestrini, G., and F. Kramer, 1899. *Demodicidae* und *Sarcoptidae*. *Das Tierreich*, 7 : pp. 1-193.
- Cerny, V., 1969. Trois genres nouveaux des Acariens plumicoles (Analgoidea) de Cuba. *Folia Parasit.*, 16 : pp. 153-158.
- Dubinin, W. B., 1950a. Systematic analysis of species of feather mites (Sarcoptiformes, Analgesoidea), parasites of anatids. *Parazit. Sb.*, 12 : pp. 17-72.
- , 1950b. Dispersion of feather mites of birds. *Byull. mosk. Obshch. Ispyt. Prir., Otdel. Biol.*, 55 (2) : pp. 29-42.
- , 1950c. About the specificity of mites in connection with the evolution of their hosts. *Usp. sovrem. Biol.*, 29 (3) : pp. 442-457.
- , 1950d. Feather mites of wintering birds of the Lenkoranskian lowlands. *Trudy Inst. Zool., Baku*, 14 : pp. 58-75.
- , 1951a. Feather mites (Analgesoidea). Part I. Introduction to their study. *Fauna USSR, Paukoobraznye*, 6 (5) : pp. 1-363.
- , 1951b. Feather mites of the Baraba Steppe. Report I. Feather mites of waterfowl and wading birds of the orders of rails, grebes, palmipedes, anserines, herons, gulls, and limicoles. *Parazit. Sb.*, 13 : pp. 120-256.
- , 1951c. Species criteria in parasitic animals. *Parazit. Sb.*, 13 : pp. 5-28.

- , 1953. Feather mites (Analgesoidea). Part II. Families Epidermoptidae and Freyanidae. Fauna USSR, Paukoobraznye, 6 (6) : pp. 1-411.
- , 1956. Feather mites (Analgesoidea). Part III. Family Pterolichidae. Fauna USSR, Paukoobraznye, 6 (7) : pp. 1-813.
- Dubinina, M. N., 1948. The parasite fauna of the gray lag-goose (*Anser anser* Linnaeus). Parazit. Sb., 10 : pp. 165-187.
- Gaud, J., and W. T. Atyeo, 1982a. La famille Freyanidae, Dubinin (Sarcoptiformes plumicoles, Freyanoidea). I. Sous - familles Burhinacarinae, n. sub-f. et Diomedacarinae, n. sub-f. Acarologia, 22 (4) : pp. 403-414.
- , 1982b. La famille Freyanidae, Dubinin (Sarcoptiformes plumicoles, Freyanoidea) II. Sous - famille Michaeliinae. Acarologia, 23 (2) : pp. 177-187.
- , 1985. La famille Freyanidae, Dubinin (Sarcoptiformes plumicoles, Freyanoidea) III. Sous - famille Freyaninae. Acarologia, 26 (4) : pp. 385-392.
- Ginetzinskaya, T. A., 1942. A new form of adaptation of feather mite *Freyana anatina* Koch to the moult of the host. Dokl. Akad. Nauk. USSR, 37 (4) : pp 146-149.
- , 1949. Parasite fauna of the Anatinae of the Volga Delta. Uchen. Zap. leningr. gos. Univ. 101, Ser. Biol., 19 (4) : pp. 81-109.
- Haller, G., 1877. *Freyana* und *Ficobia*. Zwei. neue Milbengattungen. Z. wiss. Zool., 30 : pp. 81-998.
- Koch, C. L., 1844. Deutschlands Crustaceen, Myriapoden und Arachniden. Ein Beitrag zur Deutschen Fauna. Regensburg, Heft 38.
- Krantz, G. W., 1971. A Manual of Acarology. Oregon St. Univ. Book Stores Inc., Corvallis, Oregon.
- Megnin, M. P. and E. L. Trouessart, 1884a. Diagnoses des especes et genres nouveaux de Sarcoptides plumicoles. Analgesinae, de la collection du Musee d'Angers. Le Naturaliste, 6 : pp. 403-405.
- , 1884b. Les Sarcoptides plumicoles. J. Microgr., 8 (2) : pp. 92-101.
- Peters, J. L., 1979. Checklist of birds of the World. Revised by Ernst Mayr and G. William Cottrell. Vol. I, (2nd ed.). Cambridge, Mass.

- Peterson, Paul C., 1975. An analysis of host-parasite associations among feather mites (Acari : Analgoidea). Misc. Publs. ent. Soc. Am., 9 (5) : pp. 237-242.
- Radford, C. D., 1950. Systematic checklist of mite genera and type species. Un. int. Sci. biol., Ser. C (Sec. Ent.) (1) : pp. 1-232.
- , 1953. The mites (Acarina : Analgesidae) living on or in the feathers of birds. Parasitology, 42, (3-4) : p. 199-230.
- Trouessart, E. L., 1886. Diagnoses l'especes nouvelles de Sarcoptides plumicoles (Analgesinae). Bull. Soc. Etud. scient. Angers., 16 : pp. 85-156.
- Trouessart, E. L., and M. F. Megnin, 1885. Monographie du genre *Freyana* et description des especes nouvelles du Musee d'Angers. Bull. Etud. scient. Angers., 14 : pp. 29-45.
- Turk, F. A., 1953. A synonymic catalogue of British Acari; Part II. Ann. Mag. nat. Hist., 6 (62) : pp. 81-89.
- Vitzthum, H., 1929. 5, Ordnung : Milben, Acari. Tierwelt. Mitteleur., 3 (7) : pp. 1-112.