

A guide to the heteromorphic deutonymphs or hypopi (Acarina: Hypoderidae) living under the skin of birds, with the description of *Ibisidectes debilis* gen. and sp. nov. from the scarlet ibis.

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Introduction

The heteromorphic deutonymphs, or hypopi, living under the skin and in other cellular tissues of birds have been known since the beginning of the last century. Montagu (1811) found the first species of these mites in the gannet, *Sula bassana* L., and described it under the name of *Cellularia bassani*. He did not recognize that these forms were modified nymphs but believed that they represented the adult stage of a very strange and modified 'insect'. The parasites were found again by several authors. De Filippi (1861) was the first author to suggest that these forms probably represented nymphal stages and not adults as it was believed so far. Several new species were described by different authors, mainly during the period from 1861 to 1875. In 1877 Robin & Megnin claimed that the hypopi living under the skin of the pigeon were the nymphs of the feather mite *Falculifer rostratus* Buchholz, which live as adults on the feathers of these birds. This opinion has been accepted by all authors until recently and the subcutaneous hypopi have been referred to the genus *Falculifer* or to '*Hypodectes*'.

Fain & Bafort (1966, 1967) worked out the life cycle of the hypopi living under the skin of pigeons. They have shown that these hypopi are, in fact, the nymphs of a species of *Hypodectes* with adults (previously undescribed) that are free living in the nests of the host. More recently, Fain and Beaucournu (1972) described the developmental stages (hypopus, tritonymph and male) of another species, *Neottialges (Pelecanectes) evansi* Fain, from the skin and nest of the shag (*Phalacrocorax aristotelis* L.) and also observed for the first time the tritonymph of a new species of *Phalacroductes* from the same host.

Little is known about the host specificity, ecology and the effect of these parasites on the host. Pence (1972) has surveyed the bird hosts of the Hypoderid mites known from North America. The hypopi are often found in large numbers in birds, subcutaneously in the abdominal wall and along the fascia of the thighs. In some cases the hypopi may invade the connective tissue of any part of the body wall and along the viscera. One of us has found these hypopi in many different locations—under the nasal mucosa, around the oesophagus, into the rachis of the feathers, in the air sacs, on the surface of the lungs, in the lungs, in the gular pouch tissue, attached to the walls of the main

blood vessels of the pleural cavity, between the pericardium and the heart muscle, etc. (Fain & Hyland, 1962; Fain, 1967; Fain & Amerson, 1968; Fain, 1973). It is not certain if the presence of hypopi in these places is pathogenic. Grunberg & Kutzer (1962) observed some proliferation of small blood and lymph vessels in the subcutaneous tissues, with infiltration of connective tissue and accumulation of lipid around the hypopi, as well as infiltration and swelling of ground substance. When the hypopi are present in large numbers, one may surmise a proportionately greater reaction. Also, invasion of the superficial layers of vital organs, such as the heart or the main blood vessels, may induce local impairment of function.

A revision of all the known species in the family Hypoderidae (= Hypodectidae) was published by Fain in 1967. Several new species and genera have been described since this paper. At present the family Hypoderidae is divided into 13 genera comprising approximately 40 species in total. In this paper we describe a new species representing a new genus, *Ibisidectes debilis*, from the scarlet ibis, *Eudocimus ruber* L. These hypopi were found, with the hypopi of the recently described *Neottialges eudocimae* Pence, subcutaneously and in the perimuscular fascial sheath and the pectoral muscles of the host. Before describing the new taxa, we think it useful to give a key to the known genera of the family Hypoderidae, subfamily Hypoderinae, found in the hypopial stage in birds. The other subfamily, the Muridectinae, contains the two species of *Muridectes* known to parasitize rodents (Fain & Beaucournu, 1972).

Key to the family Hypoderidae, subfamily Hypoderinae

This key should be used only to identify mature hypopi. The taxon *Pelecanectes* Fain is re-established here as a subgenus of *Neottialges* Fain (see Fain & Beaucournu, 1972).

- | | | |
|---|---|---|
| 1 | Idiosoma with a strong constriction behind the posterior legs. Legs abnormally short. Epimera I loosely fused in the midline | Genus <i>Picidectes</i> Fain, 1967 |
| - | Idiosoma without a constriction behind the posterior legs. Legs not abnormally short. Epimera variable | 2 |
| 2 | Tarsi IV at most twice as long as wide or wider than long, carrying from 1 to 3 short spines and a long apical hair | 3 |
| - | Tarsi IV from 3½ to 10 times longer than wide, carrying 3 or 4 short spines and a long apical hair | 16 |
| 3 | Tarsi III and IV with a long barbed apical hair. Tarsi IV with 3 short spines. Genital suckers strongly divergent | Genus <i>Thalassornectes</i> Fain, subgenus <i>Rallidectes</i> Fain, 1967 |
| - | Tarsi III with a long simple hair. Tarsi IV with a long barbed apical hair and 1 to 3 short spines. Genital suckers variable | 4 |
| 4 | Tarsi IV with 3 spines | 5 |
| - | Tarsi IV with 1 or 2 spines. | 8 |
| 5 | Epimera I fused in a V. Tarsi III carrying 2 long subapical hairs and 4 short spines. Apical spine of tarsi I and II short and forked apically | Genus <i>Toucanectes</i> Fain, 1968 |
| - | Epimera I fused in a Y. Other characters variable | 6 |
| 6 | Tarsi III approximately 4 to 5 times longer than tarsi IV. Apical spine of tarsi I and II short and not forked | Genus <i>Phalacroductes</i> Fain, subgenus <i>Frehelectes</i> Fain & Beaucournu, 1972 |
| - | Tarsi III at most 2½ to 2 times longer than tarsi IV. Apical spine of tarsi I and II at least as long as two-thirds of the tarsus and forked apically | 7 |

- 7 Cuticle strongly and completely sclerotised. Epimera I very long, forming a short and broad sternum. Tarsi III $2\frac{1}{2}$ times as long as tarsi IV and bearing 5 short spines and a long apical hair Genus *Alcedinectes* Fain, 1966
- Cuticle poorly sclerotised. Epimera I very short, forming a very long and narrow sternum. Tarsi III $1\frac{1}{2}$ times as long as tarsi IV and bearing 3 long simple hairs, a cylindrical hair and 2 short spines. Genus *Amazonectes* Fain, 1967
- 8 Tarsi IV with 1 spine and approximately 4 to $4\frac{1}{2}$ times shorter than tarsi III. Cuticle not sclerotised. Genital sclerite absent. Genital suckers close together and parallel. Sternum well developed Genus *Ibisidectes* gen. nov.
- Tarsi IV with 2 spines. Other characters variable 9
- 9 Genital sclerite very long and divided into 2 sclerites remaining parallel. Sternum well developed. Cuticle poorly and incompletely sclerotised. All the dorsal hairs very short except the *d5*. Anterior legs short and thick. Body very short. Tarsi IV wider than long Genus *Aradectes* Fain, 1966
- Genital sclerite not divided. Other characters variable. 10
- 10 Epimera II abnormally long. The epimerites II of the juvenile stage persisting. Epimera III fused with epimera IV. Terminal spine of tarsi I and II nearly as long as the tarsi. Body very long (1 to 1.5 mm) and bearing very long hairs. Genus *Hypodectes* Filippi, 1861 11
- Epimera II not abnormally long. Epimerites II of juvenile stage not persisting. Terminal spine of tarsi I and II much shorter than the tarsi. Body shorter (less than 1 mm), with some dorsal hairs very short 12
- 11 With a long and strong neoformed epimerite II Genus *Hypodectes* Filippi subgenus *Hypodectes* Filippi, 1861
Without a neoformed epimerite II Genus *Hypodectes* Filippi subgenus *Hypodectoides* Fain & Bafort, 1966
- 12 Tarsi I to III with a short apical simple spine. Tarsi III from 5 to 6 times longer than tarsi IV. Large sized hypopi (800 to 960 μ m) Genus *Phalacroectes* Fain, 1966 13
- Tarsi I to III with a short apical forked spine (that of tarsi III may be simple). Tarsi III from 1.2 to 3 times longer than tarsi IV. Small to medium sized hypopi (300 to 690 μ m) 14
- 13 Genital suckers close together and parallel. Genital sclerite present or lacking Genus *Phalacroectes* Fain subgenus *Phalacroectes* Fain, 1966
- Genital suckers strongly divergent and distant. Genital sclerite lacking. Genus *Phalacroectes* Fain subgenus *Pledectes* Cerny, 1969
- 14 Tarsi I to III carrying only one long normal subapical hair. Epimera I widely separate. Tarsus IV longer than wide. Body strongly sclerotised Genus *Passerodectes* Fain, 1966
- Tarsi I to III carrying 2 long subapical hairs, one of these is very thick in its basal two-thirds and very finely attenuated apically. Epimera I either fused to form a sternum or contiguous in the shape of a V without sternum Genus *Tytodectes* Fain 1966 15
- 15 Tarsi IV approximately twice as long as wide. Tarsi III with 9 hairs, the apical spine simple. Epimera I fused in a V or in a Y with a long sternum Genus *Tytodectes* Fain subgenus *Tytodectes* Fain, 1966
- Tarsi IV wider than long. Tarsi III with 6 or 7 hairs, the apical spine forked. Epimera I either fused in a Y or contiguous and in the shape of a V Genus *Tytodectes* Fain subgenus *Ispidectes* Fain, 1967
- 16 Tarsi III with a long barbed apical hair. Tarsi IV $3\frac{1}{2}$ times longer than wide Genus *Thalassornectes* Fain subgenus *Thalassornectes* Fain, 1966
- Tarsi III with a long apical hair not barbed. Tarsi IV from 5 to 10 times longer than wide 17
- 17 Epimera I not meeting in the midline. Cuticle strongly sclerotised. Genital suckers widely separate and strongly divergent. Idiosomal hairs relatively short. Body more than 1.5 mm long Genus *Suladectes* Fain, 1969
- Epimera I meeting and forming a distinct sternum. Sclerotisation of the cuticle variable. Genital suckers either parallel or slightly divergent. Some idiosomal hairs relatively very long. Body less than 1 mm long, Genus *Neottialges* Fain, 1966 18

- 18 Cuticle strongly and completely sclerotised. A primary genital sclerite never present but in some species the area between the genital suckers is more or less strongly sclerotised Genus *Neottialges* Fain subgenus *Caloenectes* Fain, 1966
- Cuticle poorly or not sclerotised 19
- 19 Genital sclerite completely absent Genus *Neottialges* Fain subgenus *Neottialges* Fain, 1966
- Genital sclerite present but more or less reduced in some species Genus *Neottialges* Fain subgenus *Pelecanectes* Fain, 1966

Hypoderid mites from the scarlet ibis (*Eudocimus ruber* L.)

Two species of Hypoderid mites were found subcutaneously in two specimens of the scarlet ibis (*Eudocimus ruber*) that died at Whippsnade Zoo (Zoological Society of London) in 1972. One of these hypopi has been described before, originally collected in America from the white ibis (*Eudocimus albus* L.), and the other is an undescribed species.

Genus *NEOTTIALGES* Fain, 1966

Subgenus *Pelecanectes* Fain, 1966

Neottialges (Pelecanectes) eudocimae Pence, 1971

This species has been described by Pence (1971) from the white ibis in Louisiana, U.S.A. We have found numerous specimens of this species (fig. 1) mixed with those of the new species *Ibisidectes debilis* described below. Our specimens of *N. eudocimae* from the scarlet ibis measure from 600 μ m long and 280 μ m wide to 710 μ m long and 360 μ m wide.

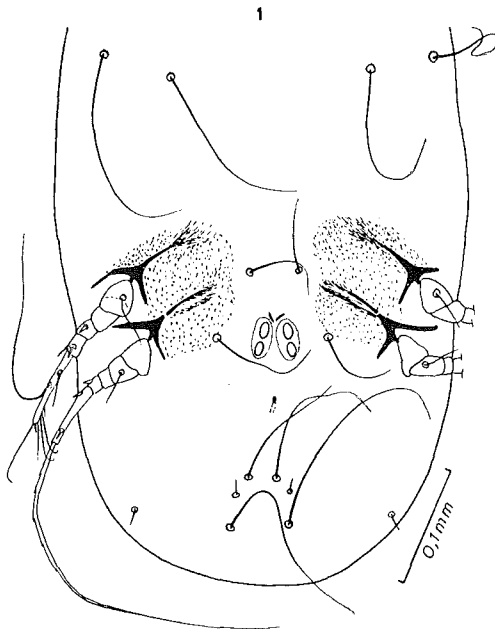


FIG. 1. *Neottialges (Pelecanectes) eudocimae* Pence. Hypopus from *Eudocimus ruber*, ventral view of the hysterosoma.

Genus *Ibisidectes* gen. nov.

Definition: The genus is based on the hypopial nymph. Body very small. Cuticle not sclerotized. Legs well developed. Tarsi IV approximately twice as long as wide and 4 to $4\frac{1}{2}$ times shorter than tarsi III. Genital sclerite completely absent. Genital suckers close together and not divergent. Epimera fused with a long sternum. Apical spine of tarsi I to III small and simple. Tarsi III with 4 long simple hairs, 2 short simple hairs and a short apical spine. Tarsi IV with a long barbed apical hair and 1 narrow spine. The hairs *sc e*, *d 1*, *d 2*, *d 5*, *l 1*, *h* and *sh* very long.

Type species: *Ibisidectes debilis* sp. nov.

Ibisidectes debilis sp. nov.

Only the hypopial stage is known.

Hypopus (figs. 2-6): The holotype is 249 μm long and 132 μm wide. Three paratypes measure (length \times width) 265 μm \times 135 μm ; 240 μm \times 130 μm ; 235 μm \times 121 μm . With the characters of the genus.

Dorsum: Sejugal furrow incomplete. Hairs *sc i* much shorter (25 μm) than the *sc ii* (90 μm). The hairs *d 1*, *d 2* and *l 1* are 125 μm , 120 μm and 120 μm long respectively. Hairs *d 3*, *d 4*, *l 2*, *l 3* and *l 4* very short (10-15 μm) (fig. 2).

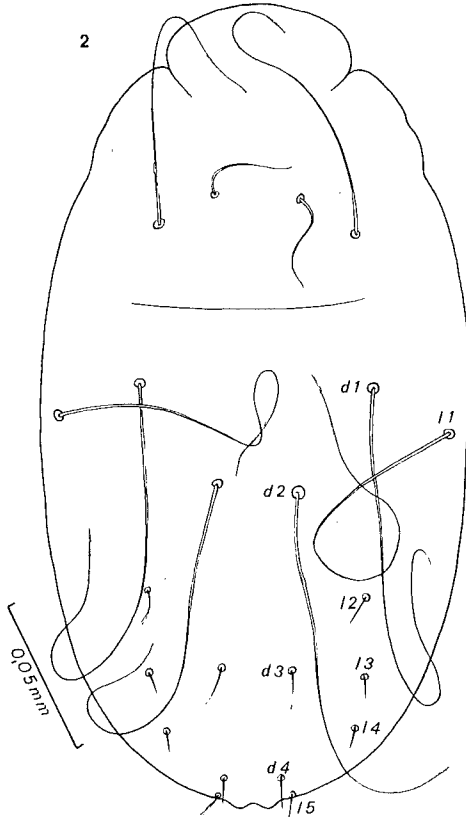


FIG. 2. *Ibisidectes debilis* sp. nov. Hypopus in dorsal view to show dorsal hairs.

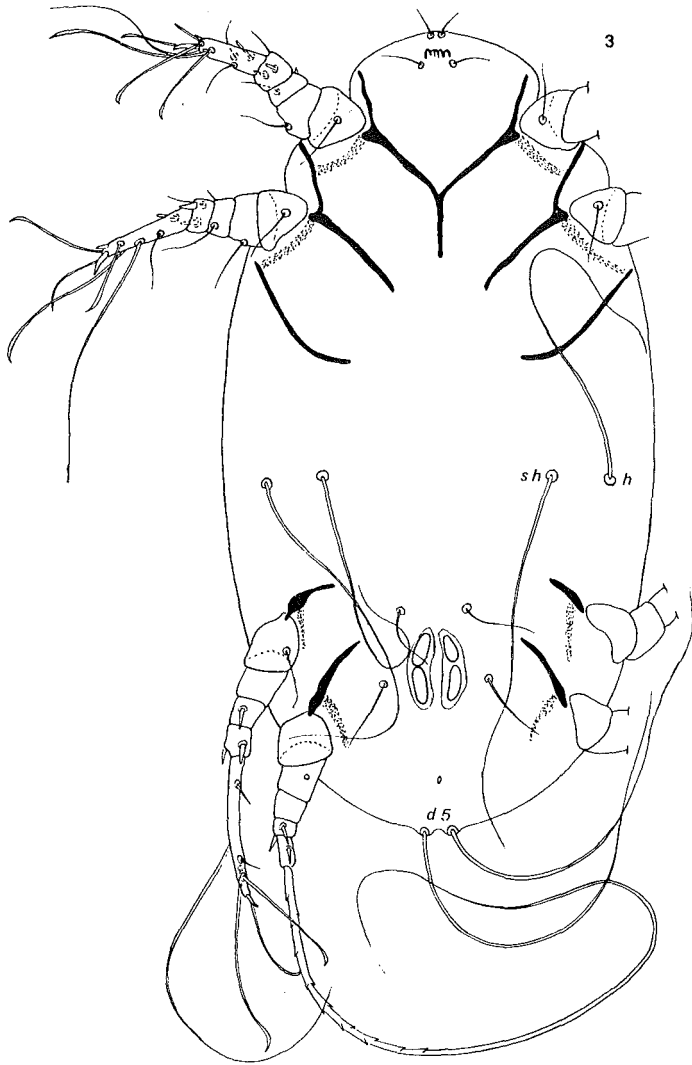


FIG. 3. *Ibisidectes debilis* sp. nov. Hypopus in ventral view.

Venter: palposoma represented by a small transverse sclerite and two short hairs. The *vi* hairs are $10\ \mu\text{m}$ long. The hairs *sh*, *h* and *d 5* are $120\ \mu\text{m}$, $120\ \mu\text{m}$ and $150\ \mu\text{m}$ long respectively (fig. 3). Genital suckers large, close together, without genital sclerite.

Host: Under the skin, in the perimuscular fascial sheath and in the pectoral muscles of *Eudocimus ruber* L., Whipsnade Park Zoo, Hertfordshire, Great Britain, 1972. The length of captivity of the birds is not known. These hypopi were mixed with those of *Neottialges* (*Pelecanectes*) *eudocimae* Pence.

Type and paratypes in the British Museum (Natural History). Paratypes in collections of authors.

Registration Numbers: *I. debilis* 1973, 507–510; *N. eudocimae* 1973, 511–512.

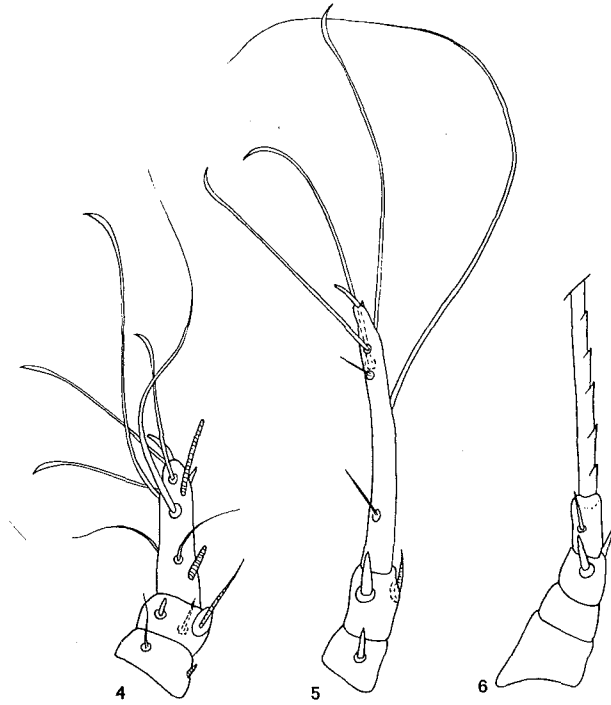


FIG. 4-6. *Ibisidectes debilis* sp. nov. Hypopus: (4) Tarsus, tibia and genu of leg I. (5) Tarsus, tibia and genu of leg III. (6) Tarsus, tibia, genu and femur of leg IV.

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Summary

A key is provided to the known genera of Hypoderid mites living subcutaneously in the hypopial stage in birds. Recent knowledge is summarized of this family of mites, known earlier under the generic names *Falculifer* and '*Hypodectes*'. *Ibisidectes debilis* gen. & sp. nov. is described in the hypopial stage, found, with *Neottialges eudocimae* Pence, in the perimuscular fascial sheath and pectoral muscles of the scarlet ibis (*Eudocimus ruber* L.).

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