

Mites, Hitherto Unrecorded in South Africa, Col- lected in Natal from Fowls, Pigeons, Turkeys, Guinea-Fowls, Wild Birds and Rabbits.

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IN the Eleventh and Twelfth Reports of the Director of Veterinary Education and Research, Part I (1926), an article by le Roux appeared, entitled "Helminths collected from the Domestic Fowl (*Gallus domesticus*) and the Domestic Pigeon (*Columba livia*) in Natal." This was an incentive to publish a report on similar lines of certain mites, hitherto unrecorded in South Africa, found on various species of birds, domesticated and wild, and the rabbit. Of the seventeen mites mentioned in this article, none apparently have been recorded from South Africa. Even Bedford (1932) gives no description of them in his work. It may be that these mites have been introduced only recently, but, owing to their widespread distribution, this does not appear likely. The other suggested reason why no descriptions of them have been given is that, as many of them apparently cause no pathological changes, no one considered them of sufficient importance to describe. On their respective hosts they are usually found in large numbers, especially in the winter time.

It is not the intention of the authors to give a detailed description of the morphology of these mites, as many of them have been described by Canestrini and Kramer (1899), and others. Microphotographs of them are given for reference purposes.

Most of the mites were collected from fowls, etc., sent in to the Laboratory for examination.

METHODS OF COLLECTION.

Feather mites are easily detected with the naked eye as tiny grey specks on the feathers. A small hand-lens is useful for distinguishing small mites from feather debris. By means of any sharp-pointed instrument, e.g. van Gieson's needle, these individual parasites can be easily picked up if the point has been dipped into the mounting material. They adhere to the point and are then transferred to the mounting material on the slide. Another method is to place infested feathers into test-tubes which are corked and kept overnight. These mites then leave the feathers in large numbers and are easily collected from the bottom and sides of the test-tubes.

Quill mites, such as *Syringophilus*, can be easily seen in the quill mixed with much debris. This gives the quill an opaque colour as compared with a normal quill, which is translucent in appearance. Depending on the degree of infestation the infected quill shows opaque patches, or the quill appears packed with debris and parasites, as though it was filled with very fine sawdust. By means of a hand-lens the parasites can be seen through the quill. To obtain them the quill is slit open with fine entomological scissors, and the contents scraped out into a watch-glass. This is left undisturbed for a few minutes when the parasites emerge from the debris and are then transferred to mounting fluid.

Cheyletiella parasitivorax of the rabbit, found on the hair close to the skin, accompanied invariably by *Listrophorus gibbus*, which has its habitat on hairs half way between the skin and the tip of the hair, are the most difficult to collect. A bunch of hair is cut off close to the skin and placed in a small beaker with the cut end uppermost. A warmed slide is placed over the beaker and touches the cut hair. In a short while these mites climb on to the slide and are then picked off singly.

For immediate examination the mites were placed in a drop of glycerine under a coverslip, but for permanent preparations the modification of Berlese's medium was utilized.

Below, each mite will be discussed individually.

Order: ACARINA.

Sub-order: ASTIGMATA.

Super family: SARCOPTOIDEA.

Family: ANALGESIDAE.

Sub-family: PTEROLICHINAE.

Genus: PTEROLICHUS.

(1) *Pterolichus obtusus* (Robin) (Plate I and Plate II, figs. 1, 2 and 3).

Host.—Domestic fowl. Hirst (1922) states that it has been found on birds, especially the French partridge.

Distribution.—Allerton Laboratory, Pietermaritzburg district, but probably widely distributed over the Union.

Habits. *Pterolichus obtusus* is found chiefly on the flight and tail feathers, where it multiplies, though odd parasites can be found moving about on the body feathers. In heavy infestations the medial surface of the wing and tail feathers are grey coloured due to the masses of mites. (See Plate II, Fig. 1.)

If these feathers are examined under a lens, these mites will be seen to have arranged themselves systematically, like cars in a car-park, in the grooves between the barbs (see Plate II, Fig. 2). They remain very quiet while undisturbed, but move rapidly when touched. All stages of development can be found on the infested feather, the infestation commencing along the rhachis and spreading along the grooves between the barbs towards the outer border of the feather.

An interesting feature of the mature female is the presence or the horse-shoe-shaped epimera together with a distinct brownish coloured chitinous shield of the dorsum. This brownish shield is not seen in young females before copulation has taken place. The gradual development of the shield is shown in Plate I, Figures 1 to 3.

Pterolichus has been seen to enter the quill of a feather already occupied by the quill-mites, *Syringophilus bipectinatus* and *Megninia cubitalis ginglymura*. It gained entrance to the quill through the superior umbilicus. On other occasions they have been seen leaving the quill through the same aperture to regain the surface of the feather. The mites apparently breed rapidly on birds that are kept in dark houses with poor ventilation, especially if the atmosphere in the houses is humid. Only slight infestations of this parasite have been seen in birds running in pens where they are subjected to bright sunlight. As far as can be ascertained these parasites cause no obvious damage to the barbs and finer structures of the feathers, even in spite of very intensive infestations that have persisted for months (Plate II, Figures 2 and 3).

Pillers (1927) claimed that *Falculifer rostratus*, a feather mite of the pigeon, did cause perforations in feathers; this could not be borne out in the case of *Pterolichus obtusus* of the fowl. This tends to confirm the findings of Levi (1941) who maintained that *Falculifer rostratus*, a parasite of the same nature as *Pterolichus obtusus*, did not harm the feathers of the pigeon. It has not been possible to ascertain the feeding habits of these mites, nor even the nature of their food. When an infested feather is plucked from a live fowl, or when the host has died, these mites tend to leave the feathers gradually. There is no doubt that very heavy infestations of birds with this mite cause loss of vigour, with signs of general debility and reduction of vitality of the host. This could be compared with "tick worry" in cattle and horses.

A heavy infestation with *Pterolichus obtusus* was soon controlled by spraying the birds with a 5 per cent. aqueous solution of nicotine sulphate, 40 per cent. strength. Painting of the perches with the same drug should be an even easier method of eradication.

Order: ACARINA.

Sub-order: ASTIGMATA.

Super-family: SARCOPTOIDEA.

Family: ANALGESIDAE.

Sub-family: ANALGESINAE.

Genus: MEGNINIA.

(2) *Megninia cubitalis ginglymura* (Plate VI, figs. 1 and 2).

Host.—Domestic fowl. Hirst (1922) mentions that it has been found also on turkeys and peacocks.

Distribution.—Allerton Laboratory, Pietermaritzburg district, and Pinetown, but probably widely distributed.

Habits.—These mites are most commonly found on the down and contour feathers on the barbs near the shaft. They were also observed on the tail and wing feathers and even inside the quill of a feather infested with *Syringophilus bipectinatus*. The eggs are attached to the barb of the down

and contour feathers. No cases of gross infestation have been observed. This mite is generally considered to be non-pathogenic, but it has been blamed for causing feather-picking in pullets. A case of "gapes" in a pullet was investigated. Scrapings were made from the lining of the trachea and these mites were found. It is possible that the presence of these mites was the cause of the irritation. It is suggested that the parasites gained access to the mouth and then the trachea as a result of the bird plucking out or at its feathers, due to irritation set up by the mites.

Order: ACARINA.

Sub-order: PROSTIGMATA.

Super family: THROMBIDOIDEA.

Family: CHEYLETIDAE.

Genus: SYRINGOPHILUS.

(3) *Syringophilus bipectinatus* (Heller, 1880) (Plate III, figs. 3 to 6 and Plates IV and V).

Host.—Domestic fowl.

Distribution.—Allerton Laboratory, Pietermaritzburg district, Matatiela, East Griqualand, Oudtshoorn, C.P., George, C.P., Europe and North America. Hirst (1922).

Habits.—*Syringophilus bipectinatus* is found in the quill mainly of the fully formed flight feathers, close to the base of the wing. It may also be found in the quill of the tail feathers. In severe infestations they also occur in the quills of the body feathers. How the infestation of the quills takes place is doubtful, though it appears that parasites enter the quill at the superior umbilicus, which often shows black spots, or a definite opening through which *Pterolichus obtusus* has been seen entering the quill. The rachis of heavily infested feathers appears somewhat dried out while the groove on the medial side becomes more pronounced. In these cases a definite opening can be detected at the superior umbilicus.

Inside the quills these mites feed on the conical cells and the walls of the quills. [Hirst (1922)]. A large amount of debris gradually accumulates, which consists of casts, dead mites and black faecal material, amongst which eggs and live parasites can be found. These parasites were found for the first time in March 1944. On this occasion the infested feathers contained only a few mites and no eggs could be found. From June the quills of infested feathers contained a much larger number of parasites together with many eggs. The debris from these feathers was of a sticky consistency and in it were many eggs. From one quill one hundred and fourteen live parasites were counted.

The mite is slow-moving, and, if watched through the quill, will often appear to be dead. Even if placed on a slide with quill debris it moves so slowly that it can be picked up with a needle without having to use a hand-lens to follow its movements.

A pair of these mites has never been found *in copulo* and, were it not for the marked difference in body-form, males and females would be very difficult to differentiate without special treatment. This is due to the soft and fatty non-chitinous substance forming their bodies, through which their sex-organs are difficult to see.

Pathogenesis.—It is doubtful whether these parasites are very harmful to their hosts, except in cases where the infestation is heavy. The quill or calamus of a normal feather is more or less transparent and is divided by so-called septa into variously sized sections. These septa are composed of dry pith-like material (see Plate IV, Fig. 1.). According to the degree of infestation with this mite, the quill becomes filled with debris and mites until the whole quill is opaque. Finally, when the quill will hold no more debris and parasites, marked distortion occurs. This is well shown in Plate V, Fig. 1., where the first feather is normal, the second half-filled, the third completely filled and the fourth shows distortion. Feathers completely filled are shown in Plate V, Fig. 2. Plate V, Fig. 3, illustrates harmful effects on the quills, while Plate IV, Fig. 2, shows feathers opened to expose the large amount of debris and mites. To remove a normal feather a certain amount of traction is necessary, but a distorted feather is easily extracted. The papillae of these flight feathers contain a cheesy, sticky mass, which on microscopical examination shows the presence of large numbers of cocci proving that secondary infection had taken place. On several occasions in the past, birds in poor condition have been received at the Laboratory without tail feathers and the poultrymen have sent them in asking what the cause was of the loss of these feathers. At that time this parasite had not been observed, in spite of the empty follicles being slightly reddened. It is possible that these feathers were infested with the quill mite and that the feathers were pulled out by the bird, owing to irritation, or that they simply dropped out. Benbrook (1944) states that these mites appear to cause partial or complete loss of feathers. It has also been suggested that these mites may be an occasional cause of feather picking, but in none of the birds harbouring this parasite and which were kept under close examination for a considerable period, was this symptom observed.

(4) *Syringophilus columbae* (Hirst 1920) (Plate III, figs. 1 and 2).

Host.—Domestic pigeon.

Distribution.—Pigeons at Allerton Laboratory, received from various parts of the Union. Probably very widely distributed.

Habits.—As described for *Syringophilus bipectinatus*.

Order: ACARINA.

Sub-order: ASTIGMATA.

Super family: SARCOPTOIDEA.

Family: ANALGESIDAE.

Sub-Family: PTEROLICHINAE.

Genus: FALCULIFER.

(5) *Falculifer rostratus* (Buchholz) (Plate VII, figs. 1 to 4).

Host.—Domestic pigeon. Recorded on domestic and other pigeons in Europe.

Distribution.—Allerton Laboratory, but probably widely distributed in the Union. In Europe. Bedford (1931).

MITES, HITHERTO UNRECORDED IN SOUTH AFRICA.

Habits.—Megnin, quoted by Neumann (1905) claims that when *Falculifer rostratus* is removed from its natural habitat, deviations from its normal metamorphosis may take place. The normal nymph, instead of moulting to a young pubescent male or female, takes on an Acarian form known as "a hypopous nymph". This form is quite different in shape from the normal nymph; it is elongated, vermicular and destitute of rostrum and internal organs, but as such it is now fitted for a new kind of life. It next enters the sub-dermic tissue by way of the feather follicles, and attempts to live there for a time by cutaneous absorption. When normal conditions are once more established it emerges to the exterior, assumes its primitive form, and finally resumes its regular evolution. These mites are found mainly close to the rhachis of the tail and wing feathers. They are easily seen with the naked eye. Two pigeons heavily infested with these mites were killed. A thorough post-mortem examination and search for these hypopous nymphae were made. What appeared to be hypopous nymphae were found in fairly large numbers only on the feathers (see Plate VII, Fig. 3) but none were found in the subcutaneous tissues and organs.

Pathogenesis.—It was impossible to find any damage done by this mite to infested feathers. This is contrary to the findings of Pillers (1927).

Order: ACARINA.

Sub-order: ASTIGMATA.

Super family: SARCOPTOIDEA.

Family: ANALGESIDAE.

Sub-Family: PROTOPHYLLOIDINAE.

Genus: PTEROPHAGUS.

(6) *Pterophagus strictus* (Megnin) (Plate VIII, figs. 1 to 6).

Host.—Domestic pigeon.

Distribution.—Allerton Laboratory.

Habits.—*Pterophagus strictus* is found mainly on the body feathers especially on those covering the lateral aspect of the thigh.

Pathogenesis.—No damage to the feathers could be found.

Order: ACARINA.

Sub-order: ASTIGMATA.

Super-family: SARCOPTOIDEA.

Family: ANALGESIDAE.

Sub-family: ANALGESINAE.

Genus: MEGNINIA.

(7) *Megninia columbae* (Buchholz) (Plate VI, figs. 3 and 4).

Host.—Domestic pigeon.

Distribution.—Pietermaritzburg district, but probably widely distributed.

Habits.—*Megninia columbae*, similarly to the *Megninia* of the fowl, is found in fairly large numbers on the body feathers and to a lesser extent on the tail and wing feathers. They appear to prefer young birds as hosts. On a squab about fourteen days old very large numbers of these mites were found while on its two parents relatively very few of these parasites were present.

Pathogenesis.—They set up no apparent lesions, but the males probably cause an intense irritation. This is borne out by the fact that an acute irritation is set up when these mites are allowed to move on human skin. It may be caused by the males dragging their long legs over the surface of the skin.

(8) *Megninia velata* (Plate XIV, figs. 1 to 4).

Host.—Muscovy duck.

Distribution.—Allerton Laboratory.

Habits.—Like other *Megninia* found chiefly on the body feathers. No case of gross infestation has been observed.

(9) *Megninia* (Species unidentified) (Plate IX and Plate X, figs. 1 and 2).

Host.—Budgerigar [*Melopsittacus undulatus* (Shaw)].

Distribution.—Pietermaritzburg.

Habits.—These were found mainly on the body feathers in small numbers, although occasional parasites were present on the tail and wing feathers. On this special bird, very large numbers of *Protolichus lunula* were also found on the tail and wing feathers. As shown in Plate IX, Figure 1, the male apparently holds the mature female until actual copulation takes place. This phenomenon has not been seen in the case of any other mites or mites of the same genus.

Sub-family: ANALGESINAE.

Genus: PROTOLICHUS.

(10) *Protolichus lunula* (Robin) (Plate II, figs. 4 and 5).

Host.—Budgerigar [*Melopsittacus undulatus* (Shaw)].

Distribution.—Pietermaritzburg.

Habits.—No gross infestations with this mite were found, although in some instances they were present in fair numbers. These parasites were found like those of the guinea-fowl in the grooves between the barbs, against the rachis of the wing feathers. The eggs were apparently laid on the barbs some distance away from the rachis. The males were rare in proportion to the females. These large mites are apparently non-pathogenic, as no damage could be seen to either feathers or host.

(11) and (12).

Two *Analgesidae* were obtained from the feathers of a wild guinea fowl—unfortunately we were unable to identify them ourselves, and the entomologist to whom they were submitted, was likewise unable to identify them. (See Plate XII, figs. 1 to 4).

Host.—Wild guinea-fowl [*Numida coronata* (Gray)].

Distribution.—Kokstad district.

Habits.—These mites were found between the barbs of the wing and tail feathers, lying against the rachis. They were present in very small numbers. They were not the cause of any obvious lesions. Two species were found, one a large one (see Figures 1 and 2) and the other small (see Figures 3 and 4).

(13) Freyana chanayi (Plate X, figs. 3 and 4).

Host.—Turkey.

Distribution.—Pietermaritzburg.

Habits.—Found in the grooves between the barbs of the tail and wing feathers. They were present only in small numbers and were not the cause of any obvious lesions.

(14) and (15).

Two further unidentified *Analgesidae* from the Indian minah, *Acridothores trystis* (Linn) (Plate XI, figs. 1 to 4), and a canary [Hartz Mountain Roller, *Serinus canaria* (Linn)] were discovered. These were found mainly on the wing and tail feathers of the specified hosts, though they were only present in small numbers.

Order: ACARINA.

Sub-order: PROSTIGMATA.

Super family: THROMBIDOIDEA.

Family: CHEYLETIDAE.

Genus: CHEYLETIELLA.

(16) Cheyletiella parasitivorax (Megnin 1878) (Plate XIII, fig. 1).

Host.—Domestic Rabbit [*Lepus cuniculus* (Linn)].

Distribution.—Pietermaritzburg district; also recorded at Onderstepoort by Bedford (1931).

Habits.—*Cheyletiella parasitivorax* occurs in the fur close to the skin of the rabbit. Observations showed that it apparently takes up this position in order to intercept another parasite, *Listrophorus gibbus*, on which it preys. The last-named parasite lives higher up the fur away from the skin. *Cheyletiella* appears harmless to the host.

Order: ACARINA.

Sub-order: ASTICMATA.

Super family: SARCOPTOIDEA.

Family: LISTROPHORIDAE.

Genus: LISTROPHORUS.

(17) Listrophorus gibbus (Pagenstecher) (Plate XIII, figs. 2 to 6).

Host.—Domestic rabbit [*Lepus cuniculus* (Linn)].

Distribution.—Pietermaritzburg district, but probably widely distributed.

Habits.—*Listrophorus gibbus* is found in large numbers on the fur midway between the skin and the tip of the fur. They appear harmless and are preyed upon by *Cheyletiella parasitivorax*, Banks (1915). This mite is peculiar in that the under-lip is expanded on each side into a flexible plate which curls round the hair. It slides up and down the hair with the help of this structure and the movement of the legs. It is also compressed laterally to allow of its progression through the fur.

SUMMARY AND CONCLUSIONS.

The occurrence of seventeen mites has been recorded apparently for the first time in South Africa. *Cheyletiella parasitivorax* has also been included, having been recorded only from Onderstepoort. These mites are apparently widespread over the Union and it is likely that many other species are present.

With the exception of *Syringophilus bipectinatus* and *S. columbae*, which produce marked distortion and malnutrition of the feathers, all the rest of the mites are apparently harmless as far as setting up lesions are concerned. It is, however, possible that gross infestations may set up "mite worry" in the hosts and so help reduce their vitality, causing debility and anaemia. The claim by other authors, that feather mites damage the barbs of the feathers, has not been confirmed, and it is thought that biting lice are more likely to be the culprits.

ACKNOWLEDGMENT.

We wish to thank Dr. A. S. Canham, Officer-in-Charge, Allerton Laboratory, for his encouragement and interest; Dr. R. F. Lawrence, Director, Natal Museum, for his help and identification of many of these mites, and Mr. L. Hill, Senior Technical Assistant, Allerton Laboratory, for his great help in the preparation of the parasites and the photographs.

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PLATE I.

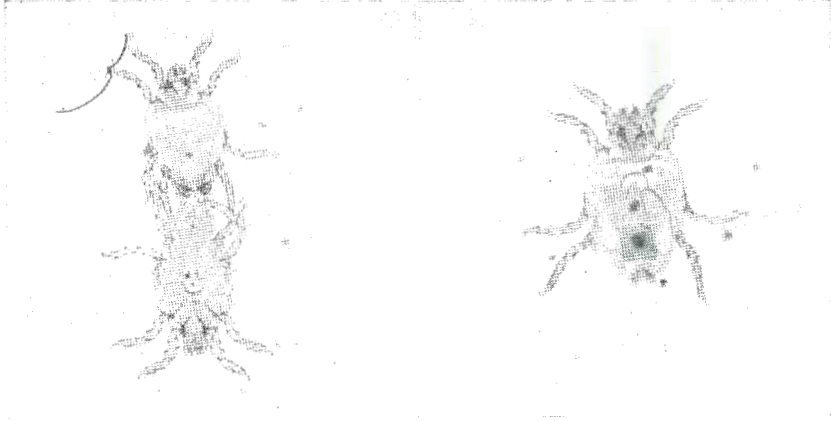


Fig. 1.—*Pterolichus obtusus* male and young female. (Chitinous shield not differentiated.)

Fig. 2.—*Pterolichus obtusus*. Ovigerous female. Chitinous shield differentiating.



Fig. 3.—*Pterolichus obtusus*. Adult female. (Chitinous shield differentiated.)

Fig. 4.—*Pterolichus obtusus*. Mature male.



Fig 1.—Australorp wing: Feather infested with *Pterolichus obtusus*.

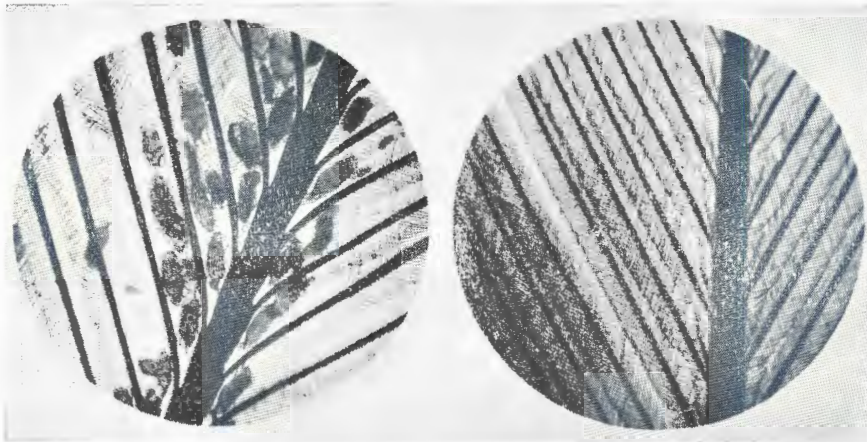


Fig. 2.—Feather infested with *Pterolichus obtusus*, showing barbs and barbules intact.

Fig. 3.—Normal feather.

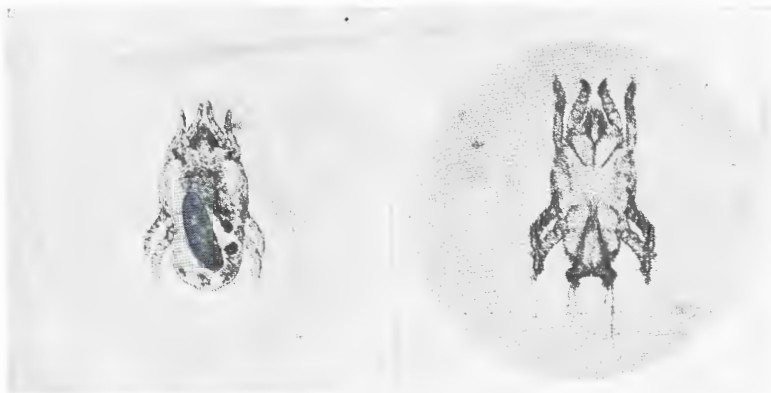


Fig. 4.—*Protolichus lunula*.
Ovigerous female.

Fig. 5.—*Protolichus lunula*.
Mature male.

PLATE III.



Fig. 1.—*Syringophilus columbae*. Female.



Fig. 2.—*Syringophilus columbae*. Male.

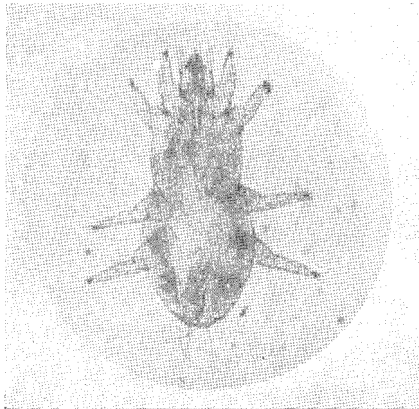


Fig. 3.—*Syringophilus bipectinatus*. Female.

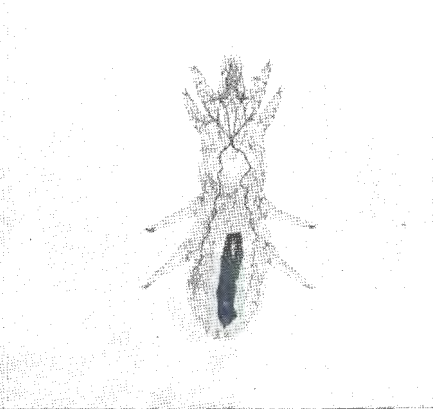


Fig. 4.—*Syringophilus bipectinatus*. Male.



Fig. 5.—*Syringophilus bipectinatus*.
Eggs.

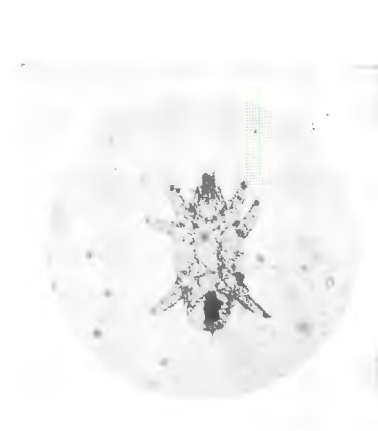


Fig. 6.—*Syringophilus bipectinatus*. Larvae.

PLATE IV.



Fig 1.—Showing quills of normal feathers.



Fig. 2.—Quills of feather infected with *Syr. bipect.*
opened.

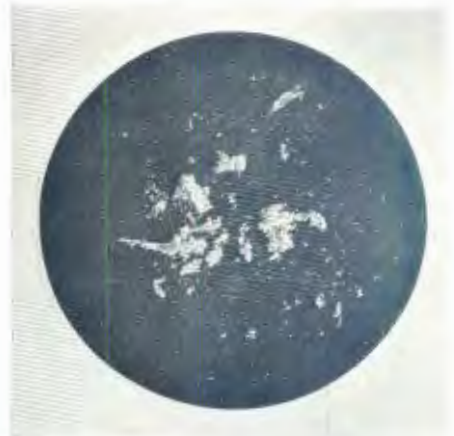


Fig. 3.—Debris scraped out of quill
infected with *Syr. bipect.*



Fig. 1.—Four feathers in various stages of infestation with *Syr. bipect.*



Fig. 2.—Quills heavily infested with *Syr. bipect.*, showing opacity due to mites and debris.



Fig. 3.—Quills heavily infested with *Syr. bipect.*, showing distortion.

PLATE VI.

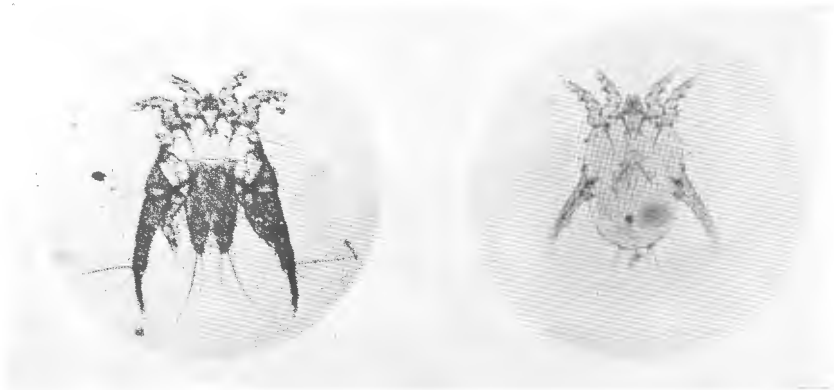


Fig. 1.—*Megninia cubitalis*
ginglymura. Male.

Fig. 2.—*Megninia cubitalis*
ginglymura. Female.

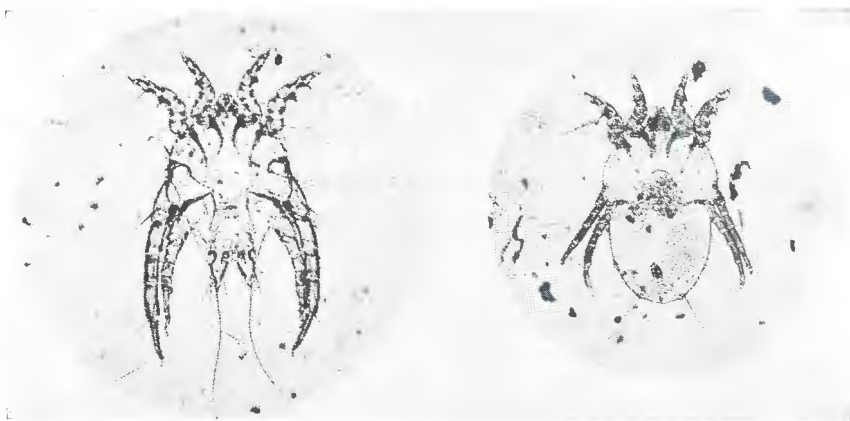


Fig 3.—*Megninia columbae*. Male.

Fig. 4.—*Megninia columbae*.
Female.

PLATE VII.



Fig. 1.—*Falculifer rostratus*.
Male.



Fig. 2.—*Falculifer rostratus*.
Male.

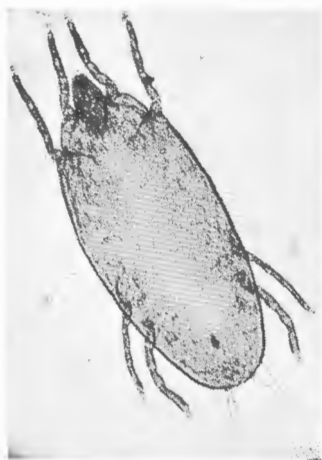


Fig. 3.—*Falculifer rostratus*.
Metamorphic form.



Fig. 4.—*Falculifer rostratus*.
Ovigerous female.

PLATE VIII.

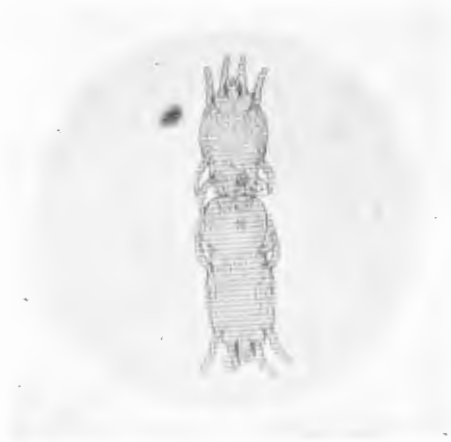


Fig. 1.—*Pterophagus strictus*. Male and female.



Fig. 2.—*Pterophagus strictus*. Female.



Fig. 3.—*Pterophagus strictus*. Female.



Fig. 4.—*Pterophagus strictus*. Female.



Fig. 5.—*Pterophagus strictus*. Female.



Fig. 6.—*Pterophagus strictus*. Male.

PLATE IX.



Fig. 1.—*Megninia* sp. Male and immature female. Host: Budgerigar.



Fig. 2.—*Megninia* sp. Female. Host: Budgerigar.



Fig. 3.—*Megninia* sp. Male. Host: Budgerigar.



Fig. 4.—*Megninia* sp. Female. Host: Budgerigar.

PLATE X.

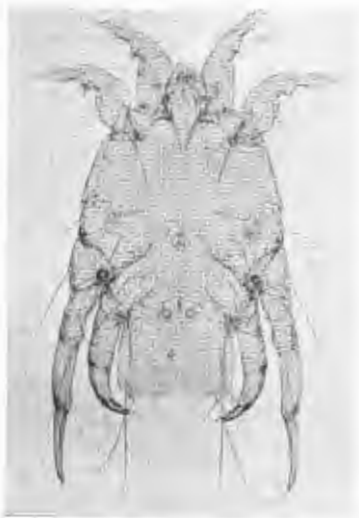


Fig. 1.—*Megninia* sp. Male. Host: Budgerigar.



Fig. 2.—*Megninia* sp. Female. Host: Budgerigar.



Fig 3.—*Freyana chanayi*. Male.
Host: Turkey.

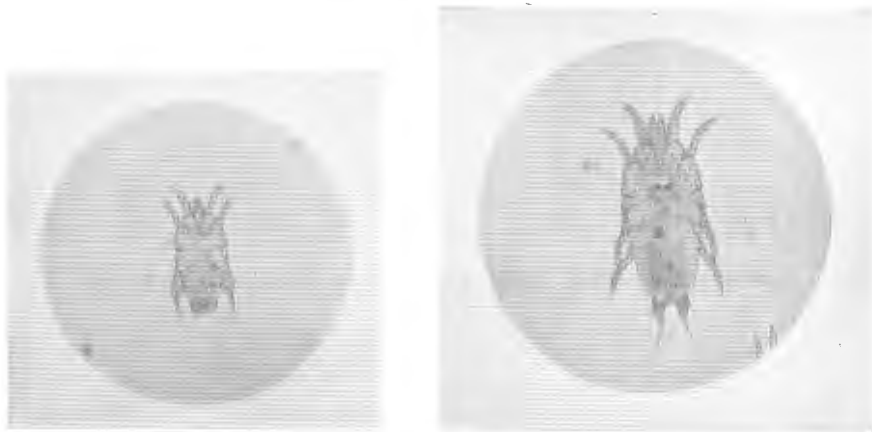


Fig. 4.—*Freyana chanayi*. Female.
Host: Turkey.

PLATE XI.

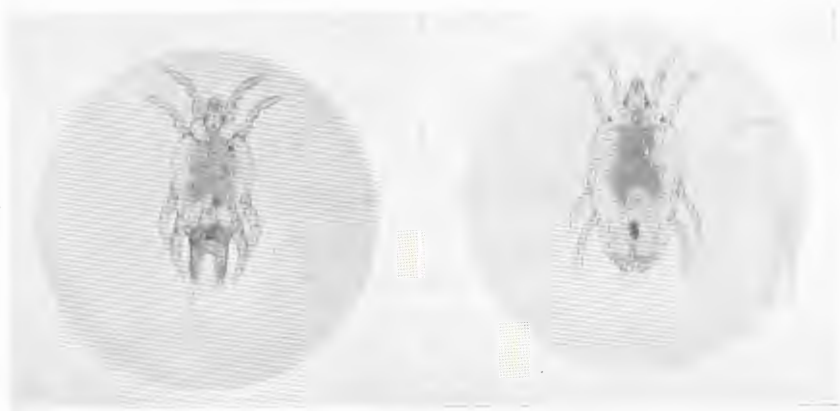


Figs. 1 and 2.—Unidentified male (left) and female (right).
Host: Indian Minah.

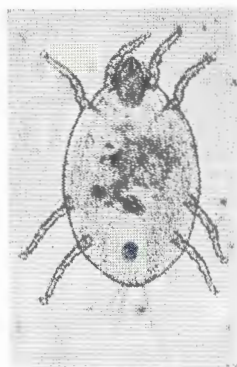


Figs. 3 and 4.—Unidentified male (left) and female (right).
Host: Indian Minah.

PLATE XII.



Figs. 1 and 2.—Unidentified male (left) and female (right).
Host: Guinea Fowl.



Figs. 3 and 4.—Unidentified male (left) and female (right).
Host: Guinea Fowl.

PLATE XIII.

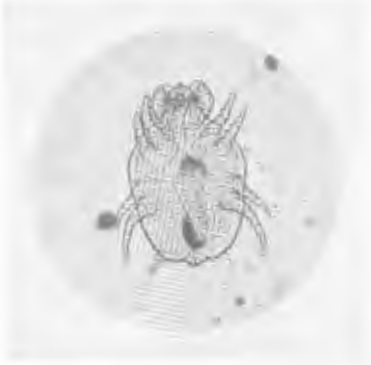


Fig. 1.—*Cheyletiella parasitivorax*. Ovigerous female.



Fig. 2.—*Listrophorus gibbus*. Male. Ventral view.



Fig. 3.—*Listrophorus gibbus*. Ovigerous female.



Fig. 4.—*Listrophorus gibbus*. Male.

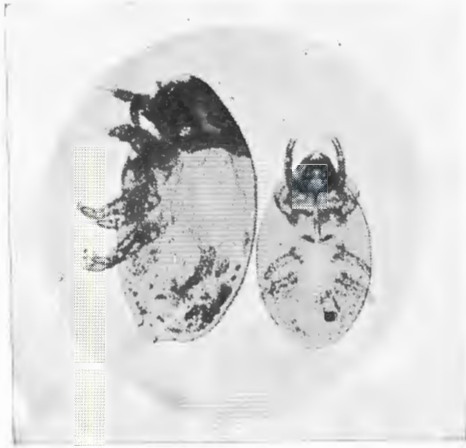


Fig. 5.—*Listrophorus gibbus*. Lateral and ventral view. Female.



Fig. 6.—*Listrophorus gibbus*. Female. Ventral view.

PLATE XIV.

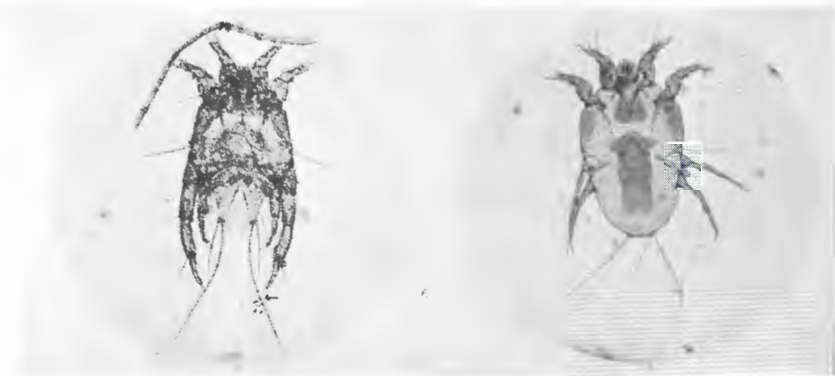


Fig. 1.—*Megninia velata*. Male.

Fig 2.—*Megninia velata*. Female.

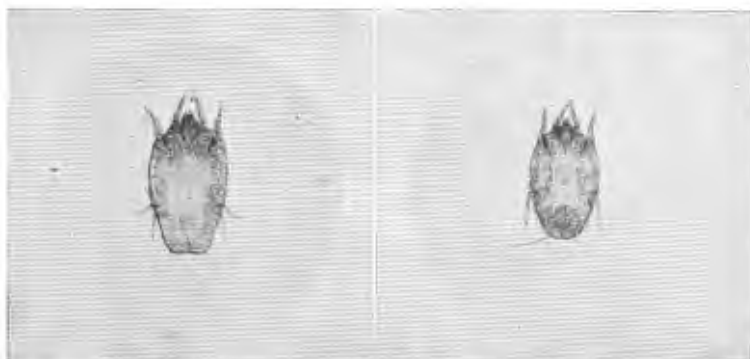


Fig. 3.—*Megninia velata*.
Nymph.

Fig. 4.—*Megninia velata*.
Larvae.

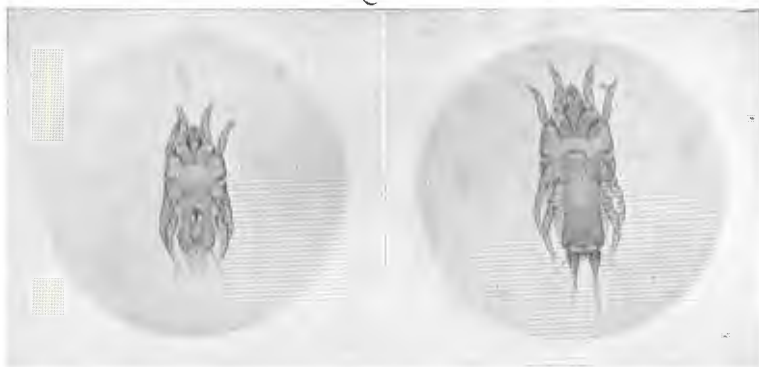


Fig. 5.—Unidentified *Analgesidae* from canary. Male.

Fig. 6.—Unidentified *Analgesidae* from canary. Female.