Dept. of Parasitology,
Fac. of Medicine, Assiut University

POULTRY AND RAT MITES AS A CAUSE OF SKIN DERMATITIS IN MAN

(With VI Plates)

By

AMANY I. HAMZA

(Received at 7/6/2003)

حلم الدواجن و الفئران كمسبب للألتهابات الجلدية فى الإنسان

أمانى ابراهيم حمزة

تحدث الأصابة بحلم الدواجن و الفئران حيث تتواجد الحظائر و جحور الفئران مسببة التهابات جلدية للأنسان. وقد تمت هذه الدراسة على حلم قام بمهاجمة مكان معيشة عائلة المؤلف فى مدينة القوصية بمحافظة أسيوط مسببا" هرش و التهابات جلدية لكل أفراد العائلة. و تمت دراسة الحلم بواسطة الميكروسكوب الضوئى والماسح الألكترونى. ووجد أنه من جنس الأورنيثونيسس من عائلة ماكرونيسيدى, وكانت الأنواع هى: أورنيثونيسس سيلفيارم، أورنيثونيسس بيرسا و أورنيثونيسس باكوتى ولقد تمت اضافة أوصاف لهذه الأجناس لأول مرة – وتعتبر اضافة علمية هامة. كما تمت مناقشة دور هذه الأنواع فى احداث التهابات جلدية للأنسان. و يجب أن يؤخذ حلم الدواجن والفئران فى الأعتبار عند التشخيص النوعى للحكة الجلدية.

SUMMARY

Poultry and rat mite infestations occur in structures where rat and bird nests are located causing skin dermatitis in humans. This study was conducted on mites that invaded the author's family habitation in El-Qussia City, Assiut Governorate, causing pruritus and skin dermatitis to all family members. They were studied by both light and scanning electron microscopy. The mites were identified as genus *Ornithonyssus* of family Macronyssidae. Three species were recorded, *O. sylviarum, O. bursa* and *O. bacoti.* The author suggested new significant descriptions in the taxonomy of these species. The role played by these mites in causing skin dermatitis in man was discussed. Infestation with bird or rat mites is one of the possibilities that must be encountered in the differential diagnosis of pruritus.

Key words: *Poultry, Rat Mites, Dermatitis, Scanning electron microscopy.*

INTRODUCTION

The Mesostigmata is a large group of mites, but a small number of species are important ectoparasites of birds and some mammals (Evans, 1992). Rat and poultry mite infestations occur in structures where rat and bird nests are located causing skin dermatitis in humans (Rosen, *et al.*, 2002). Some mites may leave the body of a dead host in a large number to wander over walls, ceilings and bedding seeking a new host (Lyon and Welbourn, 2000). Bites from these mites are difficult to diagnose and can be mistaken for flea bite.

Skin dermatitis due to poultry mites was reported by Uesugi *et al.* (1994), Orton *et al.* (2000), Lucky *et al.* (2001), and due to rat mites was reported by Engel *et al.* and Cung *et al.* (1998).

This study was conducted to identify ectoparasitic infestation into a family habitation causing pruritus and skin dermatitis to the family members.

MATERIAL and METHODS

This study was conducted on some ectoparasites that invaded the author's family habitation in El-Qussia City, Assiut Governorate, causing pruritus and skin dermatitis to all members. The author had pigeon nests in the roof. Some birds were found dead and heavily infested.

These parasites were picked up by hand from the bedding, clothes and bodies of the family members.The dead birds were immersed in water container, then the water was poured into a bottle and taken to the laboratory for centrifugation.

The sedimented parasites were put in 70% alcohol, cleaned with a brush and mounted in Hoyer's medium (Pritchard and kruse, 1982) to be examined by light microscope.

Some parasites were forwarded to the EM unit and processed according to Hayat (1981) and examined by scanning electron microscopy JEOL – JSM-5400 LV.

Identification of ectoparasites was done according to the key of Wall and Shearer (1997), modified from Baker *et al.* (1956) and Varma(1993).

RESULTS

The collected parasites were macroscopic mites measuring 0.6 – 1.4 mm. The females vary in length from about 1 mm. to 1.4 mm. when engorged. The males were about two-thirds as long as the females. Their colour ranges from yellowish to dark brown.

They were identified as poultry and rat mites as follows:

Suborder Mesostigmata due to:

- The dorsal shield partially covers the dorsal body surface, (Plate I, Fig.2).
- The stigmata present as one lateral pair between the bases of legs III and IV (Plate I, Fig.1, 2 and Plate V Fig. 2).
- A tritosternum is present behind the gnathosoma, (Plate II, Fig.5, Plate IV Fig. 4 andPlate VI Fig. 1,2).

Family Macronyssidae due to:

- Chelicerae not long and whip-like, shorter and stronger (Plates I, III and V Fig.1and2).
- Chelae are toothless and blade-like at tips, (Plate V, Fig.4).
- Genitoventral shield narrowed posteriorly, (Plates II, IVand VI Fig.1and2).

Genus *Ornithonyssus* due to:

Anal plate is egg-shaped with three setae and the anus lies in its anterior half. (Plates II, IVand VI Fig.4, 3and 4).

Species differentiation:

Dorsal shield is narrow and its setae long.

The sternal shield with 3 pairs of setae. --- *O. bacoti.* (Plate III Fig.3).

Dorsal shield is broad and its setae short.

- Sternal shield with 2 pairs of setae --- *O. sylviarum.* , (Plate II, Fig.3).
- Sternal shield with 3 pairs of setae --- *O. bursa.* (Plate IV, Fig.5).

*** The author observations in this study suggest the addition of other identification criteria to the species as follows:**

- Legs lie in the anterior ⅓ of the body, and the anal plate lies at the beginning of the posterior ⅓.--------- *O. bacoti* (Plates V and VI Fig.1 and 2).
- Legs lie in the anterior ½ of the body and the anal plate lies at the posterior ¼. ---------- *O. sylviarum* (Plate I and II Fig.1,2).
- Legs end just posterior to the middle of the body and the anal plate lies at the posterior ¼ --------- *O. bursa* (Plate III,IV Fig.1and 2).

According to the previous descriptions, the taxonomic classification of the studied ectoparasites is:

Phylum:	Arthropoda
Subphylum:	Chelicerata
Class:	Arachnida
Order:	Acari
Suborder:	Mesostigmata
Superfamily:	Dermanyssoidea
Family:	Macronyssidae ---- Ondermans, 1936
Genus:	*Ornithonyssus* ---- Sambon, 1928
Species:	*O. sylviarum* ---- Canestrini and Fanzaga, 1877
	O. bursa ------ Berlese, 1888
	O. bacoti ------ Hirst, 1913

DISCUSSION

The mites of family Macronyssidae are haematophagus natural parasites of common birds and rodents; they are small, oval in shape and are extremely mobile (Noble *et al.,* 1989). They are semitransparent and difficult to detect on skin until blood is ingested where they may appear reddish to blackish.

The taxonomy depends on main morphological characters, which are well detected by scanning electron microscopy as reported by Green and Baker (1996) and Mazen and Abdel-Aal (1997). The most important criterion was the sternal plate and the number of its` setae (Walland Shearer, 1997). In the present study, the author suggests new significant descriptions in the taxonomy, the position of the legs and anal plate in relation to the body length. Although it is quite clear, yet it was not mentioned before.

O. sylviarum (the northern fowl mite) is one of the most important external parasites of poultry in temperate regions,(Schmidt and Roberts, 1996). Its main effect as a pest is its impact on egg handlers. This mite readily bites humans leading to mild irritation to severe urticaria, pruritus and allergic reactions, (Orton *et al.,* 2000). It has a marked role in occupation diseases in poultry workers causing respiratory symptoms (Lutsky *et al.,* 1984) and otitis externa (Rossiter, 1997).

O. bursa (the tropical fowl mite). These mites generally cause mild dermatitis characterized by urticarial wheals. In more severe

cases of infestation, there may be haemorrhagic necrosis at the site of puncture, (Walter and Wilkerson, 1995).

A nosocomial outbreak of pruritic dermatitis was caused by mites from pigeons roosting on the air conditioners in the patient rooms, It was misdiagnosed as scabies, (Regan *et al.*, 1987).

Generally feather mites are the major source of clinically-relevant allergens for pigeon breeders, (Collof *et al.*, 1997). Khalifa *et al.* (2000) reported poultry mites in a control sample of dust; it was encountered to be allergenic especially in children. Moreover infestation of the scalp due to poultry mites was recorded by Pampiglione *et al.* (2001).

O. bacoti (the tropical rat mite) is found world wide in both temperate and tropical climates. It can migrate considerable distance to enter human habitations, their bites produce irritation, and sometimes a painful dermatitis will continue for 2 or 3 days, leaving red spots on the infested areas (Schmidt and Roberts, 1996). It seemed to be the commonest mites infesting rat in Egypt as reported by Bakr *et al.*, El Kady *et al.* and Younis *et al.* (1995). It frequently attacks persons living in rodent infested buildings, causing painful dermatitis or mite- allergy particularly in children, (Bakr *et al.*, 1995). Rat –mite dermatitis due to *O. bacoti* was also reported by Betke *et al.* (1987) and Lopatina *et al.* (1992).

It should be borne in mind that rat control might increase the attacks on the inhabitants of the house for a time because of the suddenly increased number of mites that leave the bodies of the dead rats. Therefore liquid acaricides can be applied in the living spaces of the treated houses before rat control is attempted, (Walter, 1996). On the other hand, chicken mites have been controlled by spraying the chickenhouse with 1% malathion (Beaver *et al.*, 1984). Therefore distinguishing between different species of *Ornithonyssus* mite is essential to determine whether bird or rodent pests are going to be controlled.

From the clinical point of view, much time and money may be spent on ineffective medication and incorrect diagnosis of dermatitis. Therefore infestation with bird or rat mites is one of the possibilities that must be encountered in the differential diagnosis of pruritus.

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LEGEND OF FIGURES

Plate I: *O. sylviarum* by light microscopy.

Fig. 1: *O. sylviarum* adult female, showing short pointed chelicerae, anal plate lies at the posterior ¼, and the sternal plate with 2 pairs of setae. X.16.5

Fig. 2: *O. sylviarum* adult female, showing protruding chelicera, broad dorsal shield, the stigmata lies between coxae IIIandIV .X.16.5

Fig. 3: *O. sylviarum,* higher magnification of the egg-shaped anal plate showing 3 setae and the anus lies in its anterior ½. X.66

Fig. 4: *O. sylviarum,* higher magnification of the sternal plate showing 2 pairs of setae. X. 33

Plate II: *O. sylviarum* by scanning microscopy.

Fig. 1 and 2: *O. sylviarum* adult female, showing sternal, genitoventral and anal plates. Legs lie in the anterior ½, and the anal plate lies at the posterior ¼. Bar =100µ.

Fig. 3: *O. sylviarum,* magnified sternal plate showing 2 pairs of setae. Bar =10µ.

Fig. 4: *O. sylviarum* magnified anal plate, showing 3 setae and the anus lies in its anterior ½. Bar =10µ.

Fig. 5: *O. sylviarum,* magnified gnathosoma showing the tritosternum and a projecting chelicera. Bar =50µ.

Plate III: *O. bursa* by light microscopy.

Fig. 1: *O. bursa* adult female showing the legs extending to the beginning of the posterior ½. X.16.5

Fig. 2: *O. bursa* adult female showing a projecting chelicera. X.16.5

Fig. 3: O. *bursa* magnified anal plate , showing 3 setae with the anus lying in its anterior ½. X.33

Fig. 4: O. *bursa* magnified sternal plate , showing 3 pairs of setae. X. 66

Plate IV: *O. bursa* by scanning microscopy.

Fig. 1: *O. bursa* adult female showing sternal, genitoventral and anal plates. Bar =100 μ.

Fig. 2: *O. bursa* adult male with ill-defined plates. Bar =100μ.

Fig. 3: *O. bursa* magnified anal plate, showing 3 setae with the anus lying in its anterior ½. Bar =10μ.

Fig. 4: *O. bursa* magnified gnathosoma showing the tritosternum and short chelicerae. Bar =50μ.

Fig. 5: O. *bursa* magnified sternal plate showing 3 pairs of setae. Bar =10μ.

Plate V : *O. bacoti* by light microscopy.

Fig. 1 and 2: *O. bacoti* adult females showing the legs lying in the anterior ⅓, the anal plate lies in the posterior ⅓ and the stigmata lies between coxae III andIV. X.13.2.

Fig. 3: *O. bacoti* adult male with ill-defined plates. X.13.2

Fig. 4: *O. bacoti* magnified gnathosoma showing a protruding chelicera and blade-like chelae. X. 33

Plate VI : *O. bacoti* by scanning microscopy.

Fig. 1 and 2: *O. bacoti* adult females showing the legs lying in the anterior ⅓, the anal plate lies in the posterior ⅓. Bar = 100μ.

Fig. 3: *O. bacoti* magnified sternal plate showing 3 pairs of setae. (The upper left one is broken). Bar =50μ.

Fig. 4: *O. bacoti* magnified anal plate, showing 3 setae with the anus lying in its anterior ½. Bar = 10μ.

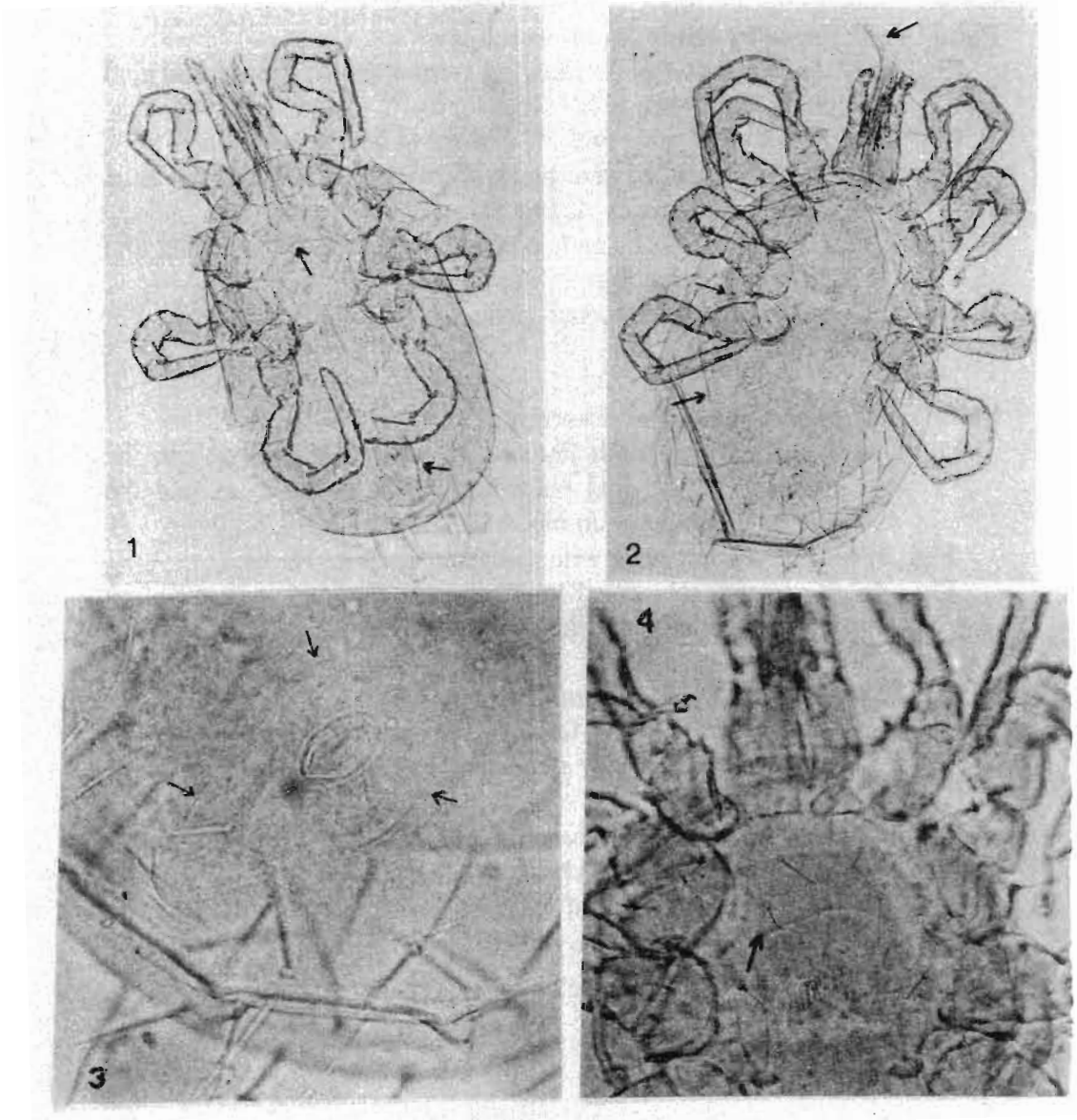

Plate I - *O. sylviarum*

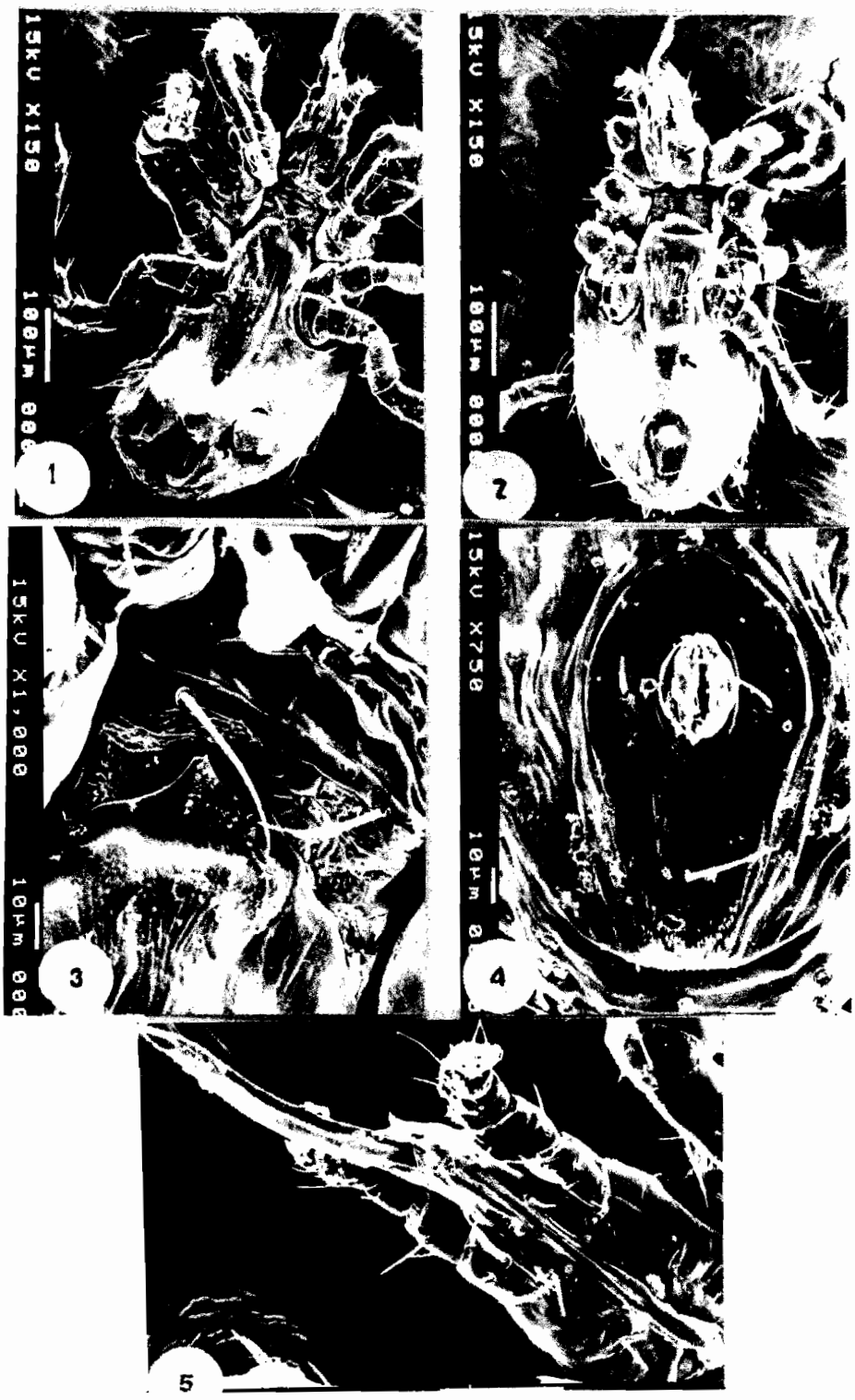

Plate II - *O. sylviarum*

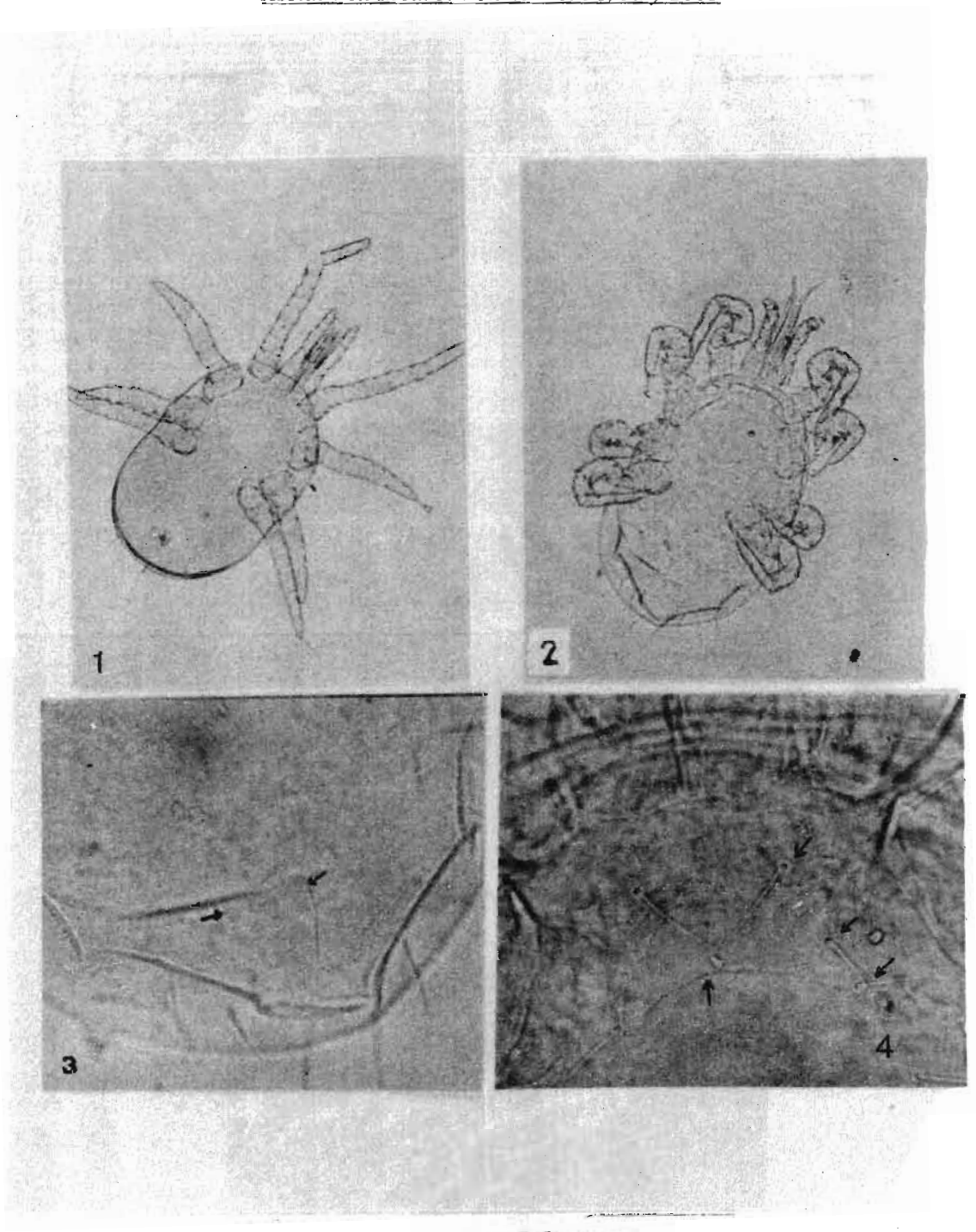

Plate III - *O.bursa*

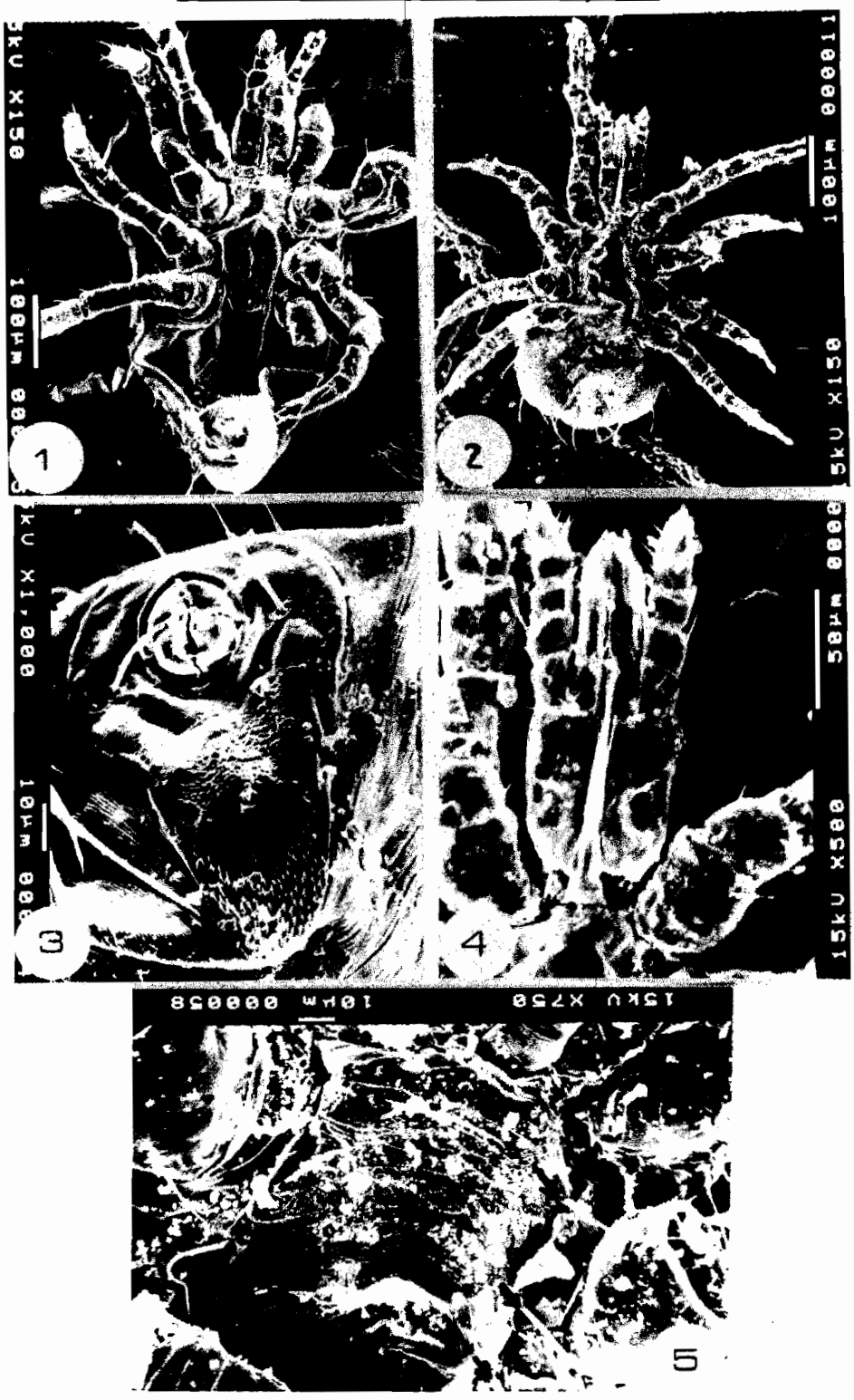

Plate IV - *O.bursa*

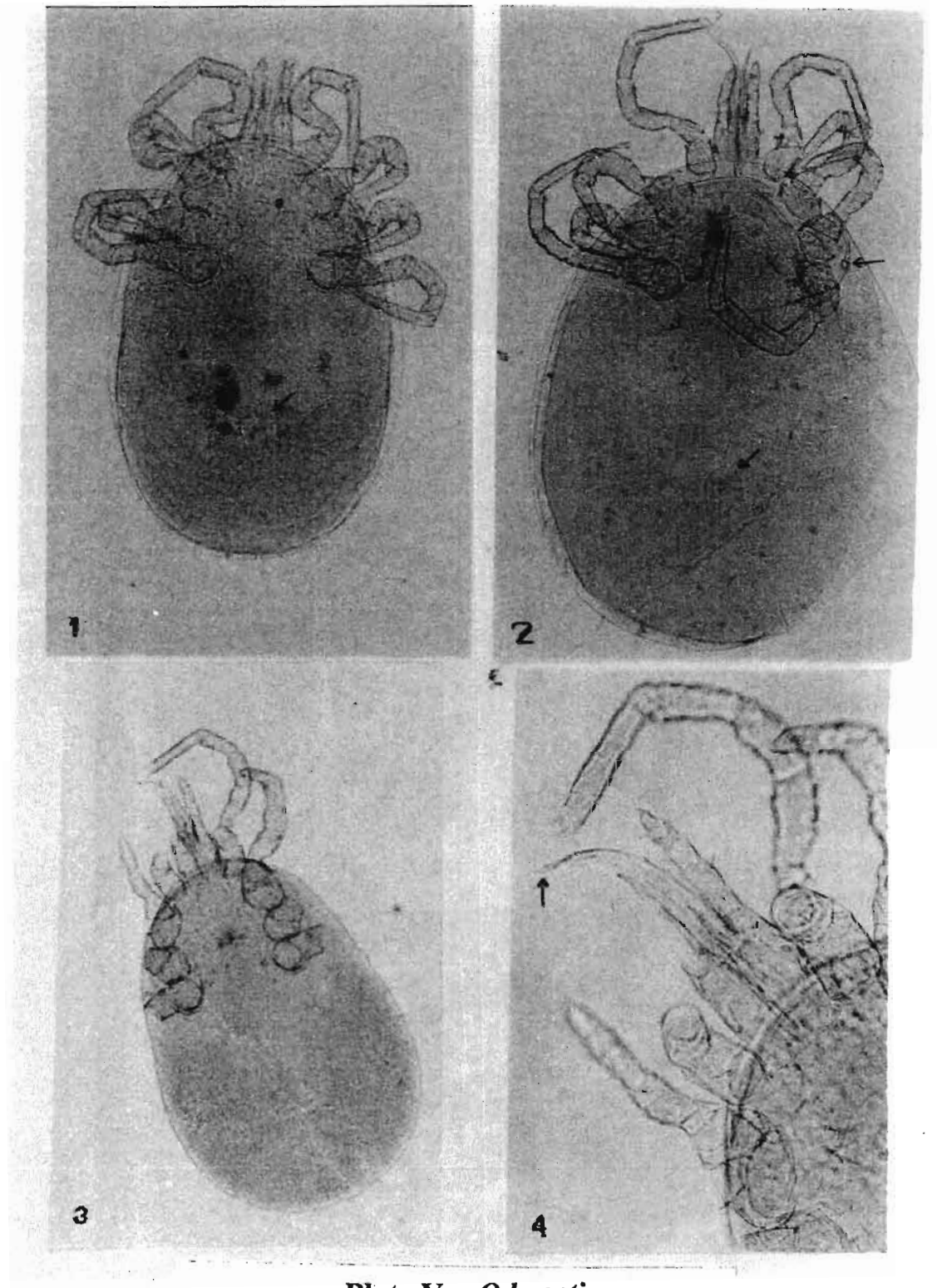

Plate V - *O.bacoti*

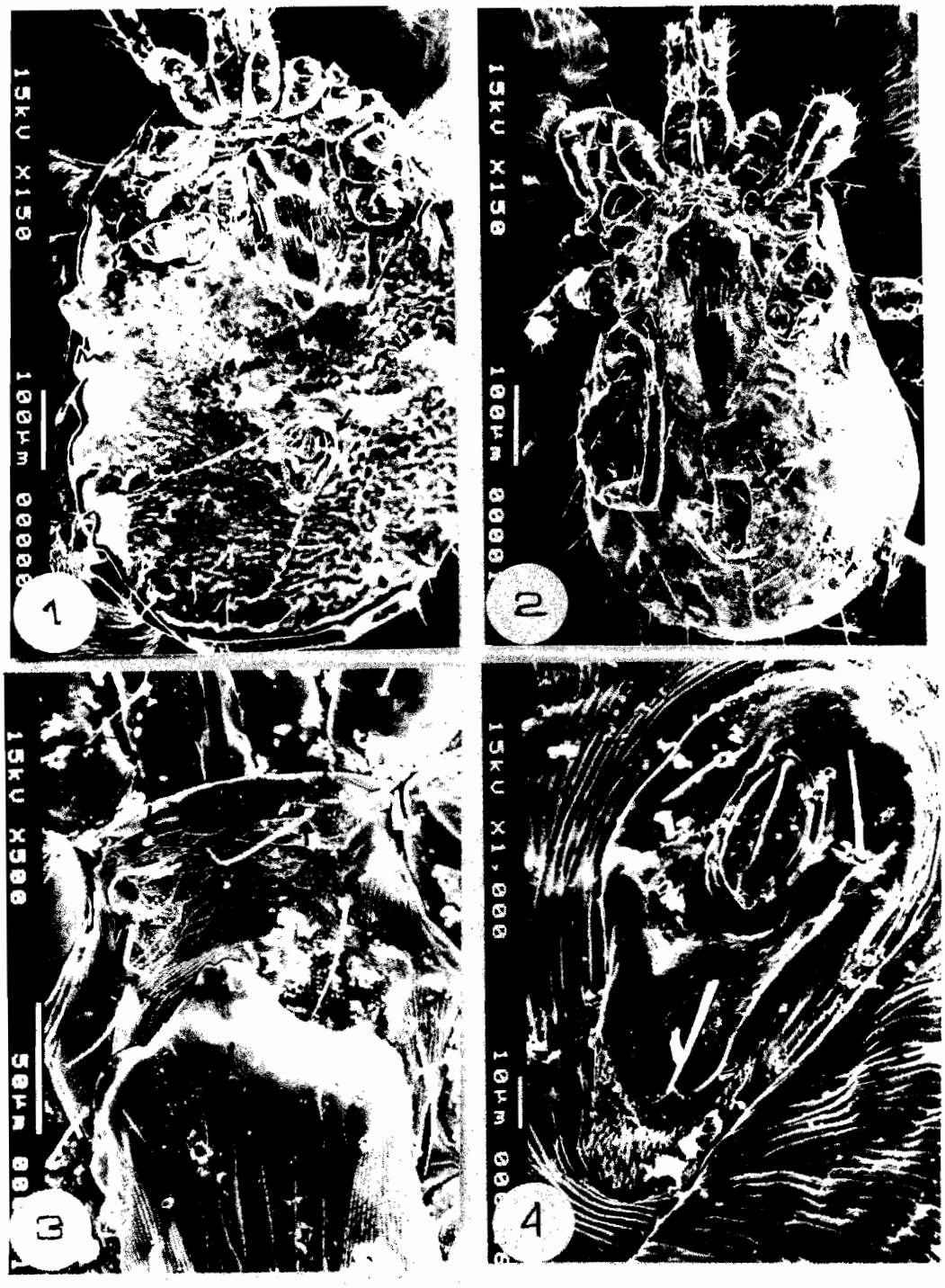

Plate VI - *O.bacoti*