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## Biometrical Studies of Ectoparasite *Bovicola ovis* Schrank (1781) (Phthiraptera-Insecta) in Sheep of Balochistan, Pakistan

Muhammed Zakir and Asim Iqbal

Department of Zoology, University of Balochistan, Quetta, Pakistan

**Abstract:** A total of 237 adult lice from sheep were collected. A detailed description of principal parts of the body with taxonomic features and morphological variations of the male and female imago of the species are performed. Fourteen biometrical characters including head length, head width, thorax length, thorax width, abdomen length, abdomen width, length of foreleg, mid leg and hind leg are presented. Coloured photographs of important taxonomic characters were taken by photographic microscope. The study confirms the presence of *B. ovis* in Balochistan, Pakistan.

**Key words:** Sheep lice, *Bovicola ovis*, ectoparasite, mallophaga, morphology

### Introduction

The *Bovicola ovis* Schrank (1781) (*Pediculus ovis* Schrank, 1781; *Trichodectus sphaerocephalus* Nitsch, 1818; *Trichodectus ovis* Neveu-Lemaire, 1912; *Bovicola ovis* Ewing, 1929) is cosmopolitan chewing louse of sheep spread all over the world. *Bovicola ovis* belongs to family Bovicolidae of Ischnocera suborder, Phthiraptera order (Lyal, 1985). *Bovicola* spp. is susceptible to high temperature but it is also intolerant to moisture. In a damp fleece, with a relative humidity of more than 90%, it will die in six hours and when covered by water it will drown in an hour (Urquhart *et al.*, 1978).

Balochistan is an arid zone with dry climate, rate of rainfall is very low and temperature is variable in different parts of the province. The sheep population is 38 %. This scarce population is additionally facing *B. ovis*, which has greatly infested. In Pakistan studies on the species related chewing lice incidence in sheep have never been made, neither reports of presence of *Bovicola ovis* species in Pakistan are available, while, the same species has been reported from India (Kumar, 2000). The main objective of the current study is to describe the morphological and taxonomic features of *Bovicola ovis* encountered in sheep of Balochistan, Pakistan with confirmation of their presence.

### Materials and Methods

Specimens were collected randomly from five districts of Balochistan i.e. Quetta, Mastung, Sibi, Bolan and Pashin. Collection was carried out from January to December 2001. Chewing lice were extracted from sheep by standard procedures (Dunn, 1932), using delousing chamber containing chloroform vapour. Sixty nine sites on sheep were inspected for lice as suggested by James (1998) and Stanley (2000).

A total of 237 adult *B. ovis* were extracted. However, only 161 adult lice were suitable for analysis. Only well preserved lice (with all required characters) were used. Slides were mounted permanently by Canada balsam. Measurements were made using a binocular microscope fitted with an eye piece micrometer scale.

Fourteen characters were measured for the study of size. These characters were based on those used by Eveleigh and Amano, (1977) and were chosen for the reproducibility of measurement and overall morphological representation.

### Results

Family Bovicolidae Keler,

Genus *Bovicola* Ewing.

The body of the insect was pale yellow colored, with elongated and oval shape of 1.79 mm (Fig. 1). Morphological variation with fourteen biometrical parameters were also studied (Tables 1 and 2).

### Morphological variations

**Head:** Width bigger than length, anterolateral margin of the head smoothly rounded, dorsum of the head with setae of short length of greater abundance anteriorly than posteriorly. Two long setae at the temple margin. Ventrally setae present in fewer amounts, greater abundance anterolaterally of long size, few setae also found posterolaterally.

Antenna filiform, three segmented hidden in the grooves of the head. First segment of antenna has less number of short setae, ventrally one setae found at the base, few present at the tip near the base of second segment, in males it is much swollen. Second segment longer and narrower than first, with large number of setae, a long seta found ventrally.

Third segment was crowded with setae of moderate and long size, tip has large number of short setae crossing each other. Eyes are degenerate or absent.

**Thorax:** Thorax with dorsal and lateral setae of moderate length. Two setae present at the margin of prothorax, few setae present along lateral margins and posteriorly (dorsally) on the prothorax and pterothorax; posterior setal row of prothorax submarginal median gap present; posterior setal row of pterothorax

Table 1: Biometrical parameters in individuals from female *Bovicola ovis* Shrank (1781) species of 139 specimens measured

Biometrical parameters	Range		
	Minimum	Maximum	Mean
Head length (mm)	0.34	0.56	0.45
Head width, taken at widest point (mm)	0.4	0.58	0.49
Ratio of head length to head width	0.85	0.96	0.90
Length of antenna (mm)	0.6	0.72	0.66
Thorax length (mm)	0.25	0.28	0.26
Thorax width, taken at widest point (mm)	0.35	0.38	0.36
Ratio of thorax length to thorax width	0.71	0.73	0.72
Length of foreleg (mm)	0.83	0.86	0.84
Length of mid leg (mm)	1.30	1.38	1.34
Length of hind leg (mm)	1.1	1.4	1.25
Abdomen length (mm)	1.05	1.1	1.07
Abdomen width (mm)	0.54	0.77	0.65
Ratio of abdomen length to abdomen width	1.94	1.42	1.64
Total body length. (mm)	1.64	1.94	1.79

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Table 2: Biometrical parameters in individuals from male *Bovicola ovis* Shrank, 1781 species of 22 specimens

Parameters	Range		Mean
	Minimum	Maximum	
Head length (mm)	0.33	0.43	0.38
Head width, taken at widest point (mm)	0.30	0.54	0.42
Ratio of head length to head width	1.1	0.79	0.90
Length of antenna (mm)	0.40	0.74	0.57
Thorax length (mm)	0.21	0.22	0.21
Thorax width, taken at widest point (mm)	0.28	0.34	0.31
Ratio of thorax length to thorax width	0.76	0.65	0.71
Length of foreleg (mm)	0.68	0.78	0.73
Length of mid leg (mm)	1.05	1.27	1.16
Length of hind leg (mm)	0.97	1.19	1.08
Abdomen length (mm)	0.88	0.98	0.93
Abdomen width (mm)	0.44	0.68	0.56
Ratio of abdomen length to abdomen width	1.32	1.44	1.66
Total body length, (mm)	1.42	1.63	1.52



Fig. 1a: *Bovicola ovis* (Male 1.52 mm)

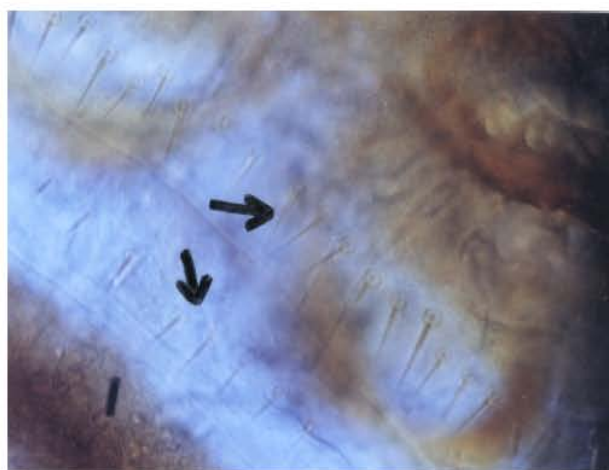


Fig. 2: Rows of setae on prothorax and pterothorax



Fig. 1b: *Bovicola ovis* (Male 1.52 mm)

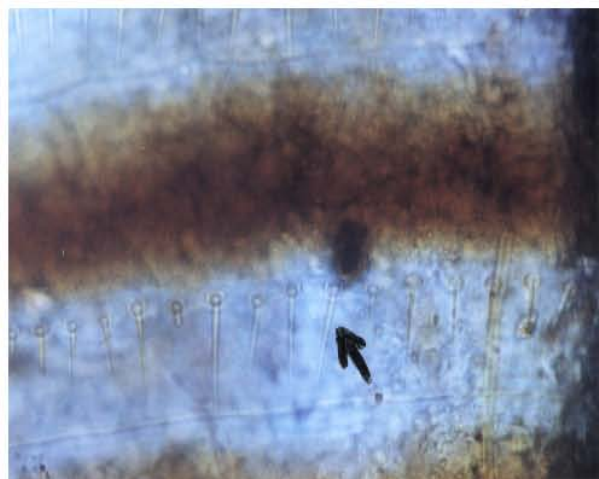


Fig. 3: Posterior row of setae on abdominal tergites.

submarginal, with median gap absent (Fig. 2); row incorporating two very long setae between posterolateral and posteromedian angles. Ventrally few setae of medium and long size were scattered. Two long setae were present mid posteriorly. Row of short was setae without median gap. Foreleg shorter than others, femur broader with few setae, tibia

longer with two long setae, tarsus two segmented with many bristles at the base of claw.

Mid leg long, femur much broader having long bristles near the base (Fig. 4) and few short bristles, tibia has medium to large sized bristles, one very long at the base of tarsus; tarsus two

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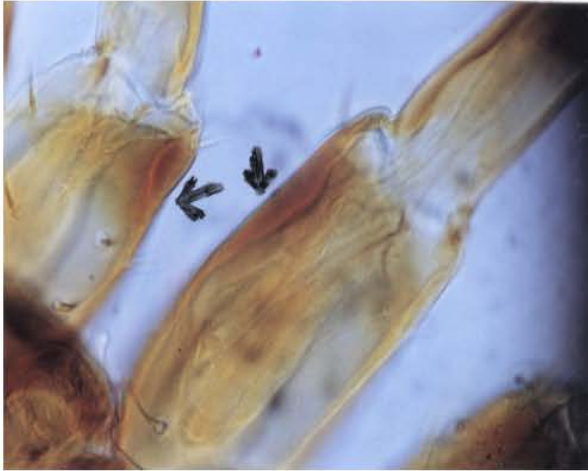


Fig. 4: Femur of foreleg and mid leg.



Fig. 5: Gonoapophysis of female showing internal lobe.

segmented, few large sized bristles at the tip only, second has few bristles, one very long at the base of the claw.

Hind leg long, femur broad and long medium to long sized setae regular, the base is narrow, tibia long, base is narrow while tip is broad consisting of medium to large sized setae, tarsus two segmented short, with few hair at the tip, pointed curved claw.

**Abdomen:** Abdomen was segmented having eight segments (Fig. 1), elongated and oval shaped with six pairs of spiracles; long, short or medium sized setae were present. Tergites and sternites consist of a row of setae posteriorly (Fig. 3). Each segment laterally bears spot densely crowded with a number of setae; 4-8 segments have a long hair on lateral sides. The last segment in males rounded with short and female with long hair. Gonoapophysis of female with large internal lobe, inner margin consist of long hair (Fig. 5). Cerci absent.

### Discussion

The widest measured part of the head was the temporal corner. The head width (HW) of the female ranged from 0.4 to 0.58 mm

with a mean of 0.49 mm. HW of the male ranged from 0.30 to 0.54 mm with a mean of 0.42 mm while the head length (HL) of the female ranged from 0.31 to 0.59 mm with a mean of 0.45 mm and in the male HL was 0.33 to 0.43 with mean 0.38 mm. In both the genders mean HW was greater than HL, while, in males the HL was also found greater than HW. Thorax width (TW) was greater than thorax length (TL) and the values of total body length (TBL) was greater in females than that of males. The bigger TBL in females (average 1.79 mm vs 1.52 mm in male) was probably due to bigger abdominal length.

Most authors consider the total body length as principal metric parameter in the morphological description of the species. According to our data (Tables 1 and 2) the TBL of *Bovicola ovis* varied from 1.64 to 1.94 mm in females and between 1.42 to 1.63 mm in males. These values are similar to those of Werneck (1936) but are different from Neveu-Lemaire (1938) who found both the sexes of same body length (1.0 mm).

The primary morphological characters, TBL, HL/HW, TL/TW, AL/AW, the smoothly curved anterolateral margin, the shape of the basal antennal segment, the thorax and the abdomen with row of hair posteriorly, lateral spots of abdomen having bundle of hair, abdomen with six pairs of spiracles and gonoapophysis with internal lobe (Furman and Catts, 1982), setae restricted to lobe only could be used in differentiation of species.

The species is closely related to *B. ovis* of cattle (Neveu-Lemaire, 1938), but could be separated by primary morphological characters mentioned above, while the head of *B. ovis* is quadrangular, narrowing anteriorly and setae on inner margin of gonoapophysis not restricted to lobe. This study confirms the presence of *B. ovis* in Balochistan, Pakistan.

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### References

- Furman, D.P., and E.P. Catts, 1982. Manual of medical entomology 4th ed. Cambridge University Press, pp: 58-62.
- Dunn, L.H., 1932: An effective method for collecting ectoparasites from live animals and birds. *Psyche*, 39: 26-29
- Eveleigh, E.S. and H. Amano, 1977. A numerical taxonomic study of Mallophaga genera *Cummingsiella*, *Saemundssonina* and *Austrromenopon* (Amblycera-Menoponidae) from aloids of north west Atlantic with reference to host parasite relationship. *Canadian J. Zool.*, 55: 1788-1881.
- Ewing, 1929. Manual of external parasite, pp: 123.
- James, P.J., 1998. Detecting lice by inspecting sheep. Queensland Department of Primary Industry Sheep Ectoparasite, Workshop, held at Goondiwindi, Australia, 10-12 Feb, 1998, pp: 6.
- Kumar, A., 2000. Biometrical studies on two Ischnoceran Phthiraptera infesting sheep and goats of Garhwal, India. *Rudolstaedter-Naturhist.-Schr.*, 10: 47-52.
- Lyal, C.H.C., 1985. A cladistic analysis and classification of Trichodectid mammal lice (Phthiraptera: Ischnocera). *Bull. Br. Mus. Nat. Hist. (Ent.)* 51: 187-346.
- Neveu-Lemaire, M., 1912. *Parasitologie des animax domestiques*, pp: 1107.
- Neveu-Lemaire, M., 1938. *Maladies parasitaires des animax domestiques. Precis de Parasitologie veterinaire, Troisieme edition*, pp: 59-66.
- Nitsch, 1818. *Magazin der Entomologie de Gernar*. Vol. 3. pp: 296
- Stanley, M.J. and P.J. James, 2000. Checking sheep for lice. Primary Industries and Resources, South Australia Fact Sheet, Agdex, 430/660.
- Sohrank, 1781. *Enumeratio Insectorum Austriae Indigenorum*, pp: 502.
- Urquhart, G.M., J. Armour, A.M. Dunn and F.W. Jennings, 1978: *Veterinary parasitology*. 2nd ed. Black Well Sciences.
- Werneck, 1936. *Mallophagose de mamíferos sul-americanos*. *Agos*, 31: 535-540.