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Incidence of phthirapteran infestation upon the buffaloes of Dehradun (India)

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Introduction

Haematopinus tuberculatus is a haematophagous phthirapteran commonly occurring on the body of Indian buffaloes. It adversely affects the vitality and productivity of the buffaloes as the infested hosts are subjected to constant itching caused by their bites together with the claws in their legs. In an attempt to get rid of lice, buffaloes rub the body against fences, walls and trees which results in skin injury. Sometimes the injured areas may be attacked by bacteria and blow flies. This lowers the vitality of infested animals and renders them more susceptible to other diseases.

The presence of *H. tuberculatus* on the body of buffaloes has been recorded in different parts of worlds (Banks 1919, van Volkenberg 1936, Gapuz 1941, Bruce 1947, Laake 1949, Becklund 1964 and Stimic & Merwe 1967). It has also been recorded on camels (Patton & Cragg 1913, Johnston & Harrisan 1913) and bisons (Patton & Cragg, 1913). Melency & Kim (1974) stated that *H. tuberculatus* can occasionally occur on cattles. Roberts (1938, 1950 and 1953) pointed out that *H. tuberculatus* is principally a parasite of water or Indian buffalo *(Bubalus bubalis)*.

Blagoveshchensky & Serdukova (1935) provided comprehensive information about the biology of *H. tuberculatus*. Quadri (1948) studied the external and internal anatomy of this louse. Chaudhuri & Kumar (1961) have further studied the life history and habits of *H. tuberculatus* infesting Indian buffaloes. Rosario & Manuel (1983) made an attempt to describe the morphology and distribution of this louse on Philippine carabaos. In the present paper an attempt has been made to furnish information regarding the incidence of infestation of *H. tuberculatus* on the buffaloes belonging to different localities of Dehradun district (India). The population dynamics, seasonal variations in population and the distribution of different stages of *H. tuberculatus* on the body of Indian buffaloes have also been studied.

Materials and Methods

The incidence of infestation of *H. tuberculatus* on the body of buffaloes belonging to twenty two localities of Dehradun district (India) has been recorded through the survey work. Use of hand lens and light source proved fruitful. As many as 373 buffaloes have been examined during the period – January, 1988 to January, 1990. Five infested hosts (all females) were subjected to fortnightly examination throughout the year 1989 to record the seasonal fluctuations in the population of this louse. All the stages present on every part of body were counted to record the population variation.

To study the distribution of *H. tuberculatus* the host body was arbitrarily divided into 12 (twelve) regions, viz., head, shoulder, foreflank, forelegs, back, ribs, belly, hindflank, thigh, hind limb and tail. Head region included poll, forehead, ears, face, muzzle and mouth. The crest was included in neck region. The forelegs included foot, shank, knee, forearm, elbow, brisket and point of shoulder. Likewise, hind legs included dew claws, pastern and nock. Top of shoulder loin, rump and hook have been covered in back region. The switch has been taken in tail region. As many as twenty four buffaloes were subjected to critical examination for recording

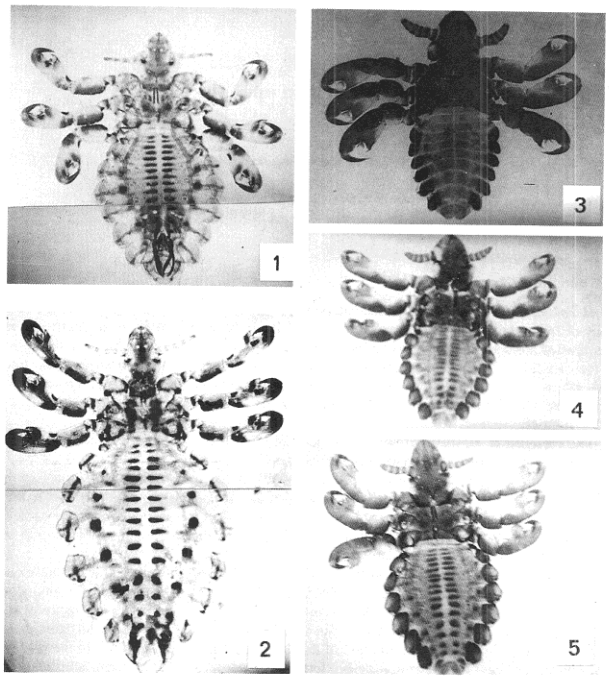

Fig. 1–5. *Haematopinus tuberculatus.*

Fig. 1. Adult male.
Fig. 2. Adult female.
Fig. 3. First instar nymph.
Fig. 4. Second instar nymph.
Fig. 5. Third instar nymph.

the population as well as distribution of lice. Entire ecto-parasite load (all the stages) was taken out from each region (indicated above) and counted. The lice were brought to laboratory, examined under binocular microscope and sorted out sexwise and stage-wise.

Observations

As many as 373 buffaloes (229 females, 49 sires and 95 buffalo calves) have been examined in 22 different localities of Dehradun during the period Jan. 88 to Jan. 90. 60.58 % of the examined animals have been found infested. There was negligible difference in the

Fig. 6. Head of adult male *Haematopinus tuberculatus*, ×60.

Tab. 1. Population structure of 1732 *H. tuberculatus* collected from 24 buffaloes during the year 1989

Stage	Mean No. per host	% age of stage	Total
Male	10.4	14.43	
Female	19.6	27.25	Adult – 41.68%
1st instar nymph	17.3	24.07	Nymphal
2st instar nymph	12.1	16.85	instars – 58.29%
3st instar nymph	12.5	17.37	

Tab. 2. Mean numbers of lice on different parts of body of 24 buffaloes during different months of the year 1989

Month	Jan.	Feb.	Mar.	Apr.	May	June	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Mean
Head	7.0	5.5	7.0	2.5	–	–	0.5	2.0	2.5	8.0	12.0	12.5	4.3
Neck	16.5	13.5	15.5	7.5	3.0	1.0	1.5	6.0	11.0	15.0	18.5	20.5	10.7
Shoudler	14.5	10.0	11.5	6.5	–	1.0	0.5	2.5	3.5	9.5	11.5	14.5	7.1
Foreflank	5.0	3.5	0.5	–	–	0.5	–	0.5	1.0	7.5	3.0	4.5	2.16
Forelegs	6.5	3.0	1.5	–	–	1.0	–	–	3.5	7.5	3.5	5.5	2.6
Back	14.0	7.5	8.5	8.5	9.5	3.0	4.0	8.0	6.00	16.0	20.5	16.0	10.12
Ribs	14.5	11.5	14.5	15.0	9.0	1.0	1.0	2.0	6.5	9.5	20.0	14.0	9.8
Belly	9.0	6.5	8.5	14.0	10.0	2.5	1.0	0.5	5.5	6.5	5.0	12.5	6.79
Hind flank	10.0	9.5	9.0	11.0	3.0	–	–	–	–	1.5	3.5	8.0	4.6
Thigh	9.5	10.0	8.0	2.0	1.0	5.5	2.5	1.5	5.0	4.5	9.5	14.5	5.3
Hind Leg	5.5	10.0	4.5	3.0	0.5	0.5	–	–	1.5	1.0	5.0	11.5	3.5
Tail	6.5	7.5	2.5	0.5	0.5	1.5	0.5	0.5	2.0	5.0	5.5	7.5	3.3
Total	118.5	98.0	91.5	70.5	36.5	17.5	11.5	23.5	48.0	91.5	117.5	141.5	70.27

incidence of infestation of two sexes. 31 out of 49 (63.26%) males were infested with *H. tuberculatus* while 150 out of 229 females carried this louse (65.5% infestation). However, incidence of infestation was low on buffalo calves as only 45 out of 95 buffalo calves (47.36%) were found infested.

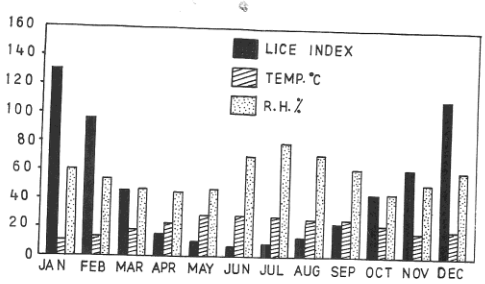

Fig. 7. Lice index (based on fortnightly observations on five buffaloes), temperature and R. H. in different months of 1989.

The distribution of *H. tuberculatus* was studied by taking out complete ectoparasite load from different regions of the body of 24 (twenty four) buffaloes. A total of 1732 lice were collected from above said buffaloes during different months of year. The collected lice were brought to laboratory and counted after separating them stagewise and sexwise (Fig. 1 to 6). It was found that nymphal population dominated (58.29%) over adult population (41.68%). Females outnumbered the male population and male, female ratio was 1:1.8. Amongst nymphs first instars were most abundant (24.07%), followed by third instars (17.37%) and second instars (16.85%) (Tab. 1). More or less similar observations have been made on five buffaloes studied for recording seasonal variation in population of this louse. Further, it was seen that the buffalo calves carried more numbers of lice than the adults.

Neck and back were found to be the most preferred sites of *H. tuberculatus* (Tab. 2). The ribs, shoulder, and belly carried moderate infestation by this louse. These regions were followed by thigh, hind flank, head, hind limb and tail in this order of decreasing frequency. Fore legs and tail showed minimum intensity of lice. The seasonal variations in the distribution of lice on the body of 24 buffaloes are shown in Tab. 2.

The eggs of *H. tuberculatus* are mostly laid in clusters, glued individually to different hairs of host. As many as 7 (seven) eggs have been found attached to one single hair in the present studies. Each egg measures 1.1 mm to 1.3 mm in length and 0.5 mm to 0.7 mm in width. Fresh eggs are white in colour but turn brown later on. It has been observed that maximum number of eggs are laid on neck region followed by shoulder, fore legs, belly, foreflank and ear in the order of decreasing frequency. As many as 647 eggs both hatched and unhatched have been counted on a female buffalo.

Five buffaloes, aged 4 to 30 months, were subjected to critical examination to record the seasonal variations in the population of *H. tuberculatus*. The observations were made by total count system. Buffaloes were examined fortnightly during the period January, 1989 to December, 1989. The population of *H. tuberculatus* remained quite high in winter months (Fig. 7). Lice index was highest in the month of January (130.3), but decreased in February (96.4). A sharp decrease was observed in the month of March (46.40) followed by regular decline in next three months (15.2, 10.1 and 7.0 respectively). Lice index showed slight increase in July (9.2) and then showed regular increase in following four months (13.7, 23.2, 44.5 and 62.5), respectively. It reached fairly high in December (111.4). It was further noted that nymphal population dominated over adults in winter days. Furthermore, in most months the female population outnumbered the males in sex ratios.

Discussion

The pattern of distribution of eggs of *H. tuberculatus* observed in the present studies is in accordance with the general observations made by CHAUDHURI & KUMAR (1961). However, ROSARIO & MANUEL (1983) found maximum egg concentration on ear, fore flank, belly and flank of philippine carabaos.

CHAUDHURI & KUMAR (1961) while describing the life history and habits of *H. tuberculatus* found that hind legs, back and shoulders of infested buffaloes are the most preferred sites, as far as distribution of adults and nymphs is concerned. They divided the body of buffalo into six regions, viz., head, neck, shoulder, forelegs, back and hind legs. It is not clear whether they observed lice infestation on belly and flank. However, ROSARIO & MANUEL (1983) divided the host body into 30 (thirty) regions and found that hind flank, neck, crest, ears, forearms, shoulders, thigh, face, etc. showed maximum infestation in that order. In the present studies it has been found that neck, back, and ribs, showed maximum infestation while shoulder, belly and thighs were having moderate infestation. The hind flank, head, hind legs, tail, forelegs and foreflank had comparatively little infestation. The louse population showed clear fluctuations in different months of the year. It remained quite high during winter months when temperature was quite low, but became low during the summers. An attempt has been made to observe the degree of correlation between mean monthly lice index and mean monthly temperature and R.H. A high degree of partial correlation between lice index and temperature ($r\ 12.3 = .91$ by keeping the R.H. effect silent) has been recorded and was found to be significant at 5% level. However, the value of r 13.2 (partial correlation between lice index and R.H. by keeping the temperature silent) was insignificant. It seems that temperature plays leading role in determining level of *H. tuberculatus* population on buffaloes. It may act directly or indirectly (by altering the microclimate of host coat by affecting the hosts behaviour).

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Summary

Out of 373 buffaloes examined in different localities of Dehradun, 60.58% have been found infested with *Haematopinus tuberculatus*. Incidence of infestation was higher on adults than on youngs. The lice index was highest in January and lowest in June. The adults and nymphs preferred neck, back, ribs, shoulder, belly, thigh, hind, flank, head, hind legs, tail, fore legs and fore flank in this order of decreasing frequency. On the other hand eggs were found most heavily concentrated on neck and back regions.

Zusammenfassung

Die Inzidenz des Läusebefalls bei den Wasserbüffeln von Dehradun (Indien)

Von 373 aus verschiedenen Gebieten Dehraduns untersuchten Wasserbüffeln erwiesen sich 60,58% als mit *Haematopinus tuberculatus* befallen. Die Inzidenz des Befalls war bei geschlechtsreifen Büffeln höher als bei Jungtieren. Der Läuseindex war am höchsten im Januar und am niedrigsten im Juni. Die Adulten und die Nymphen bevorzugten Hals, Rücken, Rippengegend, Schulter, Bauch, Oberschenkel, Hinterflanke, Kopf, Hinterbeine, Schwanz, Vorderbeine und Vorderflanke in dieser Reihenfolge abnehmender Häufigkeit. Andererseits wurden die Eier am stärksten konzentriert in der Hals- und Rückenregion angetroffen.

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