

## ISOLATION OF BACTERIA FROM CAPTIVE HERBIVORES

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Isolation of bacteria from 120 clinical samples collected from 68 herbivorous animals having pathological conditions and belonging to 14 different species of the Assam State Zoo was made. The common pathological conditions of the animals were tuberculosis, pneumonia, enteritis and wound infections. Of the 120 samples, 94 yielded *Mycobacterium tuberculosis* both bovine and human types, *Escherichia coli*, *Staphylococcus aureus*, *Streptococcus pyogenes* and *Actinomyces pyogenes*, *Pasteurella multocida*, *Pasteurella haemolytica*, *Pseudomonas aeruginosa*, *Corynebacterium ovis*, *Proteus mirabilis* and *Bacillus* spp.

The etiopathology of mortality of captive wild animals in different zoological parks of the country has been investigated by different workers (Khan, 1979; Acharjyo and Rao, 1987; Arora and Goyal, 1987) but no systematic approach has been made. Considering the importance of infectious agents in different pathological conditions, an attempt was made to isolate bacteria from samples collected at postmortem of the captive herbivores with different pathological conditions.

### MATERIALS AND METHODS

A total of 68 herbivore carcasses with different pathological conditions and belonging to 14 different species of the

Assam State Zoo were examined at postmortem and 120 samples were collected aseptically for isolation of bacteria (Table).

The isolation and identification of the bacteria were carried out as per the methods of Cruickshank *et al.* (1975) and Carter (1986). The serotyping of the isolated *Escherichia coli* strains were done at the National Salmonella and *Escherichia* Centre, Kasauli, Himachal Pradesh, India.

### RESULTS AND DISCUSSION

The types of bacteria isolated from the various species of captive herbivores having different pathological conditions

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Table. Isolation of bacteria from different species of herbivores with different pathological conditions

Pathological condition at postmortem	Species of animals	Nature of samples	Bacteria isolated
Circumscribed raised whitish nodular lesions	Spotted deer (5) Barking deer (4) Hog deer (3) Sambar (2) Black buck (5) Giraffae (2) Rhinoceros (1)	Lung, Liver lymph node, spleen, udder uterus, joint capsule.	<i>Mycobacterium tuberculosis</i> : bovine type (09) human type (10)
Pneumonia	Spotted deer (4) Barking deer (1) Sambar (1) White fellow deer (1) Mouse deer (4) Black buck (3) Serow (2) Nilgai (1) Mithun (1) Rhinoceros (2)	Lung and exudate	<i>Pasteurella multocida</i> , Streptococci (haemolytic type), Staphylococci, <i>E. coli</i> , <i>Streptococci pyogenes</i> , <i>Pasteurella haemolytica</i> , <i>Actinomyces ovis</i> , <i>Klebsiella</i> sp.
Focal nodules with abscess in the lung	Sambar (2)	Lung and pus	<i>Actinomyces pyogenes</i>
Enteritis catarrhal to haemorrhagic type	Spotted deer (1) Barking deer (2) Sambar (2) Mouse deer (2) Serow (1) Nilgai (1) Zebra (1) Rhinoceros (1) Elephant (1)	Intestine	<i>E. coli</i> serotypes 09, 097, 060, 05 074, 04, 037, 0154 017, 07, 0133, 08 0163, 043, 0156 Untypable (6) Rough strain (3)
Necrotic ulcerative colonitis	Zebra (1) Rhinoceros (2)	Colon	<i>Actinomyces</i> sp, <i>E. coli</i> (untypable)
Abscess in the liver	Spotted deer (1) Mithun (1)	Liver and pus	<i>Streptococcus pyogenes</i> , <i>Pseudomonas aeruginosa</i>

contd.

Peritonitis	Spotted deer (1) Sambar (1)	Peritoneal fluid	<i>Pseudomonas aeruginosa</i> , <i>Proteus mirabilis</i>
Wound in different areas of the body	Sambar (3) Black buck (1) Rhinoceros (2)	Swab or exudate and necrosed muscle	<i>Staphylococcus aureus</i> , <i>E. coli</i> , <i>Bacillus sp.</i> , <i>Actinomyces pyogenes</i> ,
Suppurative orchitis	Black buck (1) Zebra (1)	Testicle, pus and lymph node	<i>Corynebacterium ovis</i> , <i>Staphylococcus aureus</i>
Metritis	Spotted deer (1)	Uterus and pus	<i>Pseudomonas aeruginosa</i>
Pus in the prepuce	Sambhar (1)	Prepuccial swab	<i>Proteus mirabilis</i>
Epi-and endocardial haemorrhage	Mouse deer (1)	Heart blood	<i>Streptococcus pyogenes</i>
Hydropericardium	Sambar (1)	Pericardial fluid	<i>Proteus mirabilis</i>
Duodenal ulcer	Black buck (1)	Affected deodenum	<i>E. coli</i>
Stress condition	Rhinoceros (1)	Heart blood	<i>Streptococcus pyogenes</i>
No lesion but with a history of two consecutive abortions	Mithun (1)	Amniotic fluid and placenta	<i>Pseudomonas seruginosa</i>
Non specific	Barking deer (2) Giraffe (1)	Heart blood	<i>E. coli</i>

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Figures in parentheses indicate the number of animals.

are presented in the Table. Out of the 120 samples processed for the isolation of bacteria, 94 samples were positive for different types of bacteria.

*Mycobacterium tuberculosis* both human and bovine-types were the important isolates from the animals having tuberculous lesions. Samples from 22 animals of 7 different species having tuberculous like lesions were examined for isolation of the mycobacteria and the bacteria could be recovered from the samples of 19 animals. *M. tuberculosis* human and bovine-types were respectively detected in 10 and 9 animals. Number of other workers (Basak *et al.*, 1975; Rathore and Khera, 1982; Shah *et al.*, 1986; Singh *et al.*, 1986; Upadhyaya *et al.*, 1986) have reported that the tuberculosis is relatively a common disease in captive deer. In the present study out of the 22 animals having tuberculosis, 14 animals were deer of four different species. The other species of animals from where the mycobacteria could be isolated in the present study were black buck, giraffe and rhinoceros. Tuberculosis in giraffe and black buck has been reported by Rai and Chandrasekharan (1958), Pathak *et al.* (1987) and Shah *et al.* (1986), but the occurrence of tuberculosis in rhinoceros has not been reported. Lung and pulmonary lymph nodes were commonly affected in most of the tuberculous animals, while the liver of the rhinoceros showed nodular lesions and bovine type of mycobacteria could be isolated from the lesion.

Isolation of human type of mycobacteria suggests that the infection might have entered through the animal attendants and disseminated through monkey as large number of monkeys from nearby jungle are reported to enter into the zoo and take the feed supplied to the zoo animals. The bovine type of mycobacteria might have spread from the reservoir animals through contaminated feed and water.

The samples examined from the animals having pneumonic lesions were positive for various types of bacteria such as *Pasterurella multocida*, *Pasteurella haemolytica*, *Streptococcus pyogenes*, *Escherichia coli* and *Klebsiella* spp. Isolation of most of these bacteria from the cases of pneumonia of captive wild animals has been reported by number of other workers (Freeman, 1979; Ramachandran *et al.*, 1983 and Srinivasan *et al.*, 1977). *Pasteurella multocida* infection has also been reported in a wide variety of wild animals in captivity (Rosen, 1981; George, 1985). Death of 15 rhinoceros due to haemorrhagic septicaemia caused by the bacteria in the Kaziranga National Park, Assam has also been reviewed by Laurie *et al.* (1983).

The bacteria isolated from the cases of enteritis of the animals were mostly the *Escherichia coli*. The important *Escherichia coli* serotypes identified were 037, 08, 0133, 0154, 0163, 09, 097, 060, 074, 04, 043 and 0156. Isolation of some of these *Escherichia coli* serotypes in cases of diarrhoea and

gastroenteritis in lambs, kids and calves has been reported by other workers (Sarma and Boro, 1983; Smith and Halls, 1967).

The bacterial species such as *Staphylococcus aureus*, *Streptococcus pyogenes* and *Actinomyces pyogenes* were mostly isolated from the animals having abscesses in liver and lung and peritonitis etc.

Another important microorganism isolated in the present study was *Corynebacterium ovis* from testicle, lung, lymph node and kidney of a black buck which showed suppurative orchitis and pneumonia at postmortem. The exact route of *C. ovis* infection was not clear, but it is assumed that the infection might have entered through scrotal injury and then spread to other organs. Similar view in sheep has been suggested by Lalkrishna *et al.* (1977).

Isolation of wide variety and some of the important species of bacteria from the captive herbivores of the zoo suggests the possible role of the bacteria in the disease processes of the animals, however, detailed epidemiological studies are needed to identify the sources of the bacterial infection, so as to adopt necessary preventive measures.

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