COLOR ATLAS ON PARASITES OF CAPTIVE WILD ANIMALS

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DEPARTMENT OF WILDLIFE SCIENCE
MADRAS VETERINARY COLLEGE
TAMILNADU VETERINARY AND ANIMAL SCIENCES UNIVERSITY
CHENNAI - 600 007

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FOREWORD

Conservation is an integral part of the maintenance of natural resources of our country. In this, the health and disease related features of wild animals are given emphasis by veterinarians all over the world, in liaisonship with protected area managers who are the custodians of forests. Wild animals still need large scale research and development interventions in the areas of health and disease management.

Parasitic diseases need to be given specific attention in captive wild fauna. The colour atlas revealing evidences of various parasitic fauna is a valuable reference tool not only to veterinarians serving in various zoos, zoological gardens and zoological parks of this country but also to researchers and student community at large, including biologists.

The interdisciplinary approach adopted in the preparation of the colour atlas is a welcome feature. This illustrative guide will be of practical use for an understanding on the occurrence of various parasitic fauna causing problems in health status of the wild animals. Once the wild animals get affected by various parasitic fauna, there will be a break down in the immunity status and the animals may succumb to other infectious diseases.

My hearty congratulations to the authors of this publication which is a long over due need felt by all the stakeholders who have interest in conservation and enrichment of wildlife in our country.

Date : 8-8-2006
Place : Chennai – 51

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FOREWORD

The health care measures in captive wild fauna definitely need some kind of special care against various parasitic diseases in wild animals that are being maintained in various zoos of this country. It is a fact that the animals affected by parasites will be one of the predisposing causes for multiple diseases.

Hence, the preparation of color atlas like this on different parasitic conditions will help the veterinarians working in various captive wild animal health management areas in understanding about the identification of various parasites that are commonly expected to occur in wild animals. Endangered animals like tigers, lions, elephants etc., need high level of protection.

It is evident that the preparation of color atlas with significant references on the occurrence of various parasites in wild fauna will be of definite assistance in formulating suitable therapeutic regimen, in these valuable animals maintained in zoos.

The zoo veterinarians in particular will be benefited by this in addition to the students and researchers. This color atlas can be considered as one of the major contributions in the long pursuing of goals of wild life conservation in India.

Congratulations !

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Principal Chief Conservator of Forests
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Date : 14-08-2006

FOREWORD

Conservation of wild animals reared in various zoos, zoological parks etc. is one of the most important features that are being offered a great extent of emphasis through out the world, now a days.

The newly entering zoo veterinarians often feel technical problems in identifying the various parasitic fauna of wild animals that belong to various taxonomic groups, unlike the case generally with the veterinarians dealing with the domestic livestock. The preparation of a color atlas like this is of technically a helpful one towards paving ways for the effective enrichment of knowledge, in the field of wildlife health and diseases.

It is indeed a useful activity that the Department of Wildlife Science has brought this color atlas on various parasites of captive wild animals that belong to multiple species. The illustrations like this will be of much helpful one in framing the treatment procedures in case of captive wild animals.

The scientific illustrative work will surely help the zoo veterinarians who by virtue of the job, needs to assist in the health and disease related features. No doubt that such documentation works will assist the zoo directors in the scientific management of zoos in this country. Hope all zoo veterinarians, biologists and others engaged in wildlife research in this whole country will get much benefitted by this illustrations prepared with different examples on evidences of parasites.

14.8.06.

(Shri C.K. Sridharan)

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FOREWORD

The protection of wild animals from various disease causing agents is very important in the systematic conservation of various wild animal species. It is crystal clear that the preparation of color atlas on various parasitic fauna that are likely to be encountered in different mammalian species like elephants, tigers and reptilian species like crocodiles, snakes and aviary species like flamingo, peacocks etc. would be immensely useful to the zoo veterinarians, who are working hard to tackle the disease problems of various animal species.

Additionally, this color atlas prepared by the Department of Wildlife Science in collaboration with the Department of Parasitology will be more useful to Veterinary and Biology students in addition to catering the need of Wildlifers, of this field.

This color atlas on the parasites of captive wild animals maintained in zoos would assist in the therapeutic management of parasitic diseases that are encountered during the implementation of health care measures in the zoos of this country. This informative resource is the right kind of one that has been developed over different periods of time, and it will also help to document the incidence of a number of diseases of wild animals of different zoos, biological parks etc of this country. Moreover this color atlas may also be useful to the needy as a reference material.

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Dated: 11 .08.2006

FOREWORD

India is one of the countries with rich heritage of wildlife and biodiversity. The conservation of captive wild animals is one of the important features, which is given special emphasis in the current era.

The colour atlas explains the various kinds of parasitic fauna harboured in wild animals. In addition to the description, the atlas is certainly useful for strengthening the understanding among zoo veterinarians and students of veterinary and biology faculty.

The inter-disciplinary approach reflected in the preparation of this colour atlas is appreciated. I am sure, efforts of this nature form the basis for the scientific management of captive wild animals in zoos, crocodile banks, national parks, etc.

I congratulate the team who have contributed their time and knowledge in bringing out the atlas.

Lalitha John 110806

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INDEX

AVIFAUNA

REPTILES

Carnivores

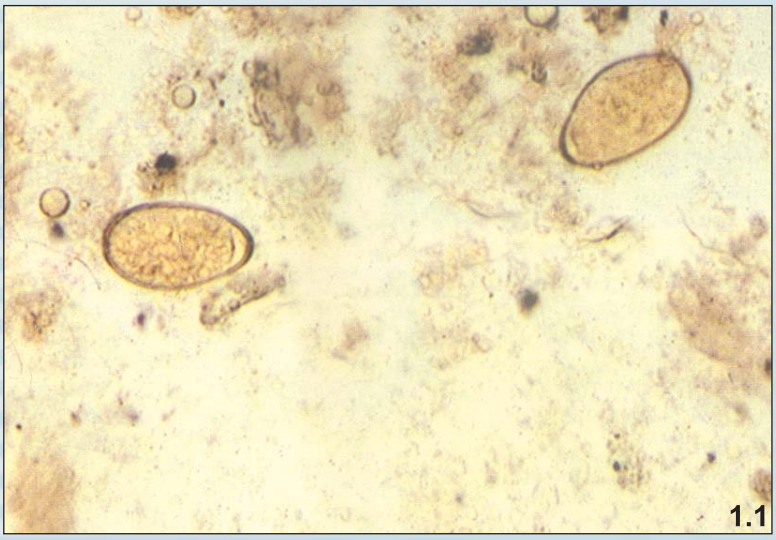
TREMATODE INFECTION

Disease	:	**Paragonimosis**
Causative agent	:	*Paragonimus westermanii*
Hosts affected	:	Wild carnivores, Tiger, Panther
Location	:	Lungs-Usually within a cystic cavity Rarely brain, spinal cord or other organs.
Material for diagnosis	:	Sputum, feces
Stage and description	:	Egg - Yellowish brown, with operculum shell thickened at the opposite pole Measures 75-118 µm by 42-67 µm (Plate 1.1).

CESTODE INFECTIONS

Disease	:	**Dipylidiosis**
Causative agent	:	*Dipylidium caninum*
Hosts affected	:	Hyena, Fox.
Location	:	Small intestine
Material for diagnosis	:	Feces for the presence of gravid segments (Plate 1.2)
Stage and description	:	Gravid segments contains egg packets Egg - Circular, has thick plain shell Contains Hexacanth embryo 25-40 µm diameter (Plate 1.3 and 1.4).

PLATE - 1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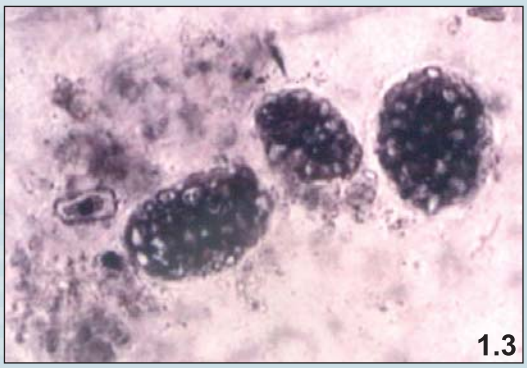
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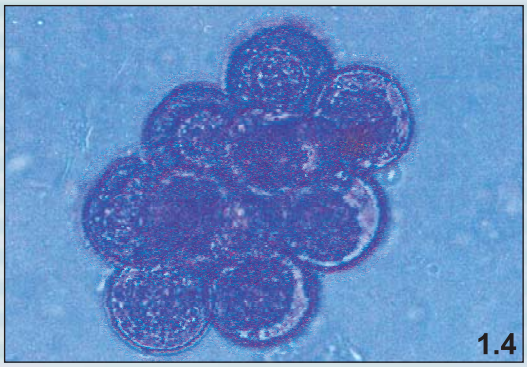
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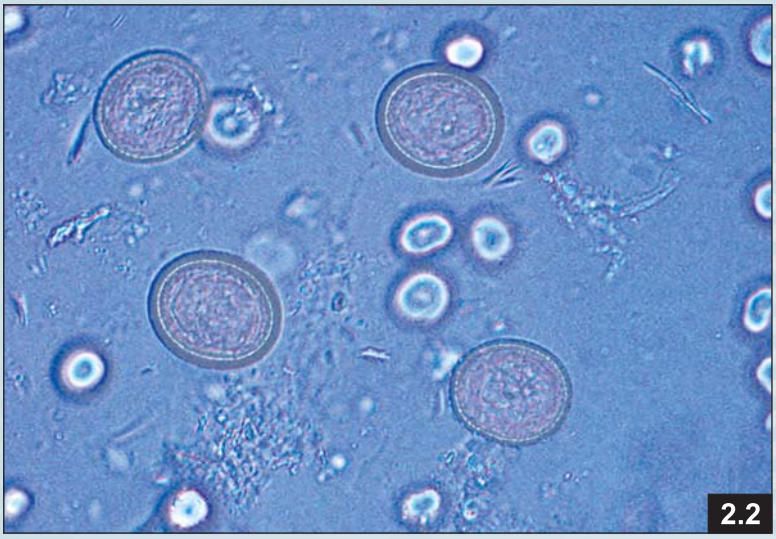
PLATE - 2

2.1



2.2

Disease	:	**Taeniosis**
Causative agent	:	*Taenia* sp. *viz., Taenia hydatigena* *Taenia pisiformis/ T. taeniformis etc* (Plate 2.1)
Hosts affected	:	Wild carnivore
Location	:	Small intestine
Material for diagnosis	:	Feces
Stage and description	:	Egg - Thick shelled, characteristically brown with radial striations (cart wheel appearance) Contains hexacanth embryo, Measures 43-53 by 43-49 µm

Disease	:	**Echinococcosis**
Causative agent	:	*Echinococcus* sp.
Hosts affected	:	Fox, wild felids
Location	:	Adult - Small intestine Intermediate stage (Hydatid) - seen in ungulates and man in various organs.
Material for diagnosis	:	Feces
Stage and description	:	Typical taenid eggs Egg - Circular, Thick shelled with radial striations Yellow tinted Hexacanth embryo inside Measures 32-36 by 25-30 µm (Plate 2.2)

Disease	:	**Diphyllobothriosis**
Causative agent	:	*Diphyllobothrium latum*
Hosts affected	:	Tiger, Hyena, Fox
Location	:	Small intestine
Material for diagnosis	:	Feces
Stage and description	:	Egg - Oval shaped Yellowish brown in color Have rounded ends Presence of operculum contains yolk cells Measures 67-71 by 40-51 µm (Plate 3.1)

Disease	:	**Spirometrosis**
Causative agent	:	*Spirometra felis*
Hosts affected	:	Jungle cat, Tiger, African lion, Clouded leopard
Location	:	Small intestine
Material for diagnosis	:	Feces
Stage and description	:	Egg - Oval shaped Yellowish brown in color Both ends are pointed Presence of operculum Contains yolk cells (Plate 3.2)

PLATE - 3

3.1

3.2

PLATE - 4

4.1

4.2

4.3

4.4

NEMATODE INFECTIONS

Disease	:	**Ascarosis (Ascarid infection)**
Causative agent	:	*Toxocara canis* (Plate 4.1), *Toxocara cati*, *Toxascaris leonina*
Hosts affected	:	Wild felidae and Canidae
Location	:	Small intestine
Material for diagnosis	:	Feces
Stage and description	:	*Toxocara canis* Egg - Subglobular with thick and finely pitted shell Contains compact yolk inside Measures 65-75 µm (Plate 4.2). *Toxocara cati* Egg - Similar to *Toxocara canis* (Plate 4.3) *Toxascaris leonina* Egg - Slightly oval with thick and smooth shell. Contains compact yolk (Plate 4.4).

Disease	:	**Ancylostomosis**
Causative agent	:	*Ancylostoma caninum*, *Ancylostoma braziliense*
Hosts affected	:	Lion, Cheetah, fox, Wild dog, Hyena, Jackal, Civet cat and Tiger
Location	:	Small intestine
Material for diagnosis	:	Feces
Stage and description	:	Egg - Oval shaped, thin shelled Segmented yolk (usually 8 cells) Measure 75-45 µm (Plate 5.1).

Disease	:	**Spirocercosis**
Causative agent	:	*Spirocerca lupi*
Hosts affected	:	Fox, Wolf, Jackal, Coyote, Wild felidae like Snow Leopard, Lynx etc
Location	:	Within nodules on the wall of oesophagus, stomach and Aorta. More rarely free in stomach and other organs (Plate 5.2).
Material for diagnosis	:	Feces
Stage and description	:	Egg - Thick shelled Gelatin capsule shaped Fully developed larvae inside Measure 30-37 by 11-15 µm (Plate 5.3).

PLATE - 5


5.1

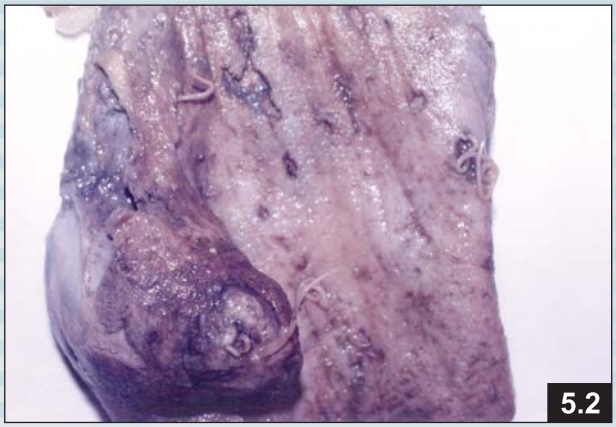

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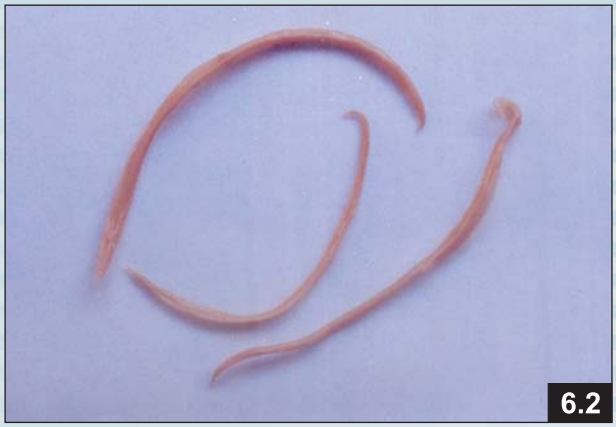
PLATE - 6

6.1



6.2

6.3

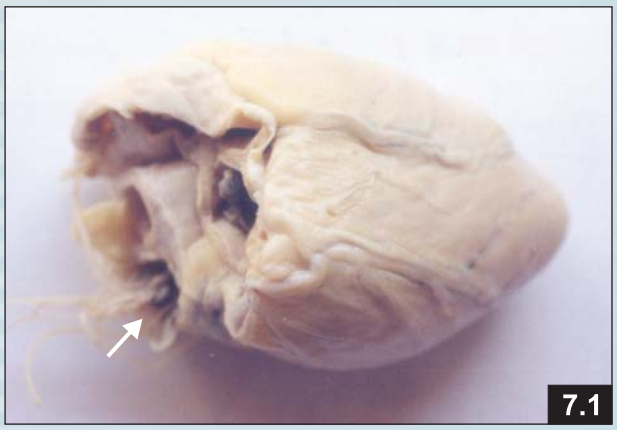
Disease	:	**Gnathostomosis**
Causative agent	:	*Gnathostoma spinigerum*
Hosts affected	:	Mink, pole cat and several wild carnivora
Location	:	Stomach wall within cysts (Plate 6.1)
Material for diagnosis	:	Feces
Stage and description	:	Egg - Oval shaped, green tinted Thin shelled with cap at one end Fine granulation of yolk inside.

Disease	:	**Physalopterosis**
Causative agent	:	*Physaloptera praeputialis* (Plate 6.2)
Hosts affected	:	Wild felids
Location	:	Stomach
Material for diagnosis	:	Feces
Stage and description	:	Egg - Resemble *Spirocerca lupi* eggs 49-58 by 30-34 µm Mixed infection of *Gnathostoma* and *Physaloptera* spp. (Plate 6.3).

Disease	:	**Heart worm disease**
Causative agent	:	*Dirofilaria immitis*
Hosts affected	:	Fox, wolf
Location	:	Heart - Right ventricle (Plate 7.1), pulmonary artery
Material for diagnosis	:	Blood
Stage and description	:	Microfilariae (First stage larvae of filarids) in the blood Microfilariae are longer (300 µm or more) Elongate with a straight tail and tapered head (Plate 7.2)

Disease	:	**Trichuriosis**
Causative agent	:	*Trichuris vulpis*
Hosts affected	:	Fox
Location	:	Caecum and other parts of intestine
Material for diagnosis	:	Dung
Stage and description	:	Egg - Brown, Barrel shaped Transparent plug at either pole Contain unsegmented embryo inside Measures 70-90 µm (Plate 7.3).

PLATE - 7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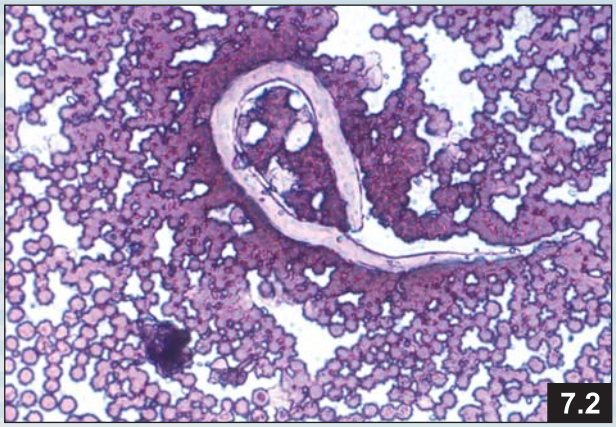

7.2


7.3

PLATE - 8

8.1

8.2

PROTOZOAN INFECTIONS

Disease	:	**Trypanosomosis**
Causative agent	:	*Trypanosoma evansi*
Hosts affected	:	Carnivores especially tigers
Location	:	Blood, lymph, tissue fluids
Material for diagnosis	:	Peripheral blood smear, lymph node smear
Stage and description	:	Fusiform Presence of flagella arising from kinetoplast Well developed undulating membrane and free flagella. Presence of vesicular nucleus (Plate 8.1).

Disease	:	**Babesiosis**
Causative agent	:	*Babesia canis, Babesia gibsoni*
Hosts affected	:	Jackal, wolf, wild dog, fox *B. gibsoni* - Jackal natural host
Location	:	Blood
Material for diagnosis	:	Peripheral blood smear
Stage and description	:	*B. canis* - Merozoites in RBCs as pyriform bodies which lie at an angle to one another (Plate 8.2) *B. gibsoni* - As annular or oval or signet ring form within the RBC

Disease	:	**Hepatozoonosis**
Causative agent	:	*Hepatozoon canis*
Hosts affected	:	Dog, cat, jackal, hyena
Location	:	Schizonts in the endothelial cells of spleen, liver, bone marrow.
Material for diagnosis	:	Blood smear
Stage and description	:	Gamonts commonly occur in leucocytes Gelatin capsule shaped Dark reddish purple nucleus Horse shoe shaped chromatin usually situated at one end of the parasite (Plate 9.1).

Disease	:	**Ehrlichiosis**
Causative agent	:	*Ehrlichia canis*
Hosts affected	:	Carnivores
Location	:	Blood
Material for diagnosis	:	Peripheral blood smear
Stage and description	:	Presence of single or compact colonies of inclusion bodies (morulae) as intracytoplasmic forms in circulating leucocytes (Plate 9.2).

PLATE - 9

9.1

9.2

PLATE - 10

10.1

10.2

Disease	:	**Isosporosis**
Causative agent	:	*Isospora felis*
Hosts affected	:	Cat, lion, tiger and members of felidae
Location	:	Small intestine
Material for diagnosis	:	Feces
Stage and description	:	Oocyst ovoid, oocyst wall smooth (Possibly pinkish) Sporulated oocyst with 2 sporocysts and each sporocyst with 4 sporozoites (Plate 10.1).

Disease	:	**Toxoplasmosis**
Causative agent	:	*Toxoplasma gondii*
Hosts affected	:	Cat, ocelot, mountain lion, Asian leopard cat, Bobcat and probably cheetah
Location	:	Small intestine - epithelial cells of villi
Material for diagnosis	:	Feces
Stage and description	:	Oocysts spherical Contain 2 sporocysts each with 4 sporozoites Measure 12 by 10 µm (Plate 10.2)

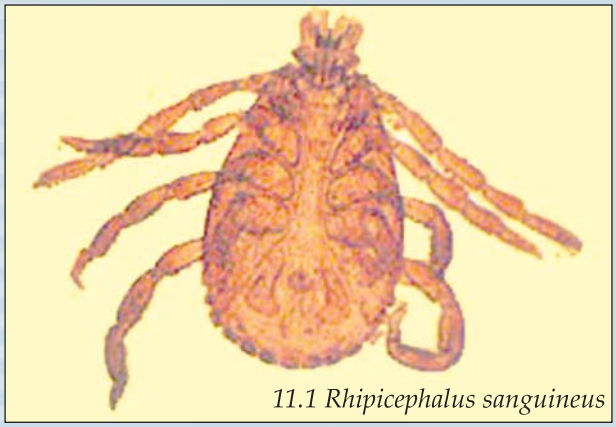
Plate 11.1 : *Brown dog tick*

Plate 11.2 : *Mite seen in the hair follicle and sebaceous glands*

Plate 11.3 : *Fleas*

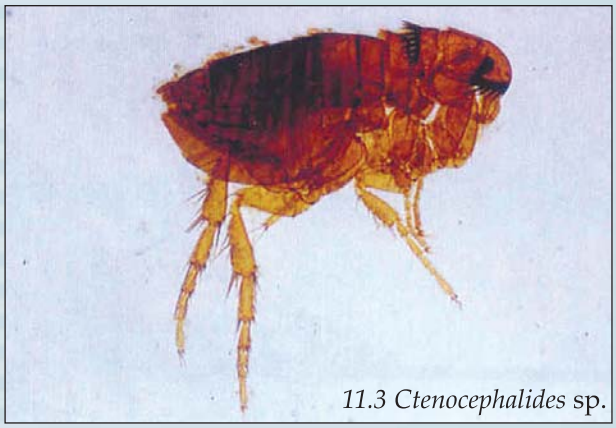
PLATE - 11

COMMON ARTHROPODS OF CARNIVORES



11.1 Rhipicephalus sanguineus

11.2 Demodex sp.



11.3 Ctenocephalides sp.

Herbivores

PLATE - 12


12.1


12.2

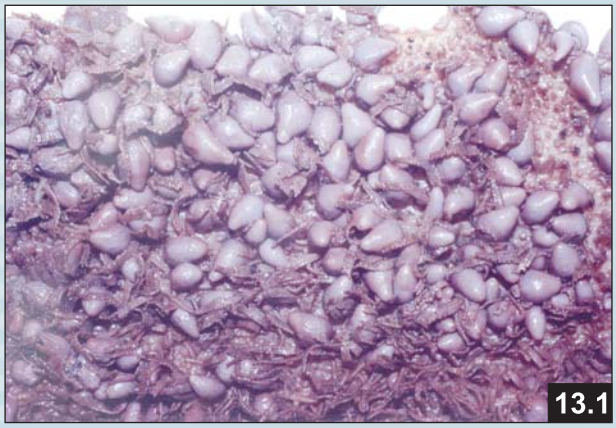

12.3

TREMATODE INFECTIONS

Disease	:	**Fasciolosis**
Causative agent	:	*Fasciola gigantica*
Hosts affected	:	Cheetal, Black buck, Bison, Elephants, Wild boars
Location	:	Adult (Plate 12.1) in Bile duct Immature fluke - Liver Traumatic hepatitis (Plate 12.2)
Material for diagnosis	:	Feces
Stage and description	:	Egg - Large sized, oval shaped Yellowish tinted Indistinct operculum Contains yolk cells and germ cells Measure 156-197 by 90-100 µm (Plate 12.3).

Disease	:	**Amphistomosis**
Causative agent and location	:	RUMEN (Plate 13.1 and 13.2) *Cotylophoron cotylophorum* *Paraphistomum cervi* *Gastrothylax crumenifer* CAECUM AND COLON *Pseudodiscus collinsi* *Pseudodiscus hawkesii* *Gastrodiscus secundus* *Pfenderius* sp.
Hosts affected	:	Wild ruminants, Elephants
Material for diagnosis	:	Dung
Stage and description	:	Egg - Oval shaped Clear and Pearly in appearance (non tinted) Distinct operculum Contains yolk and germ cells (Plate 13.3).

PLATE - 13


13.1


13.2


13.3

PLATE - 14

14.1

14.2

PLATE - 14

14.1

14.2

INTERMEDIATE HOST FOR TREMATODES

Plate 14.1 : *Lymnaea* sp.

Plate 14.2 : *Indoplanorbis* sp.

CESTODE INFECTIONS

Disease	:	**Monieziosis**
Causative agent	:	*Moniezia* sp.
Hosts affected	:	Black buck, barking deer, wild Bovids and Giraffe
Location	:	Small intestine
Material for diagnosis	:	Dung
Stage and description	:	Presence of ripe segments looking like cooked rice in dung (Plate 15.1). On crushing the segments eggs can be seen Egg - Triangular or squarish in shape Well developed pyriform apparatus Contains hexacanth embryo Measures 60-80 µm (Plate 15.2 - 10X) (Plate 15.3 - 45X)

Disease	:	**Cestodiosis**
Causative agent	:	*Anoplocephala* sp.
Hosts affected	:	Elephants, Rhinocerous
Location	:	Small intestine - Adult (Plate 15.4)
Material for diagnosis	:	Dung
Stage and description	:	Egg - Triangular or square shaped; Hexacanth embryo, having pyriform apparatus without cap like formation

PLATE - 15


15.1

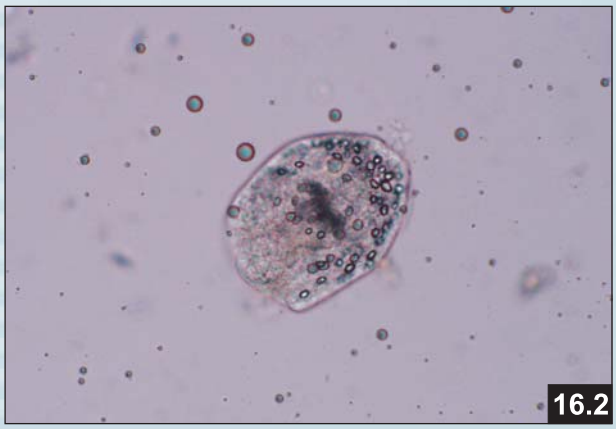

15.2


15.3


15.4

PLATE - 16

16.1



16.2

16.3

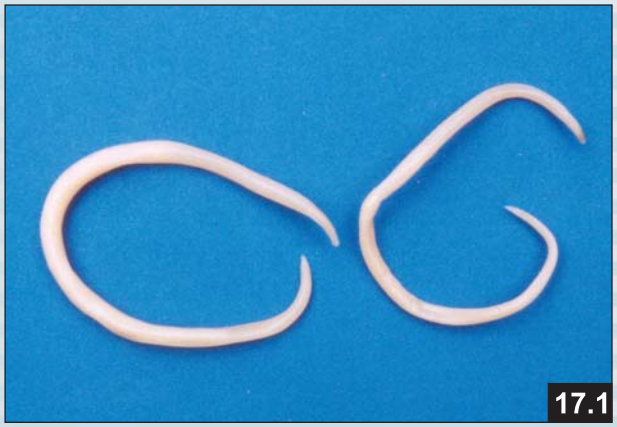
Disease	:	**Hydatidosis - Hydatid cyst**
Causative agent	:	*Echinococcus* sp.
Hosts affected	:	Wide varieties of ungulates including man
Location	:	Most frequently seen in liver and lungs May also develop in other internal organs including central nervous system (Plate 16.1).
Diagnosis	:	By post-mortem Presence of Protoscolices in the hydatid cyst fluid (Plate 16.2) Serological diagnosis

Disease	:	**Cysticercosis - *Cysticercus tenuicollis***
Causative agent	:	*Taenia hydatigena*
Hosts affected	:	Deer, black buck, gibbon
Location	:	Peritoneal cavity
Material for diagnosis	:	Post-mortem
Stage and description	:	Fluid filled cyst of about 5cm or more in diameter attached to various organs on the peritoneal surface (Plate 16.3)

NEMATODE INFECTIONS

Disease	:	**Ascarosis (Ascarid infection)**
Causative agent	:	*Ascaris* sp. (Plate 17.1) *Ascaris suum* - *Pig* *Parascaris equorum* - Zebra
Hosts affected	:	Wild pig, Wild boars and zebra
Location	:	Small intestine
Material for diagnosis	:	Dung
Stage and description	:	*Ascaris suum* Egg - Ovoid thick shelled with prominent projections Brownish yellow in colour Unsegmented yolk seen as a compact mass 50-75 by 40-50 µm (Plate 17.2 - 10X) *Toxocara vitulorum* Egg - Subglobular, finely pitted albuminous layer Thick shelled with compact yolk 75-95 by 60-75 µm (Plate 17.3 - 45X)

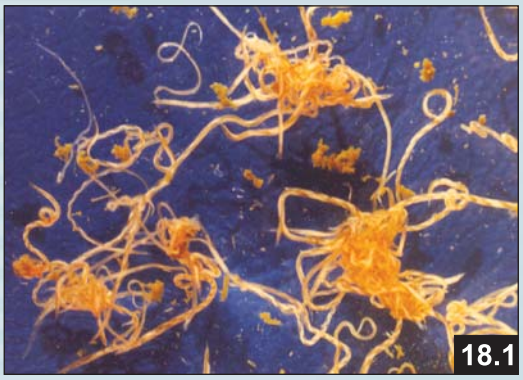
PLATE - 17


17.1


17.2


17.3

Plate - 18


18.1


18.2


18.3


18.4

Disease	:	**Strongylosis**
Causative agent	:	*Haemonchus* sp. (Plate 18.1), *Bunostomum* sp., etc.,
Hosts affected	:	Wild ruminants / Herbivores
Location	:	Intestine
Material for diagnosis	:	Dung
Stage and description	:	Egg - Oval shaped Thin shelled Segmented yolk inside 70-95 by 41-50 µm (Plate 18.2 - 40X) (Plate 18.3 - 45X)

Disease	:	**Strongyloidosis**
Causative agent	:	*Strongyloides* sp.
Hosts affected	:	Wild ruminants, zebra
Location	:	Small intestine
Material for diagnosis	:	Dung
Stage and description	:	Egg - Comparatively small in size Oval shaped Thick shell with both ends blunt Well developed embryo inside the egg Measures 40-70 by 20-40 µm (Plate 18.4)

Disease	:	**Dictyocaulosis**
Causative agent	:	*Dictyocaulus* sp. (Plate 19.1 and 19.2)
Hosts affected	:	Wild ruminants, Zebra, Camel
Location	:	Bronchi
Diagnosis	:	Larvae in feces Eggs - Sputum or nasal discharge (Eggs with fully developed larvae) 112-138 by 69-90 µm

Disease	:	**Trichuriosis**
Causative agent	:	*Trichuris* sp.
Hosts affected	:	Wild ruminants, wild pig, wild boar,
Location	:	Caecum
Material for diagnosis	:	Feces
Stage and description	:	Eggs - Brown coloured Barrel shaped Transparent plug at either pole Contains unsegmented embryo Measures 70-80 by 30-40 µm (Plate 19.3)

PLATE - 19


19.1


19.2


19.3

PLATE - 20


20.1


20.2


20.3

Disease	:	**Oxyuriosis**
Causative agent	:	*Oxyuris equi* (Plate 20.1)
Hosts affected	:	Zebra
Location	:	Large intestine
Material for diagnosis	:	Perineal region swabs
Stage and description	:	Eggs - Creamy coloured masses of eggs, Elongate, slightly flattened on one side, Provided with a plug at one pole, Measures 90 by 42 µm (Plate 20.2)

Disease	:	**Enterobiosis, Pin worm infection**
Causative agent	:	*Enterobius vermicularis*
Hosts affected	:	Higher primates like Chimpanzee, Gibbon
Location	:	Caecum, Appendix, Ascending colon
Material for diagnosis	:	Perianal and perineal swabs
Stage and description	:	Egg - Similar to *Oxyuris equi* (Plate 20.3)

Disease	:	**Setariosis**
Causative agent	:	*Setaria cervi*
Hosts affected	:	Deer
Location	:	Peritoneal cavity
Diagnosis	:	Worms are long, milky white and spirally coiled towards the hind end (Plate 21.1)

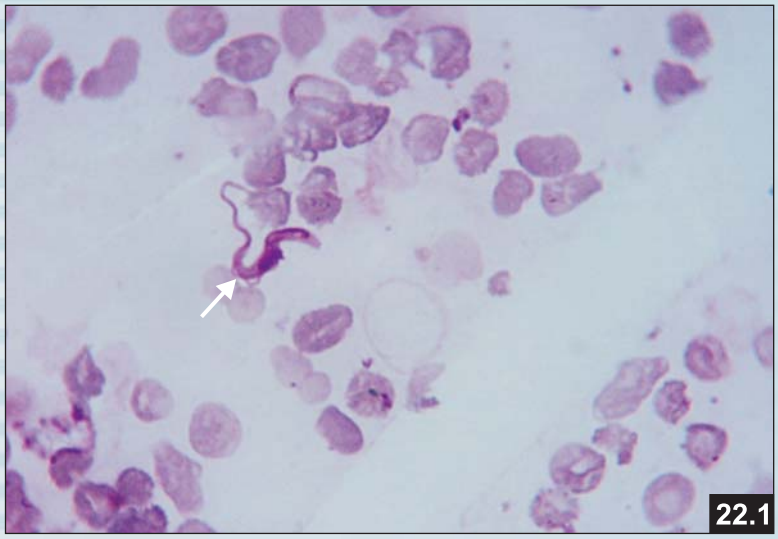
Disease	:	**Filariosis**
Causative agent	:	*Indofilaria pattabhiramani* *Indofilaria elephantis*
Hosts affected	:	Elephants
Location	:	In the skin as cutaneous haemorrhagic nodules of 1-2 µm size
Diagnosis	:	Discharge from the nodules reveal the microfilaria (Plate 21.2)

PLATE - 21

21.1

21.2

PLATE - 22



PROTOZOAN INFECTIONS

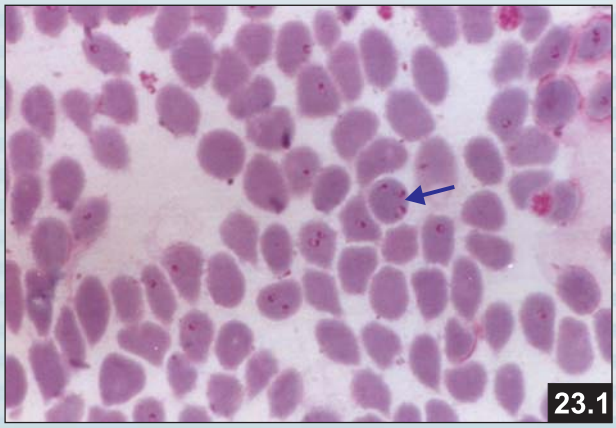
Disease	:	**Trypanosomosis**
Causative agent	:	*Trypanosoma evansi*
Hosts affected	:	Wild ruminants, equines
Location	:	Blood, lymph, tissue fluids
Material for diagnosis	:	Peripheral blood smear, lymph node smear
Stage and description	:	Fusiform Presence of flagella arising from kinetoplast Well developed undulating membrane and free flagella Presence of vesicular nucleus (Plate 22.1).

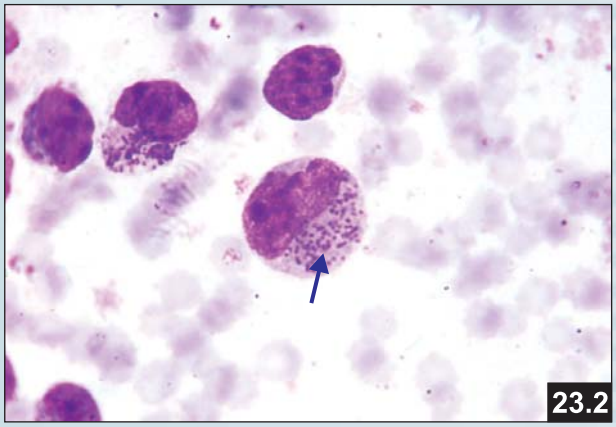
Disease	:	**Babesiosis**
Causative agent	:	*Babesia* sp.
Hosts affected	:	Herbivores, equines and carnivores.
Location	:	Merozoites in RBCs
Material for diagnosis	:	Blood smear
Stage and description	:	Merozoites in RBCs are Pyriform, rounded, oval or irregularly shaped. They occur characteristically forming an acute angle in RBCs (Plate 22.2).

Disease	:	**Theileriosis**
Causative agent	:	*Theileria* sp.
Hosts affected	:	Herbivores
Location	:	Merozoites in RBCs; Schizonts in lymph nodes
Material for diagnosis	:	Blood smear Lymph node smear.
Stage and description	:	Merozoites of various shapes (Round, oval, comma or rod shaped) within the RBCs (Plate 23.1). Schizonts (known as kochs Blue Bodies) as irregularly oval or rounded matrix with numerous chromatin particles in the cytoplasm of the lymphocytes (Plate 23.2).

Disease	:	**Anaplasmosis**
Causative agent	:	*Anaplasma marginale*
Hosts affected	:	Herbivores, zebra, bison, antelopes, deer, elk and camel.
Location	:	Inside RBCs
Material for diagnosis	:	Blood smear
Stage and description	:	Small, spherical red to dark red bodies in the margin of erythrocytes (Plate 23.3)

PLATE - 23


23.1


23.2

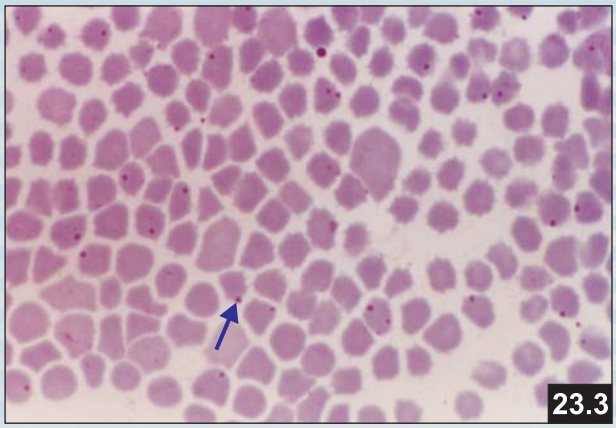

23.3

PLATE - 24


24.1


24.2


24.3

Disease	:	**Amoebiosis**
Causative agent	:	*Entamoeba histolytica*
Hosts affected	:	Non-human primates, including monkey, chimpanzee, Gibbons etc.
Location	:	Large intestine, sometimes liver
Material for diagnosis	:	Feces
Stage and description	:	Trophozoite (Plate 24.1) Cyst (Plate 24.2) Round shaped Four distinct nuclei Presence of chromatoid bodies

Disease	:	**Giardiosis**
Causative agent	:	*Giardia lamblia*
Hosts affected	:	Monkeys, pigs, budgerigars
Location	:	Small intestine, colon
Material for diagnosis	:	Feces
Stage and description	:	Trophozoite Ellipsoidal bilaterally symmetrical (Resembles a pear which had been cut in half longitudinally) Anterior end is broadly rounded Posterior end is drawn out Presence of 2 or 4 nuclei (Plate 24.3).

Disease	:	**Coccidiosis**
Causative agent	:	*Eimeria* sp.
Hosts affected	:	Bovids, cervids and avifauna
Location	:	Small intestine
Material for diagnosis	:	Feces
Stage and description	:	Oocyst Unsporulated oocyst Ovoid, Spherical or Ellipsoidal Sporulated oocyst Ovoid / spherical, 27 by 20 µm Presence of sporocysts containing sporozoites within the oocyst (Plate 25.1).

Disease	:	**Balantidiosis**
Causative agent	:	*Balantidium coli*
Hosts affected	:	Non human primates including Chimpanzee, Macaque
Location	:	Caecum and colon
Material for diagnosis	:	Dung
Stage and description	:	Cyst - Ovoid or spherical Faintly yellowish or green in color Presence of macronucleus Cyst wall is composed of 2 membranes Measures 40-60 µm (Plate 25.2)

PLATE - 25

25.1

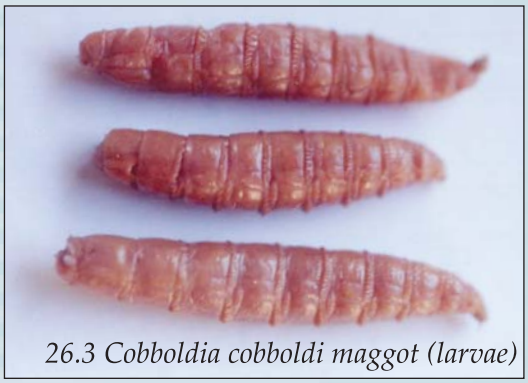
25.2

PLATE - 26

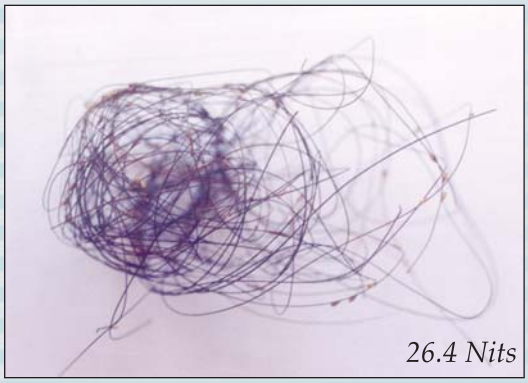
ARTHROPODS

26.1 Tabanus sp. *fly*

26.2 Lipoptena cervi fly



26.3 Cobboldia cobboldi maggot (larvae)



26.4 Nits

Plate 26.1 : *Vector for Trypanosomosis*

Plate 26.2 : *Common fly on cervids*

Plate 26.3 : *Larvae seen in stomach of elephants*

Plate 26.4 : *Eggs of lice*

Plate 27.1 : *Engorged ticks*

Plate 27.2 : *Sarcoptes* sp. - burrowing mite causing skin lesions

Plate 27.3 : *Psoroptes* sp. - a non burrowing mite causing scaly lesions

PLATE - 27

ACARINES

27.1 *Boophilus* sp. *tick*

27.2 *Sarcoptes scabiei mite*

27.3 *Psoroptes* sp. *mite*

Avifauna

PLATE - 28


28.1


28.2


28.3

Disease	:	**Ascarosis**
Causative agent	:	*Ascaridia galli, Heterakis gallinarum*
Hosts affected	:	Patridges, Pheasants, Quails, guinea fowl, turkey, duck, goose
Location	:	*Ascaridia galli* - Small intestine (Plate 28.1) *Heterakis gallinarum* - Caecum
Material for diagnosis	:	Droppings
Stage and description	:	*Ascaridia galli :* Eggs - Oval shaped Thick and smooth shelled Contain unsegmented yolk 73-92 by 45-57 µm (Plate 28.2 - 10X). *Heterakis gallinarum* : Slightly thinner shell 65-80 by 30-46 µm (Plate 28.3 - 45X).

Disease	:	**Gapes**
Causative agent	:	*Syngamus trachea*
Hosts affected	:	Pigeons, Turkey, Pheasants, Guinea fowls, Goose and various wild birds
Location	:	Trachea - Adult (Plate 29.1)
Material for diagnosis	:	Droppings
Stage and description	:	Egg - Ellipsoidal, thickened Operculum at either poles (differentiate from *Capillaria* sp. eggs) Measures 70-100 by 43-45 µm (Plate 29.2)

Disease	:	***Capilloriosis spp***
Causative agent	:	*Capillaria* sp. *(C. obsignata / C. contorta / C.anatis / C. caudinflata)*
Hosts affected	:	Pheasants, Pigeon, Fowl, Turkey and related wild birds
Location	:	Small intestine / Crop / oesophagus / mouth
Material for diagnosis	:	Droppings
Stage and description	:	Egg - Barrel shaped shell, colourless Bipolar plugs which do not project far (Plate 29.3)

PLATE - 29


29.1


29.2


29.3

PLATE - 30

30.1

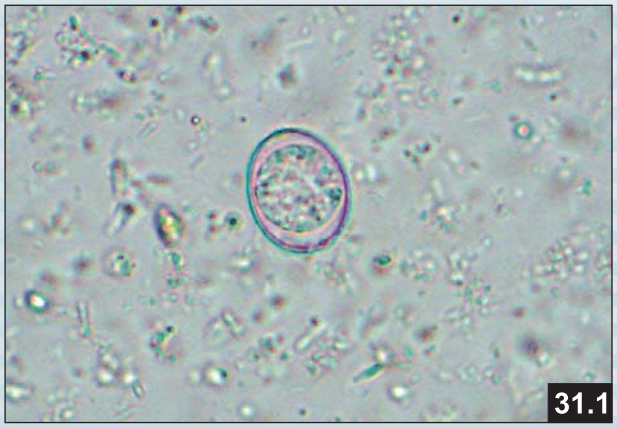
30.2

Disease	:	**Strongyloidosis**
Causative agent	:	*Strongyloides* sp.
Hosts affected	:	Wild birds
Location	:	Small intestine
Material for diagnosis	:	Dung
Stage and description	:	Egg - Comparatively small sized Oval shaped Thick shelled with both ends blunt Well developed embryo inside the egg Measures 40-70 by 20-40 µm (Plate 30.1)

Trematode egg - *Milvus migrans* (Pariah kite)
(Plate 30.2)

Disease	:	**Coccidiosis**
Causative agent	:	*Eimeria* sp.
Hosts affected	:	Bovids, cervids and avifauna
Location	:	Small intestine
Material for diagnosis	:	Feces
Stage and description	:	Oocyst Unsporulated oocyst Ovoid, Spherical or Ellipsoidal (Plate 31.1) Sporulated oocyst Ovoid / spherical, 27 by 20 µm Presence of sporocysts containing sporozoites within the oocyst (Plate 31.2).
		Acanthocephalan egg Egg - Oval, thick shelled with 4 layers, fully developed larva inside, larva covered with small spines 67-110 by 40-65 µm (Plate 31.3)

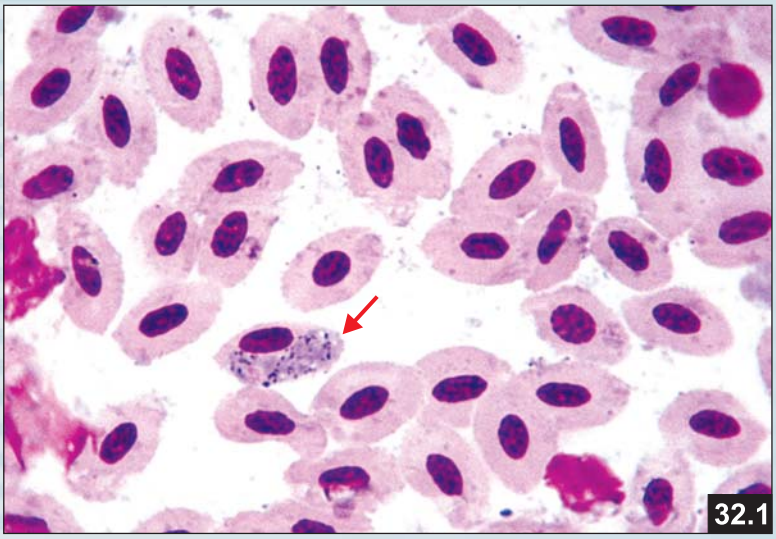
PLATE - 31


31.1

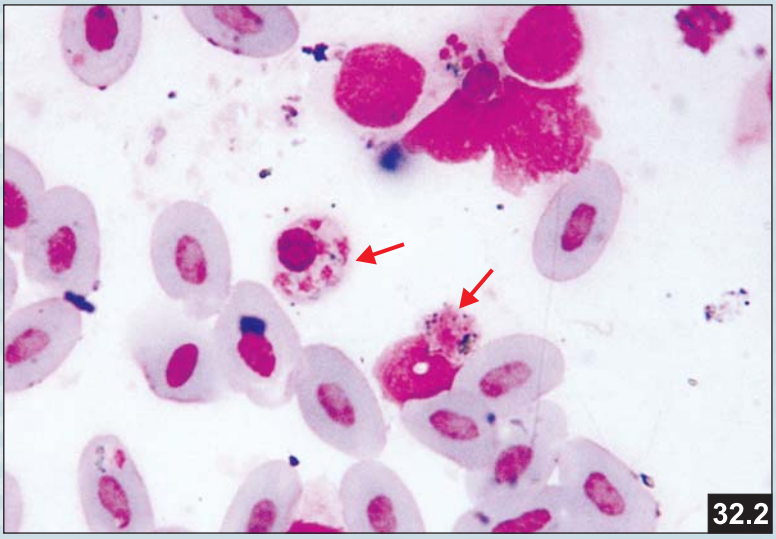

31.2


31.3

PLATE - 32



32.1



32.2

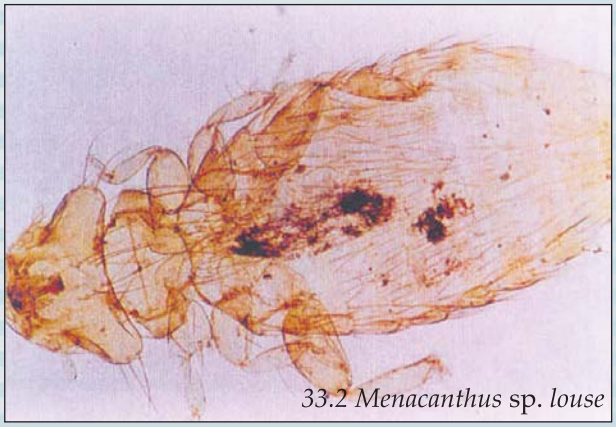
Disease	:	***Haemoproteus* infection**
Causative agent	:	*Haemoproteus columbae*
Hosts affected	:	Domestic wild pigeons and number of wild birds
Location	:	Gamonts in RBCs
Material for diagnosis	:	Blood smear
Stage and description	:	Gamonts occur in RBCs as crescent or bean shaped bodies which partially encircle the nucleus of the cell in the form of halter (Plate 32.1).

Disease	:	**Avian malaria**
Causative agent	:	*Plasmodium* sp.
Hosts affected	:	Avifauna Natural host Jungle fowl
Location	:	Trophozoites and schizonts in RBCs
Material for diagnosis	:	Blood smear
Stage and description	:	Trophozoite : Ring like appearance Chomation as a rounded mass at the periphery of the parasite. Schizont : Large sized mass of protoplasm with numerous nuclear fragments (Plate 32.2).

PLATE - 33

ARTHROPODS OF AVIFAUNA

33.1 Menopon sp. *louse*



33.2 Menacanthus sp. *louse*

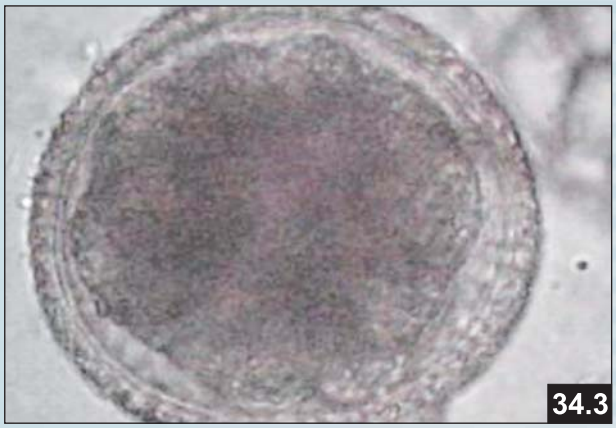
33.3 Ornithonyssus sp. *mite*

Reptiles

PLATE - 34


34.1


34.2


34.3

Kalicephalus : Egg - Transparent, Thin shelled, Oval shaped
Developing larva inside (Plate 34.1 - 40X)

Ophidascarid : Egg - Thick walled
Compact yolk inside (Plate 34.2 - 10X)
(Plate 34.3 - 40X)

Haemogregarines : Halter shaped gametocytes in RBC's (Plate 35.1)

PLATE - 35

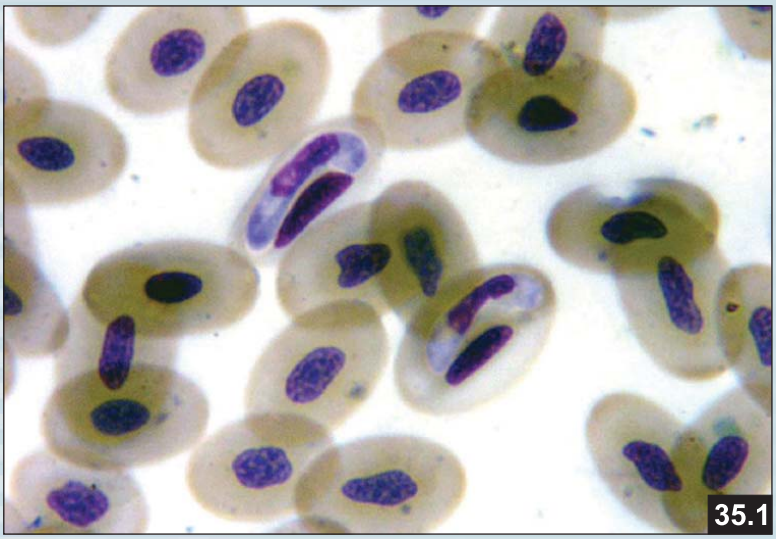


PLATE - 36

ACARINES

36.1 Aponomma gerviasi ticks on snakes

36.2 Engorged ticks

COLOR ATLAS ON PARASITES OF CAPTIVE WILD ANIMALS

DEPARTMENT OF WILDLIFE SCIENCE
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