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# Coprological Survey and Inventory of Animals at Obafemi Awolowo University and University of Ibadan Zoological Gardens

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**Abstract:** Infections with helminthes are a major health issue in captive and wild animals. However, prevalence data of gastrointestinal parasites in zoological gardens in Nigeria are scarce. This study took an inventory of the wild animal population and surveyed for helminth parasites in animals at the Obafemi Awolowo University (O.A.U) and University of Ibadan (U.I) Zoological Gardens. Twenty (20) and twenty-two (22) species of animals were documented at O.A.U and U.I zoological gardens respectively. The parasites identified include *Ancylostoma duodenale*, *Ascaris lumbricoides*, *Haemonchus contortus, Toxoascaris leonine* and *Trichuris trichuris*. Management issues include improper handling and inadequate feeding of animals. Regular deworming and hygienic measures are necessary to prevent helminth infections in captive animals. Improved funding and management are therefore necessary to ensure sustainability of Nigerian zoological gardens.

**Key words:** Parasites · Nigeria · Wildlife · Zoological Gardens · Range

## INTRODUCTION

The study of diseases of wild animals is important to public health and to comparative pathology and medicine. Diseases of wild animals in aberrant hosts (domestic animals or man) may result in epidemics of disease with high mortality. Zoological Gardens, by their nature, aggregate a number of species of animals in close proximity and many of these animals are exotic to the geographical location of the gardens. Proximity provides opportunity for the transmission of diseases or parasites to species which would not normally come into contact with these pathogens. Transmissions can be from exotic to indigenous animals or vice versa; frequently the animals involved have had no previous contact with the pathogens and thus are highly susceptible to infection.

Nigeria is blessed with abundant wildlife species. However, any natural resource, which is not properly managed on a sustainable basis is bound to be depleted [1], so to counter the negative effects of the exploitation, it is necessary to adopt strict management of these resources e.g. repopulation of endangered species, breeding of certain species for meat production and other marketable products and conservation of wild animal in wildlife parks and zoological gardens. *In-situ* conservation involves keeping animals within their original habitat or natural environments. Examples of such are national parks and games reserves. *Ex-situ* conservation involves keeping the wild animals alive outside their natural environments e.g. in zoological gardens, where they are used for exhibition, education, recreation and research purposes. University of Ibadan (U.I.) and Obafemi Awolowo University (O.A.U.) zoological gardens were established in 1948 and 1962 respectively for such purposes.

Investigation and understanding of wildlife diseases are vital aspects of natural resource management programs. The need to conserve endangered species and the development of semi free-range wild animal parks have attracted attention to the potential transmission of infectious microorganisms, their impact on the health of individuals and groups of wild animals and their effect on conservation programs. Animals kept in captivity or bred in semi-free-range areas, such as zoological gardens, may become infected with entero-pathogens in their enclosures.

This study therefore did an inventory of the wild animals at the University of Ibadan and Obafemi Awolowo University's zoological gardens. Coprological survey was also conducted to determine the helminth infection status of the animals.

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## MATERIALS AND METHOD

**Study Sites:** The study sites were the University of Ibadan (UI) and Obafemi Awolowo University (OAU) Zoological Gardens, both in Nigeria.

**Methodology:** This study involves gathering of information from observations and records on the general management practices for each of the species. Faecal samples were collected from the cages and pens of animals, while simple floatation method was used for the helminth parasites determination. 10 g of faeces was crushed with applicator sticks and mix well with 10 ml of saline. The mixture was filtered through two layers of dampened surgical gauze into a 15ml conical centrifuge tube. The suspension was centrifuged at 1500 rpm for 5 minutes. The supernatant was decanted into disinfectant and the sediment re-suspended and re-centrifuged in saline, when there was excessive debris in the sample.

The sediment was re-suspended and thoroughly mixed in 12ml of zinc sulphate solution (specific gravity was 1.20) and centrifuged for 1 minute at 2500 rpm. The tube was placed in a rack in a vertical position and enough zinc sulphate was slowly added with a dropper pipette to fill the tube so that an inverted meniscus forms. Without shaking the tube, a 22 x 22 mm coverslip was carefully placed on top of the tube so that its underside rests on the meniscus. The tube was allowed to stand vertically in a rack with the coverslip suspended on top for 10 minutes.

The coverslip was carefully lifted with its hanging drop containing parasite eggs and cysts on the underside and mounted on a clean slide, liquid side down. The slide was gently rotated after adding the coverslip to ensure a uniform mixture [2]. The slide was then thoroughly microscopically examined. The parasites were identified and documented using photomicrographs.

## RESULTS AND DISCUSSION

Parasites and parasite-induced diseases is a very real threat to the stability of wildlife populations and to human's health and socio-economic well-being. Knowledge of pathogen biodiversity and is important for managing wildlife and it also provides information about an ecosystem that may not otherwise be readily apparent. It is clear that for zoological gardens in Nigeria, we do not have adequate baseline knowledge for parasite diversity and distribution. Our challenge now lies in establishing baselines, archives and long term monitoring programs that will enable us to detect and respond to changes in the health or balance of these systems.

Table 1: Inventory of wildlife species at Obafemi Awolowo University Zoological Garden.

| S/N | Common name | Species | Male | Female | Juvenile | Total |
|---|---|---|---|---|---|---|
| A. | PRIMATES | | | | | |
| 1. | Baboon | *Papio Anubis* | 1 | 3 | - | 4 |
| 2. | Mona monkey | *Cercopithecus* | 2 | | | 2 |
| 3. | Red patas monkey | *Erythrocebus patas* | 1 | - | - | 1 |
| B. | AVES | | | | | |
| 1. | Water birds | *Anser albifrons* | 2 | 1 | - | 3 |
| C | REPTILES | | | | | |
| 1. | Royal python | *Python regius* | 1 | - | - | 1 |
| 2. | River turtle | *Trionyn triunvi* | 1 | - | - | 1 |
| 3. | Hinged tortoise | *Kinixys belliana* | 1 | - | - | 1 |
| 4. | Dwarf crocodile | *Osteaolamus* | 1 | 1 | 1 | 3 |
| D | RODENT | | | | | |
| 1. | Porcupine | *Athenunus africanus* | 1 | 1 | - | 2 |
| E | FELINE | | | | | |
| 1. | Civet cat | *Viverra civetta* | 1 | - | - | 1 |
| F | ANTELOPE | | | | | |
| 1. | Maxiwell Duiker | *Cephalophus maxiwelli* | - | 1 | - | 1 |
| G | AVES | | | | | |
| 1 | Crane crown | | 1 | 1 | - | 2 |
| 2. | Goose | *Anser rossi* | 1 | - | - | 1 |
| 3. | Water birds | *Anser albifrons* | 2 | 3 | - | 5 |
| 4. | Lizard buzzard | *Kaupifako monognammicus* | 1 | - | - | 1 |
| 5. | Parrot | *Poicephalus senegalis* | 1 | - | - | 1 |
| 6. | Pea fowl | *Pavo cristatus* | 1 | 1 | - | 2 |
| H | RODENTS | | | | | |
| 1. | Brush - tail porcupine Athererus | *Atherunus africanus* | 2 | 2 | - | 4 |
| I | EQUINES | | | | | |
| 1 | Camel | | - | 1 | - | 1 |
| 2. | Donkey | *Equus family* | 1 | 1 | - | 2 |

Table 2: Inventory of Wildlife species at the University of Ibadan Zoological Garden.

| S/N | COMMON NAME | SPECIES | MALE | FEMALE | JUVENILE | TOTAL |
|---|---|---|---|---|---|---|
| A. | PRIMATES | | | | | |
| 1. | Chimpanzee | *Pan tryglodytes* | - | - | - | 1 |
| 2. | Putty nosed monkey | *Cercopithecus petaurista* | 2 | 4 | - | 2 |
| 3. | Drill monkey | *Mandrilus leucophaeus* | 1 | 1 | - | 3 |
| 4. | Lowland monkey | *Gorilla gorilla* | - | - | - | 1 |
| 5. | Green monkey | *Cercopithecus* | 2 | 4 | - | 6 |
| 6. | Baboon | *Papio anubis* | - | - | - | 7 |
| 7. | Red paths monkey | *Erythrocebus paths* | 1 | - | - | 1 |
| 8. | Mona monkey | *Cercopithecus monas* | 1 | 1 | 2 | 5 |
| B. | FELINE | | | | | |
| 1. | Lion | *Panthera leo* | 1 | 1 | 2 | 4 |
| 2. | Striped Hyaena | *Hyaena hyaena* | - | - | - | 4 |
| 3. | Civet cat | *Viverra civetta* | 1 | - | - | 1 |
| 4. | Jackal | *Canis aureus* | 1 | 2 | - | 3 |
| C. | ANTELOPES. | | | | | |
| 1. | Giant Eland | *Taurotragus dorcas* | - | - | - | 1 |
| 2. | Dorcas | *Gazellegazella dorcas* | - | - | - | 1 |
| 3. | Red-franked Duiker | *Cephalophus rufilatus* | - | 1 | - | 1 |
| 4. | Maxiwell Duiker | *Cephalophus maxiwelli* | 1 | 1 | 2 | 4 |
| D. | SWINE | | | | | |
| 1. | Red river hog (bush dog) | *Potanochenus porcus* | 1 | - | - | 1 |
| E. | REPTILES | | | | | |
| 1 | Nile crocodile | *Crocodylus niliticus* | 1 | - | - | 1 |
| 2. | Slender shouted crocodile | *Crocodylus cataphratus* | 1 | - | - | 1 |
| 3. | Dwarf crocodile | *Osteaolaenus tetrapis* | 1 | - | - | 1 |
| 4. | Indian python | | - | - | - | 1 |
| 5. | African python | *Python sabae* | 2 | - | - | 2 |
| 6. | Soft shell river turtle | *Trionyn triunovi* | | | | 2 |
| 7. | Monitor lizard | *Vevanus niloticus* | 2 | 2 | - | 4 |
| 8. | Black splitting cobra | | 3 | - | - | 3 |
| 9. | Land tortoise | *Anapsida family* | 1 | 1 | 13 | 15 |
| F. | AVES | | | | | |
| 1 | Crane crown | | 1 | 1 | - | 2 |
| 2 | Goose | *Anser rossi* | 1 | 1 | - | 1 |
| 3. | Water birds | *Anser albifrons* | 2 | 3 | - | 5 |
| 4 | Lizard buzzard | *Kaupifako Monognammicus* | - | - | - | 1 |
| 5. | Parrot | *Poicephalus senegalis* | - | - | - | 1 |
| 6 | Pea fowl | *Pavo cristatus* | 1 | 1 | - | 2 |
| G. | RODENTS | | | | | |
| | Brush-tail Porcupine Athererus | *Atherunus africanus* | 2 | 2 | - | 4 |
| H. | EQUINES | | | | | |
| 1. | Camel | *Camelus bactrionsis* | - | - | - | 1 |
| 2. | Donkey | *Equus asinus* | 1 | 1 | - | 2 |

Table 3: Helminth Parasites Infestation of wildlife Species at Obafemi Awolowo University Zoological Garden

| S /N | Name of Wildlife Species | Type of Helminth Parasites |
|---|---|---|
| 1 | Baboons | *Ascaris lumbricodes; trchuris trichuris* |
| 2 | Mona monkeys | *Ancylostoma deodonale* |
| 3 | Porcupines | *Ascaris lumbricoides* |
| 4 | Crocodiles | *Ascaris lumbricoides* |
| 5 | Civet cat | *Ascaris lumbricoides* |
| 6 | Red Patas Monkey | Negative |
| 7 | Water birds | Negative |
| 8 | Maxiwell deciker | Negative |

Table 4: Helminth Parasites Infection of Wildlife Species at University of Ibadan Zoological Garden

| S/N | Name of Species | Type of Helminth Parasites |
|---|---|---|
| 1. | Baboons | *Ascaris lumbricoides Ancylostoma duodenale* |
| 2. | Hyaenas | *Ascaris lumbricoides* |
| 3. | Giant eland | *Heamonchus contortus* |
| 4. | Lion cubs | |
| | Female Lion | |
| | Male Lion | *Ascaris lumbricoides* |
| | *Ascaris lumbricoides* | *Toxoascaris leonine; Ancylostoma duodenale* |
| 5. | Gorillas | *Ascaris lumbricoides* |
| 6. | Jackals | *Ascaris lumbricoides* |
| 7. | Civet Cat | *Ascaris lumbricoides* |
| 8. | Maxiwell duikers | *Ascaris lumbricoides* |
| 9. | Camel | *Ascaris lumbricoides* |
| 10. | Donkeys | *Ascaris lumbricoides* |
| 11 | Dorcas Gazelle | *Ascaris lumbricoides* |
| 12. | Porcupines | *Ascaris lumbricoides* |
| 13 | Red River Hog | *Ascaris lumbricoides* |
| 14. | Putt Nose Monkeys | Negative |
| 15 | Chimpanzee | Negative |
| 16. | Goose | Negative |
| 17 | Water birds | Negative |
| 18. | Green Monkeys | Negative |
| 19. | Mona Monkeys | Negative |
| 20. | Drill Monkeys | Negative. |

The results of the inventory of the wildlife species in the zoological garden of Obafemi Awolowo is presented in Table 1, while that of the University of Ibadan zoological garden is Table 2. Tables 3 and 4 show the results of helminth parasites isolated from different species of animals at Obafemi Awolowo University and University of Ibadan zoological gardens,respectively. Of eight (8) species of animals sampled at OAU, 6 (62.5%) of them were positive for one parasite or the other, while in UI, out of the twenty (20) species sampled, 13 (65%) were positive for parasite.

Photomicrographs of the parasites identified are presented in Figures 1-5. The parasites identified are: *Ancylostoma duoenale*, *Ascaris lumbricoides*, *Haemonchus spp*. *Toxoascaris leonine* and *Trichuris trichuris*. The public health implication of these infections is that some of them are zoonotic e.g *Ascaris lubricoides, Trichuris trichuris and Ancylostoma duodenale*. Humans and gorillas are capable of exchanging many parasites [3-6], direct and indirect contact with humans has the potential to alter gorilla parasite burdens. The major reasons for problems in the Nigerian Zoological gardens

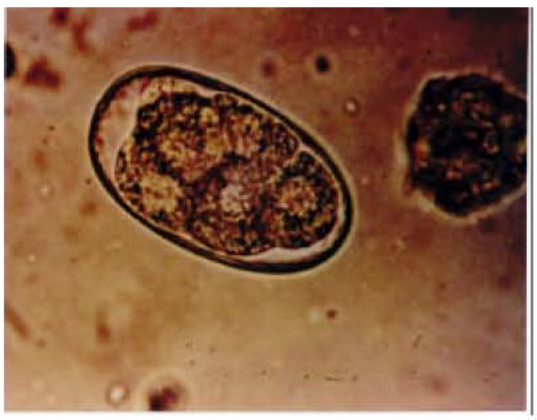

Fig. 1: Photomicrograph of *Ancylostoma duodenale* egg isolated from faecal samples of animals at the zoological gardens

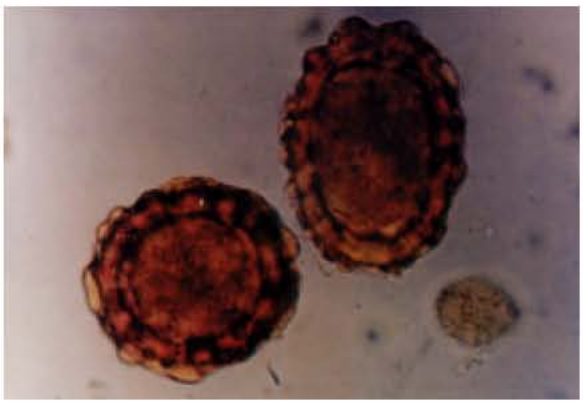

Fig. 2: A Photomicrograph of *Ascaris lumbricoides* egg isolated from faecal samples of animals at the zoological gardens

Fig. 3: A Photomicrograph of *Haemonchus contortus* egg isolated from faecal samples of the giant Eland at the University of Ibadan zoological garden

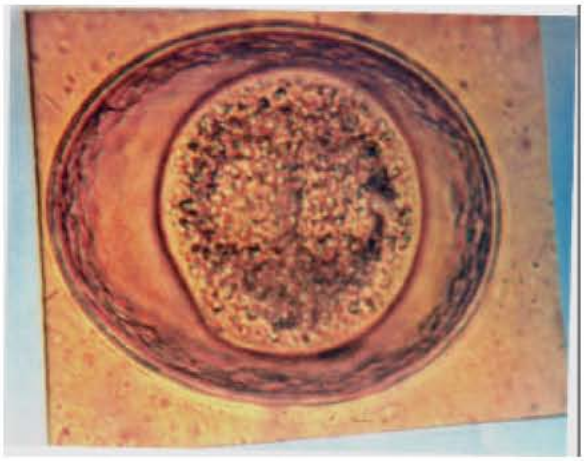

Fig. 4: A Photomicrograph of *Toxoascaris leonine* egg isolated from faecal samples of a lion at the University of Ibadan zoological garden

have been perennial and reported by various workers [7-10]. Zoological Gardens, by their nature, aggregate a number of species of animals in close proximity and many of these animals are exotic to the geographical location of the Gardens. Proximity provides opportunity for the transmission of diseases or parasites to species which would not normally come into contact with these pathogens. Fecal samples are easy to obtain and once collected can be stored in preservatives for long periods of time, allowing for parasitologic examination at a later time or at an offsite location. Resulting data on parasite burdens is an important component of a site-specific health assessment plans for wildlife populations. These data are necessary for understanding the impact of human activities and management efforts on wildlife and human populations and to develop responsible long-term conservation strategies. Helminth infection

Fig. 5: A Photomicrograph of *Trichuris trichuris* egg isolated from faecal samples of Baboons at the Obafemi Awolowo University zoological garden

may be successfully prevented by daily dung removal. Wildlife species under captivity must also be provided with stimulating environment for optimum performance. Exposure to extreme conditions must also be avoided so as not jeopardize their health [11]. Further studies of the diseases of zoo animals might contribute to better understanding of the epidemiology of diseases in man and domestic animals.

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