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Title

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Journal

International Journal of Comparative Psychology, 3(4)

ISSN

0889-3675

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Publication Date

1990

DOI

10.46867/C44P45

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THE STUDY OF ANIMAL BEHAVIOUR IN INDIA: ORIGIN AND CURRENT STATUS

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ABSTRACT: Recorded observations on animal behaviour in India date back to ancient times. Behaviour of various animals was observed and described in ancient Indian classics. Many species of animals have been described as 'Vahanas,' that is, animals ridden by various Hindu deities. The sculptures and drawings of a number of deities also include these mounts with their characteristic behavioural patterns. However, scientific investigations on animal behaviour is a recently developed branch of biological science in India, initiated in the late 1950's. Systematic ethological research on various species of Indian animals was begun only in early 1970's, after the formation of the Ethological Society of India. At present a variety of topics such as foraging and feeding behaviour, habitat selection, social and reproductive behaviour, chronobiology, chemical communication signals and neurobehaviour are being investigated by Indian ethologists, who are mainly zoologists, and a few psychologists. A wide range of species from lower metazoa to higher vertebrates are observed by ethologists in India. An analysis of the development of ethology in India indicates that the progress of this discipline as a major field of research and teaching in India is satisfactory. Further, if the present trend is maintained, ethology should develop as a major discipline of animal research in India by the year 2000.

INTRODUCTION

India has a rich cultural and religious heritage. Long before the dawn of history, humans appear to have had practical knowledge in biology. Human beings have long been systematising their knowledge of the plants and animals amongst which and on some of which they lived. However, the information is scattered and incomplete. Much of the cultural and religious heritage of India is oriented around a number of plant and animal forms (Rao, 1957).

ANIMAL BEHAVIOUR IN ANCIENT INDIAN CULTURE

Recorded observations on animal behaviour in India date back to ancient times, and the behaviour of various animals was observed

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TABLE 1
A List of Deities and their Vahanas/Companions in the Hindu Faith

<i>Deities</i>	<i>Vehicle/Companions</i>
Brahma (God of Creation)	White Swan
Durga (Goddess who killed the Demon)	Lion/Deer
Mahaganapathi (Elephant God)	Shrew
Indra	Iravatham (White elephant)
Sastha	Tiger
Siva (God of annihilation)	Bull (Nandi)/Serpent
Srikrishna	Cow/Panchajanya (Shell)
Subramanya (Army chief of Gods)	Peacock
Vishnu (God of existence)	Kite(Garuda)/Serpent
Yama (Lord of death)	Buffalo

and described in the ancient Indian Classics (i.e., Mahabharatha, Ramayana, Upanishats, etc.). Many species of animals were described as “Vahanas” or the “vehicles” of various deities in Hinduism. This also reveals indirect evidence of knowledge about the behaviour and the utility of these animals during those ancient periods. Sculptures and drawings of a number of deities also show these “Vahanas” with their characteristic behaviour patterns (Table 1). This has been responsible for creating love and affection for animals in ancient times in India. For example, the depiction of the shrew as the Vahana of Maha Ganapathi, is interesting, as Ganapathi is several times heavier than the small shrew. This may be because the voracious nature of this insectivore and its effectiveness in controlling insect and rodent pests was precisely known during that ancient civilization. Such animals are still considered as “sacred animals” by their devotees.

TABLE 2
The Number of Papers Presented at ESI Annual Conferences

<i>Year</i>	<i>Place of the Conference</i>	<i>Number</i>
1980	Madurai Kamaraj University, Madurai	69
1981	University of Agricultural Sciences, Bangalore	83
1982	University of Calicut, Calicut	61
1983	St. John's Medical College, Bangalore	61
1984	University of Kerala, Trivandrum	87
1985	The New College, Madras	118
1986*	Annamalai University, Annamalai	51
1987*	University of Agricultural Sciences, Bangalore	44

*Announcements of the conferences were delayed.

Even now in India, Brahmins who worship Ganapathi never kill shrews even though this animal invades kitchens and is a nuisance in the home.

SYSTEMATIC STUDIES IN ANIMAL BEHAVIOUR IN INDIA

Systematic observations on animal behaviour is a recently evolved branch of biological research in India, initiated only in late 1950's and carried out by a few scientists independently. Dr. M.D. Parthasarathy of the Bangalore University is one of the pioneers among the ethologists of India. His major field of investigation was the social and reproductive behaviour of bonnet macaques in Bangalore (Rahman & Parthasarathy, 1969a, b).

ETHOLOGICAL SOCIETY OF INDIA

The Ethological Society of India (ESI) was formed in 1970 by a small group of zoologists, motivated to do so by S.A. Barnett who was

TABLE 3
Scientific Sessions Organised During the Annual Conferences
of the Ethological Society of India

<i>Title of Sessions</i>
Animal economics
Animal orientation and communication
Avian ethology
Behavioural adaptations
Behavioural development
Behaviour during solar eclipse (1980)
Behavioural physiology
Brain and behaviour
Cognitive ethology
Biological rhythms
Environment and behaviour
Ethology and conservation of endangered species
Ethology of pests
Evolution and behaviour
Feeding behaviour
Habitat ethology
Hormones, pheromones and behaviour
Invertebrate behaviour
Reproductive behaviour
Sociobiology
Vertebrate behaviour

then at the Australian National University. Barnett organised a workshop on animal behaviour at the University of Agricultural Sciences, Bangalore, in 1970. At the end of this workshop the participants laid the foundation for the ESI. This Society was registered under the Indian Society Act as a voluntary body with clearly defined aims and objectives.

The ESI has been organising annual conferences every year since 1972. Today, the annual conference of the ESI is the best forum for discussions on animal behaviour in India (Table 2). Diverse sessions were held during these symposia (Table 3). A second workshop on animal behaviour was organized under the auspices of the ESI at the Central College, Bangalore University, Bangalore in 1977 by Bruce Johnson then at the University of Tasmania, Australia.

TABLE 4
Centres of Research in Animal Behaviour in India

<i>Place</i>	<i>Institution</i>
Aligarh	Aligarh Muslim University
Annamalai	University of Annamalai
Bangalore	Bangalore University*
	University of Agricultural Sciences*
	Indian Institute of Science*
	St. John's Medical College
Bhavanagar	Bhavanagar University
Bombay	Bombay Natural History Society
Calicut	University of Calicut*
Dehra Dun	Indian Institute of Wildlife
Gorakhpur	University of Gorakhpur
Jaipur	University of Rajasthan
Jodhpur	University of Jodhpur*
	Central Arid Zone Research Institute*
Madras	Layola College*
	Entomology Research Institute*
Madurai	Madurai Kamaraj University*
Mysore	University of Mysore**
Simla	University of Himachal Pradesh**
Trichur	Kerala Forest Research Institute
Trivandrum	University of Kerala*
Varanasi	Banaras Hindu University*

*Institutions where animal behaviour is of prime importance in India.

**Psychologists; others are zoologists.

CURRENT STATUS OF ETHOLOGY IN INDIA

The status of research and teaching in ethology in India was assessed by Barnett (1971), Johnson, Krishnamoorthy, & Phaniel (1984), Alexander (1985), Sridhara (1986) and Sridhara, Krishnamoorthy, Kale, & Shrihari (1987). These analyses revealed that there has been a gradual increase in the availability of books and scientific journals in the field of animal behaviour in India. The number of workers has increased and the fields of investigation in the area of ethology have diversified. Sridhara (1986) reported that the thrust was in areas concerned with social behaviour, feeding, reproduction, communication, rhythms, and responses to environment. Table 4 gives the major centres in India where ethology is getting considerable attention. Table 5 gives the animal species so far studied in ethological research in India.

TABLE 5

A List of Animals Observed in Behavioural Studies in India

A. Mammals

- Bandicoot rat, *Bandicota bengalensis*
- Black buck, *Antilope cervicapra*
- Blue bull, *Boselaphus tragocalemus*
- Bonnet monkey, *Macaca radiata*
- Cattle, *Bos indicus*
- Chital, *Axis axis*
- Common Indian mongoose, *Herpestes edwardsi*
- Domestic dog, *Canis familiaris*
- Elephant, *Elephas maximus*
- Fruit bat, *Pteropus giganteus*
- Field mouse, *Mus booduga booduga*
- Goat, *Capra sp.*
- Giant squirrel, *Ratufa indica*
- Guinea pig, *Caira porcellus*
- Hanuman langur, *Presbytis entellus*
- Hog deer, *Axis porcinus*
- Insectivorous bat, *Taphozous melanopogon*
Hippocorleros bicolor
Rhinopoma hardwickei
- Indian gerbil, *Tatera indica*
- Indian palm squirrel, *Funambulus palmarum*
- Lion-tailed macaque, *Macaca silenus*
- Musk shrew, *Suncus murinus*
- Nilgiri tahr, *Hemitragus hylocrius*

TABLE 5 (Continued)

-
- Nilgiri langur, *Presbytis johni*
 Rhesus monkey, *Macaca mullata*
 Rabbit, *Oryctolagus cuniculus*
 Rat, *Rattus norvegicus*
 Slender loris, *Loris tardigradus*
 Sambar deer, *Cervus unicorn*
 Spiny field mouse, *Mus platythrix*
 Wild dog, *Cuon alpinus*
 Wild house mouse, *Mus musculus castaneus*
 White mouse, *Mus musculus*
- B. *Birds*
- Barbets, *Megalaima viridis*, *M. rubricapilla*
 Blue rock pigeon, *Columba livia*
 Budgerigoes, *Melopsittacus undulatus*
 Common babbler, *Turdoides caudatus*
 Crow pheasant, *Centropus sinensis*
 Hoopoe, *Upupa epops*
 Indian little grebe, *Podiceps rufficollis*
 Jungle babbler, *Turdoides striatus*
 Koel, *Eudynamis scolopaea*
 Malabar pied hornbill, *Anthraceros coronatus*
 Openbilled stork, *Anastomus oscitans*
 Purple sunbird, *Nectarinia asiatica*
 Parakeet, *Psittacula krameri*
 Red wattled lapwing, *Vaniellus indicus*
 Starling, *Sternus vulgaris*
 Shama, *Copsychus malabaricus*
 Spotted munia, *Lonchura punctulata*
 Weaver bird, *Ploceus philippines*
 Whistling thrush, *Myiophoneus caenileus*
 Yellow wattled lapwing, *Vaniellus malabaricus*
- C. *Reptiles*
- Checkered keelback water snake, *Xenochrophis piscator*
 Garden lizard, *Calotes versicolor*
 Indian cobra, *Naja naja*
 Indian water snake, *Natrix piscator*
 Spiny tailed lizard, *Uromastix hardwickii*
- D. *Amphibians*
- Apodan, *Ichthyophis beddomi*
 Indian bull frog, *Rana sp.*
 Toad, *Bufo melanostictus*

E. *Fishes*

- Air breathing Teleosts, *Clarias batrachus*
Clandra punctatus
 Carp, Rohu, *Labeo rohita*
 Mrigal, *Cirrhinus mrigala*
 Cat fish, *Mystus montanus*
 Cyprinoids, *Puntius stigma*
Gambusia affinis
Labistes reticulatus
 Eel, *Pisodonophis boro*
 Flat head, *Platycephalus indicus*

F. *Mollusca*

- Cockle, *Anadara rhombea*
 Oyster, *Crassostrea madrasensis*
 Snail, *Planispira vittata*
 Slug, *Mariaella dussumier*

G. *Arachnida*

- Pseudoscorpions, *Anagarypus asiaticus*
Compsaditha indica
Hygroshelifer indicus
Lechytia indica
Oratemnus indicus
Stonatemnus indicus
Tyrannochthonius indica

- Scorpion, *Heterometrus fulvipes*
Merobuthus tamulus tamulus

- Spiders, *Latrodectus hasseltii*
Heteropoda venatoria
Cyrtophora citricola
C. cicairosa

Mites

- Oribatid mites, *Pelokylla malabarica*

Ticks

- Hylomma dromedarii*
H. marginatum
H. revipunctata
H. hussaini

H. *Crustaceae*

- Freshwater prawn, *Penaeus latisuleatus*
Macrobrachium lamerrii
 Field crab, *Paratelphusa hydrodromous*

TABLE 5 (Continued)

Fiddler crab, <i>Ucalactea annulepis</i>
Hermit crab, <i>Clibanarius longitarsus</i>
Marine crab, <i>Dorippa polita</i>
I. <i>Insecta</i>
Army worm, <i>Mythimna separata</i>
Aphids, <i>Myzus persicae</i>
<i>Rhopalosiphum padi</i>
<i>Hydophis coriandri</i>
Bag worm, <i>Uania crameri</i>
Braconids, <i>Metioridea hutsoni</i>
Black carpenter ant, <i>Camponotus compressus</i>
Black headed caterpillar of coconut, <i>Opisina arenosella</i>
Cockroach, <i>Periplanata americana</i>
Chalcid wasp, <i>Brachimeria lasus</i>
<i>B. nephantidis</i>
<i>B. nasolai</i>
<i>B. intermedia</i>
<i>B. podagrifa</i>
Dragon fly, <i>Potamarcha congener</i>
Eulophids, <i>Melitobia sp.</i>
Fig wasp, <i>Kradibia gestroi</i>
Fish louse, <i>Argulus foliaceus</i>
Fruit fly, <i>Dacus dorsalis</i>
Fire ant, <i>Soleropsis germinata</i>
Grasshoppers, <i>Heeroglyphus nigrorepletus</i>
<i>Poecilcerus pictus</i>
Giant water bug, <i>Lethocerus indicus</i>
Honey bees, <i>Apis dorsata</i>
<i>A. florea</i>
<i>A. indica</i>
Ichneumonids, <i>Campoletis chlorideae</i>
Leaf webber, <i>Nephoteryx eugraphella</i>
Mosquitoes, <i>Culex pipens</i>
<i>Armigeres subalabatus</i>
<i>Aedes albopictus</i>
<i>Anopheles stephensi</i>
Membracids, <i>Leptocentrus leucarpis</i>
<i>Otinotus oneratus</i>
<i>Oxyrachis terandus</i>
Paper wasp, <i>Ropalidia marginata</i>
Plant bugs, <i>Chrysoions purphreus</i>
<i>Dysdercus angulatus</i>

- Plant hopper, *Nephotettix virescens*
N. nigropictus
Nilaparvata lugons
Sogatella jurcifera
- Raduvid bug, *Coranus vitellinus*
- Rice moth, *Corcyra cephalonica*
- Silk worm, *Bombyx mori*
Philosamia ricini
- Social wasp, *Ropalida cyathiformis*
- Spotted leaf beetle, *Henospi lachna septima*
H. implicata
- Syrphid fly, *Aphidophagous syrphidae*
- Termite, *Odontotermes wallonensis*
Postelectrotermes nayari
- Water scorpion, *Laccotrephes griseus*

J. *Annelida*

- Eudrilus eugeniae*
- Earth worm, *Dichogaster bolavi*
Dravida willisi
Lampito mauritii
Lenngaster pusillus
Octochactiona surensis
Pheretima sp.
Ocnerodrilus occidentails
- Freshwater leech, *Hirudo birmanica*
- Nereids, *Ceratonereis costae*
C. burmensis
Nereis chilkaensis
Lycastis indica

K. *Platyhelminthes*

- Tape worm, *Raillietina tetragona*

Although India is far behind achieving the objective of making animal behaviour a major branch of biological research, the progress in this branch during the past 15 years is quite satisfactory. However, most of the investigations are superficial and detailed investigations are warranted. Further, more emphasis should be given to field oriented investigations rather than to laboratory experiments. This would encourage utilization of its applications in areas of pest control, management of domestic, farm and laboratory animals and in the conservation and management of wild animals.

The Department of Science & Technology under the Ministry of Science & Technology of the Government of India has established a subcommittee on Ecology and Ethology. On the basis of these devel-

opments, the present growth of research in animal behaviour in India will steadily continue. More groups of researchers will emphasise field oriented applied ethology in the coming decades, and ethology will emerge as a major field of research and teaching in biology in India.

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