APPENDICES
Traditional therapeutic uses of animals among tribal population of Tamil Nadu

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Studies on the therapeutic use of animals and animal parts have been neglected compared to plants. This paper presents the findings of an ethno-zoological study carried out among nine tribes spread over four districts of Tamil Nadu, India. Detailed information was obtained on the traditional therapeutic uses of sixteen different animal species, consisting of mammals (6), birds (5), reptiles (2), arthropods (2) and annelid (1), for the treatment of over 17 kinds of diseases or ailments, including asthma, arthritis, epilepsy, paralysis, hydrocele and leprosy. Community research to confirm the medicinal value of these traditional remedies would go a long way leading to the discovery of novel drugs from bugs.

Keywords: Animals, Archaeozoology, Ethnozoology, Tribals, Tamil Nadu, Zootherapy, Zooarchaeology.

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The science of ethnozoology is a sub-field of anthropology concerned with how human beings perceive, manage, classify and use animal species. It also focuses on the ways in which animals influence the people they interact with and how man utilized animals for food, clothing, work, worship, and companionship. Zooarchaeology and archaeozoology, which primarily focus on the identification and interpretation of animal remains from an archaeological context, are disciplines included in ethnozoology. The medicinal use of animals and animal derived product called zootherapy is an important component of ethnozoology.

According to zootherapeutic universality hypothesis¹, all human civilizations with a structured medical system will utilize animals as medicines. Animal based medicines have always played a significant role in the healing practices, magic rituals and religions of indigenous and western societies all over

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the world\textsuperscript{2,3}. Although the phenomenon of zootherapy is widespread, it has only recently aroused interest of researchers. Some are focusing on its cultural aspects while other are studying the pharmacological effects\textsuperscript{4} of the substances involved. Of the 252 essential chemicals selected by the World Health Organization, 11.1% come from plants and 8.7% from animals\textsuperscript{5}.

India is gifted with immense faunal and floral diversity. There are about 45,000 species of plants and 81,000 species of animals\textsuperscript{6}. The tribals who depend on plants and animals for their day-to-day life and health problems are the real custodians of the knowledge of medicinally important plants and animals. Most of the knowledge accumulated by the tribals on medicinal plants and animals is unknown to the scientific community. Most of the biodiversity associated with tribals has either disappeared or is on the verge of extinction\textsuperscript{7}. Therefore, the immediate concern of the scientific community is to document the indigenous knowledge related to therapeutic use of plant and animal species and to devise strategies to preserve and tap this rich knowledge in a more sustainable way for the benefit of mankind. Though there have been many studies on the ethnobotany\textsuperscript{6,8-13}, ethnozoological studies are limited\textsuperscript{14-15}. Even though there are 37 tribal communities in Tamil Nadu, a survey of the published literature revealed no comprehensive report on ethnozoology of Tamil Nadu. Hence, an attempt has been made to study the ethnozoology of Tamil Nadu and the results are presented here.

Methodology

Study area

The study area, Tamil Nadu, is situated on the eastern side of the southern tip of the Indian peninsula. It is bounded on the east by the Bay of Bengal, in the west by the Arabian Sea and the states of Kerala and Karnataka, in the north by Karnataka and in the west by Andhra Pradesh. It is the eleventh largest state of the union of India and comprises 4\% of the country’s total area. The state has 29 districts and includes 37 tribal communities.

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Tribe Name</th>
<th>Location</th>
<th>Population (in numbers)</th>
</tr>
</thead>
</table>
| 1     | Irular     | 1)Mudumalai, Nilgiri District  
                  2) Maruthamalai, Coimbatore District | 7500  
                  500 |
| 2     | Kanikaran   | Karaiyar, Ambasamudram Taluk, Thirunelveli District | 500  
                  1500 |
| 3     | Kattunayakan| Mudumalai, Nilgiri District | 1850  
                  8000 |
| 4     | Kota        | Kothagiri, Nilgiri District | 8000  
                  1500 |
| 5     | Kurimbas    | Masinagudi, Nilgiri | 2000  
                  1500 |
| 6     | Palliyan    | 1) Vasudevanallur, Sivagiri Taluk, Thirunelveli District  
                  2) Kadayanallur, Thenkasi Taluk, Thirunelveli District | 200  
                  100 |
| 7     | Paniyan     | Thorappalli, Nilgiri District | 7500  
                  2000 |
| 8     | Sholaga     | Hasanoor, Erode District | 2000  
                  1500 |
| 9     | Toda        | Mandu, Nilgiri District | 2000  
                  1500 |
Ethnozoological studies were carried out in four districts of Tamil Nadu, viz. Thirunelveli, Nilgiris, Coimbatore and Erode. All the nine tribal communities residing in the four districts were covered. The details of the tribes studied are presented in Table 1.

Survey
The ethnozoological surveys were carried out non-randomly during January to June 2003. The authors took special permission from the authorities concerned to interview the tribal population. Judgmental selection was used to identify tribal members who are aware about the animal medicine, identification, preparation and usage. The authors went door to door to identify the key respondent and asked about the ailments for which the animal derived remedies were used and the manner in which the medicines were prepared and administered. Approximately 10% of each tribal population is covered in the interview. Before each interview, the authors took permission from the tribals to record the conversations and take photographs. The duration of each interview lasted approximately two hours. The age of the tribals interviewed ranged between 20 and 75 years and included both men and women. However, the tribals had a strong belief that the efficacy of the therapy will be lost if it is disclosed to strangers. Some of them hesitated to reveal the preparation of some of the medicines they used. Wherever possible, medicinal raw material samples were obtained, catalogued and deposited in the authors' laboratory. Most of the species are very common and identified by the authors, using zoological references. The termite species was identified by Dr. D. Rajagopal, Director of Instruction, Agricultural College, Mandya, Karnataka, India.

Results
The animal resources used as medicines by the tribals consisted of mammals (6), birds (5), reptiles (2), arthropods (2) and annelids (1). They used these animals for the treatment of over 17 kinds of diseases or ailments, including asthma, arthritis, epilepsy, paralysis, hydrocele and leprosy. Asthma is the most frequently cited ailment. A brief outline of the preparation and use of various zootherapies administered by the tribes is given below.

Anemia
For anemia, the Palliyan and Sholaga tribes used flesh of house crow *Corvus splendens* whilst Kanikaran and Kurimba tribes used flesh of house sparrow *Passer domesticus*. Interestingly, Irular tribes used both these animals. The flesh is cooked along with the seeds of the *Piper nigrum* and *Piper longum*; stem of ginger *Zingiber officinale*; root of *Allium sativum*; ghee of cow and the natural honey to make a 'legheum' (thick paste). Five gram of the 'legheum' is administered thrice a day after meals.

Arthritis
For arthritis, all the tribes except Toda used the flesh of Monitor (*Varanus salvator*). One kilogram of the meat along with the skeleton of the monitor is mixed
together with 3 litre of coconut milk and boiled for 48 hrs until the meat is completely dissolved. After removing the bones from the medium 50g of ganja leaf (Cannabis sativa) is added to the preparation and boiled until it solidifies. This reptilian tribal drug is orally administered twice a day for 40 days.

Asthma

Asthma is the most frequently cited disease of the tribes. As such, a number of drugs are available for the treatment. The most commonly used animal medicine for asthma by all the tribes was honey followed by winged stage of termites (6/9 tribes), blood and flesh of black monkey (Presbytis johni) (4/9 tribes), mucus of earthworm (3/9 tribes) and flesh of bat (2/9 tribes). Except earthworms, Kanikaran tribes used almost all the other four animals for the treatment of asthma.

In the case of treatment by honey, shade-dried seeds of Piper nigrum and Piper longum, leaves of Adhatoda vasica and Ocimum sanctum and the roots of Glycyrrhiza glabra, Alpinia galanga, Costus speciosus are powdered. One gram of the powder is mixed thoroughly with 10 g of natural honey to make a 'legheum'. Five gram of the 'legheum' is administered thrice a day after each meal. Earthworm is mainly used by the tribes to treat asthma in children below 11 years. Five to six adult earthworms are subjected to ex-osmotic pressure for 2 hrs in 5 g of sugar to extract their body fluid in the form of mucus. This animal syrup is administered to children twice a day for 3 days before each meal. This medicine is reported to offer better relief in asthma and prevents recurrence of the disease in the lifetime of the patients. In the case of termites, tribals used to roast the winged stage in an earthen pot and consume as such in the evenings for 3 days.

 Conjunctivitis and pimples

For the treatment of conjunctivitis as well as for pimples all the tribes used tooth and tusk of elephant (Elephas indicus). Scratched tooth and tusks are mixed with mother's milk and applied topically on the affected part before going to bed.

Contracted limbs and hiccups

Except Kanikaran, all the other tribes use the flesh and fat of peacock (Pavo cristatus) for the treatment of contracted limbs. The fat content of the visceral organs is melted over a short flame and applied externally on the contracted limbs. For the treatment of hiccups, ten gram each of the seeds of Piper longum and Cuminum cyminum are powdered and mixed with 10 g ash of peacock’s feather. One gram of the drug is administered thrice a day for 3 days along with routine meals.
Cough and cold
For cough and cold all the tribes use honey. The preparation and use is similar to that for asthma.

Epilepsy and paralysis
Blood and flesh of pigeon (*Columba livia*) was used by most of the tribes (7/9) for the treatment of epilepsy and paralysis. Fresh blood of the pigeon is applied on the skin from head to foot thrice a week. The blood should remain on the skin for 6 hrs.

Haematoma
For haematoma egg albumin of common hen was used by all the tribes studied. Five gram of the solid leaf pulp of *Aloe littoralis* is soaked in egg albumin for 3hrs. Similarly, 5 g each of the seeds of *Phaseolus mungo*, *Oryza sativa* and dried stem of *Curcuma longa* are soaked in water for 3 hrs. The plant products are ground well in the egg albumin to get a thick paste, which is applied topically on the affected parts.

Hemorrhoids
For hemorrhoids, fat of pig (*Sus scrofa*) was used by all the tribes except Toda. The fat content of the adipose issue of the pig is melted in an earthen pot and applied topically until hemorrhoids disappear.

Hydrocele
Irular and Sholaga tribes used the penis of Sambhar (*Cervus unicolor niger*) for the treatment of hydrocele. The dried penis is scratched in water and it is applied on the scrotum of man till the symptoms of hydrocele disappear.

Insect bites
Six out of nine tribes studied used urine of goat (*Capra capra*) for the treatment of insect bites. The urine of female goat is mixed with 20 g of 'Kodapal patta' (Tamil local name) and consumed early in the morning for a day. The patient should take saltless food during treatment.

Leprosy
For leprosy, interestingly, Kurimbas used flesh and fat of tiger (*Panthera tigris*) as well as fat of python (*Python reticulata*) whilst Kanikaran, Kattunaikkan and Toda tribes used only the fat of python. The fat deposits are carefully collected from the gonads and melted in an earthen pot and applied on the affected parts till the disease is cured.

Night blindness
Except Toda, Kanikaran and Palliyan all the other tribes used liver of goat (*Capra capra*) for night blindness. Hundred gram of the leaf of *Acalypha indica* is ground and roasted in an earthen pot without oil for 15 min. Small pieces of the goat liver (250 g) are also partially roasted with the leaf for another 15 min. This mixture is administered to the patients early in the morning before meals. The patient should avoid salt during dinner. The patient is reported to recover in the same night.

Discussion
Honey played a major role in their therapies. It was used for the treatment of cough and cold as well as for the treatment of asthma by all the 9 tribes studied. Apitherapy or therapy with bee...
products like honey, propolis, fortified honey, herb honey, is a part of traditional medicine. Because of their beneficial effects, these products used as food and medicines by tribes are receiving worldwide attention. There are many medical reports about the effectiveness of honey in gastric ulcers or gastro-intestinal disorders in humans. Propolis, a resinous wax-like substance which bees collect from plants is claimed to be useful for arthritis. Similarly, tooth and tusk of elephant was used by all the tribes for the treatment of conjunctivitis as well as pimples. An interesting find was that of termite species *Odontotermes* used for the treatment of asthma by six out of nine tribes studied. Termites are also reported to have antimicrobial properties besides its food value.

India, when compared to rest of the world (Table 2) is gifted with rich faunal diversity. With a mere 2.4% of the world's area, India accounts for 7.31% of the global faunal total with a faunal species count of 89,451 species. Instead of taking stringent measures against the practitioners of zootherapy or forcing them to leave their traditional therapies awareness should be created for traditional farming system, where the animals could be raised using scientific techniques. Education on domestication, conservation and preservation of the biological diversity in a more scientific and sustainable way should be the most important consideration in devising measures to ensure permanent and reliable source of medicine for the tribes. As stated by Patil this study also raises some important questions about rights of tribal people and scientific validity of the uses. In many areas the tribals are known to live in harmony with nature since centuries utilizing the available forest resources and without causing ecological disturbances. Animals become endangered only when exploited beyond certain limits. Also, the claims made by these tribals should be tested for their validity using modern scientific techniques. If found untenable, the tribals

<table>
<thead>
<tr>
<th>Taxa</th>
<th>No of species in India</th>
<th>No of species in the world</th>
<th>Percentage of India to the world</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protista</td>
<td>2577</td>
<td>31259</td>
<td>8.24</td>
</tr>
<tr>
<td>Mollusca</td>
<td>5070 (967)</td>
<td>66535</td>
<td>7.62</td>
</tr>
<tr>
<td>Arthropoda</td>
<td>68389 (16214*)</td>
<td>987949</td>
<td>6.90</td>
</tr>
<tr>
<td>Other Invertebrates</td>
<td>8329</td>
<td>87121</td>
<td>9.56</td>
</tr>
<tr>
<td>Protochordata</td>
<td>119</td>
<td>2106</td>
<td>5.65</td>
</tr>
<tr>
<td>Pisces</td>
<td>2546</td>
<td>21723</td>
<td>11.72</td>
</tr>
<tr>
<td>Amphibia</td>
<td>209 (110)</td>
<td>5150</td>
<td>4.06</td>
</tr>
<tr>
<td>Reptilia</td>
<td>456 (214)</td>
<td>5817</td>
<td>7.84</td>
</tr>
<tr>
<td>Aves</td>
<td>1232 (69)</td>
<td>9026</td>
<td>13.66</td>
</tr>
<tr>
<td>Mamalia</td>
<td>390 (38)</td>
<td>4629</td>
<td>8.42</td>
</tr>
</tbody>
</table>

Figures in parenthesis show the number of endemic species

* Insecta

(Source: MoEF 1999)
should be educated about the endangered species and should be discouraged from using these animals for medicinal purposes. Possible alternatives in appropriate form should be found out as law prohibits hunting of the animals. This would probably go a long way leading to the discovery of more drugs from bugs.

Acknowledgements

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