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## A study on the prevalence of entomophagy among the Bodos of Assam

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### Abstract

Entomophagy is a common practice among rural and urban Bodos - a major tribe of Assam, India. A survey was conducted in the remote rural areas of Assam from June, 2013 to May, 2014. The insects collected from various habitats were preserved by following standard methods. An inventory on the knowledge on the wild edible insects of the Bodos of the studied areas is presented here. The study revealed that a total of 25 species of insects, belonging to eight orders and fourteen families are consumed as food by the Bodos. Out of them ten species belong to order Orthoptera, five to the Hymenoptera, three to Coleoptera, two each to Odonata and Hemiptera and one each to Araneae, Lepidoptera and Isoptera. The ethnozoological knowledge of this tribe ranges from edible to medicinal use. This study aims to make a comprehensive list of edible insects consumed by the Bodos of Assam.

**Keywords:** Assam, Bodo, Entomophagy, Therapeutics, Folk medicine

### Introduction

Insects have played an important part in the history of human nutrition in Africa, Asia and Latin America<sup>[1]</sup>. The consumption of insects as food is as old as the history of mankind. Although insects form a small part of the bulk of the diet, they are important in compensating for the general deficiency in animal proteins, fats, and calories that occurs among marginal societies<sup>[2]</sup>. Some of the important groups consumed by the Bodos include caterpillars, grasshoppers, beetle grubs, winged termites, bee, ant broods, cicadas and a variety of aquatic insects. This tribe is mostly dependent on forest resources for their livelihood and have developed their own skills, tools and techniques for harvesting forest resources. Assam is a land of rich biodiversity characterised by uneven topography and diverse vegetations. The richness in diversity of biological resources and traditional communities has provided opportunity for evolving in numerous ethno zoological knowledge among this tribe.

The Bodos are an ethnic and linguistic community, early settlers of Assam in the Northeast part of India. They are mostly confined to the extreme north of north bank of river Brahmaputra of Assam, by the foothills of Bhutan and Arunachal Pradesh<sup>[3]</sup>. Certain species of edible insects are found abundantly in this region. They contain many useful nutrients, including proteins and calories and if popularised may contribute towards solving the problem of malnutrition in India. The traditional knowledge of entomophagy among the Bodos is rich but confined because it is only orally passed through generations. So, it is an imperative and urgent task to document as much as we can of the traditional wisdom as long as it is still possible<sup>[4]</sup>. The ethnozoological knowledge among this tribe ranges from edible to medicinal use. Certain species of insects are consumed during festivals, some for therapeutic purposes and some as a component of folk medicine. At recent times this rich traditional knowledge has started eroding which now requires special attention. Insects have long been a significant dietary factor in the poorer regions of the world, and it is high time that scientist recognizes this fact and begins to build on it, rather than discouraging or ignoring the practice<sup>[5]</sup>. The present study was thus conducted to document the wild edible insects consumed by the Bodos of Assam.

### Methodology

The survey was conducted in the rural areas of Assam from June, 2013 to May, 2014 by performing interviews, field studies and through structured questionnaires. The districts chosen for the study were namely Baksa, Chirang, Kokrajhar, Sonitpur, Dhemaji and Udalguri as the tribe is mostly confined to these districts of Assam. Ten remote villages near to reserve forests inhabited by the Bodos and their nearby markets were selected at random for the

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survey, in each of the districts. The survey was conducted only on wild species of insects. Domesticated species of insects sold in the market were excluded in the study. The specimens were collected with the help of local informants who were mostly the local inhabitants of the collection site and were skilled in the collection work. The insects were collected from various wild habitats, fresh water bodies, paddy fields, vegetable gardens, grasslands and from the local markets. The local people were also addressed with questionnaires as to how the edible insects are harvested, their seasonal availability, the way they are cleaned, cooked or dried and about the body parts of the insects that are eaten or discarded. The insect species were preserved following standard methods<sup>[6]</sup>. The preserved species were packed in specimen tubes containing 70% alcohol and submitted to Zoological Survey of India (ZSI), Shillong and Kolkata for identification. The specimens were identified and classified up to species level by experts from ZSI, Shillong and Kolkata.

## Results

An inventory on traditional knowledge on the edible insects of the Bodos of the studied areas is presented in Table 1. The study revealed that a total of twenty five species of local insects, belonging to eight orders and fourteen families, were consumed as food by the Bodos. Out of them two species belong to order Odonata, ten to Orthoptera, two to Hemiptera, five to Hymenoptera, three to Coleoptera and one each to Araneae, Lepidoptera and Isoptera. Highest number of species were being consumed from Orthoptera which encompasses different grasshopper species. Edible portions of the insect's body are cleaned and the unwanted parts discarded. The insects are fried, smoked or boiled before consumption. Some species like *Vespa affinis continentalis*, *Polistis olivaceus*, *Parapolybia varia*, *Oecophylla smaragdina* and *Pompilidae* are consumed raw.

**Table 1:** Inventory of wild edible insects consumed by the Bodos of Assam.

Sl. No	Scientific Name	order	family	English Name	Vernacular name	Seasonal Availability	Mode of intake
1	<i>Vespa affinis continentalis</i> Bequaert	Hymenoptera	Vespidae	Vespa bicolor	Handilore bere	Jun-Oct	Larvae stage. Roasted, fried, raw or smoked
2	<i>Polistis (Gyrostoma) olivaceus</i> (De Geer)	Hymenoptera	Vespidae	Paper wasps	Jotha Bere	Jun-Oct	Larvae stage. Roasted, fried, raw or smoked
3	<i>Parapolybia varia</i> (Fabricius)	Hymenoptera	Vespidae	Lesser paper wasps	Mwsou salai bere	Jun-Oct	Larvae stage. Roasted, fried, raw or smoked
4	<i>Oecophylla smaragdina</i> (Fabricius)	Hymenoptera	Formicidae	Weaver ant	Khwjema	March-Aug	Larvae stage. Roasted, fried, raw or smoked
5	<i>Lethocerus indicus</i> (Lep. & Serv.)	Hemiptera	Belostomatidae	Giant Water bug	Gangjema	Whole Year	Adult. Wings are discarded. Fried or smoked
6	<i>Laccotrephes ruber</i> (Linn)	Hemiptera	Nepidae	Unknown	Lanjai gwlo	Jun-Oct	Adult. Wings are discarded. Fried or smoked
7	<i>Tarbinskiellus portentosus</i>	Orthoptera	Gryllidae	cricket	Khusanggra	Whole Year	Adult. Wings are discarded. Fried or smoked
8	<i>Gryllotalpa Africana</i> (Beauvois)	Orthoptera	Gryllotalpidae	Mole cricket	Sosroma	Whole Year	Adult. Wings are discarded. Fried or smoked
9	<i>Eupreponotus inflatus</i> (Uvrov)	Orthoptera	Acrididae	Short-Horned Grasshopper	Guma Nargi	May-Sep	Adult. Wings are discarded. Fried or smoked
10	<i>Choroedocus robustus</i> (Serville)	Orthoptera	Acrididae	Short-Horned Grasshopper	Guma Khushep	May-Sep	Adult. Wings are discarded. Fried or smoked
11	<i>Chondracris rosea</i> (De Geer, 1773)	Orthoptera	Acrididae	Short-Horned Grasshopper	Guma Nareng	May-Sep	Adult. Wings are discarded. Fried or smoked
12	<i>Phlaeoba infumata</i> (Brunner Von Wallenwiyi)	Orthoptera	Acrididae	Short-Horned Grasshopper	Guma Daosri Jagra	May-Sep	Adult. Wings are discarded. Fried or smoked
13	<i>Oxya fuscovittate</i> (Marschall)	Orthoptera	Acrididae	Short-Horned Grasshopper	Guma Daosri jagra	May-Sep	Adult. Wings are discarded. Fried or smoked
14	<i>Mecopoda elongate elongate</i> (Linnaeus)	Orthoptera	Tettigoniidae	Long-Horned Grasshopper	Guma Khufri	May-Sep	Adult. Wings are discarded. Fried or smoked
15	<i>Ruspolia baileyi</i>	Orthoptera	Tettigoniidae	Nsenene	Guma Gwthao	Sep- Dec	Adult. Wings are discarded. Fried or smoked
16	<i>Mantis inornate</i> (Werner)	Orthoptera	Mantidae	Praying Mantis	Guma Gangu	May-Sep	Adult. Wings are discarded. Fried or smoked

17	<i>Dytiscus Marginalis</i>	Coleoptera	Dytiscidae	Diving Beetle	Chingkhouri	Whole year	Adult. Wings are discarded. Fried or smoked
18	<i>Macrotermes</i>	Isoptera	Termitidae	Termite	wuri	May-July	Adult. Wings are discarded. Fried or smoked
19	<i>Nephila</i>	Araneae	Nephilidae	Giant Wood Spider.	Bema Raja	May- Nov	Adult. Wings are discarded. Fried or smoked
20	<i>Unidentified</i>	Coleoptera	Unidentified	Unidentified	Burbila fisa	April-June	Adult. Wings are discarded. Fried or smoked
21	<i>Unidentified</i>	Coleoptera	Unidentified	Unidentified	Burbila gedet	April-June	Adult. Wings are discarded. Fried or smoked
22	<i>Unidentified</i>	Hymenoptera	Pompilidae	Wasps	Hani bere	Jun-Oct	Larvae stage. Roasted, fried Raw or smoked
23	<i>Unidentified</i>	Lepidoptera	Unidentified	Unidentified	Gunjet	Whole year	Larvae stage. Roasted, fried or smoked
24	<i>Unidentified</i>	Odonata	Unidentified	Dragonfly nymph	Garba fangtha	May - July	Nymph Roasted or Fried
25	<i>Unidentified</i>	Odonata	Unidentified	Unidentified	Jujai Mala	May- Oct	Nymph Roasted or Fried



**Fig 1:** *Vespa affinis continentalis* Bequaert



**Fig 4:** *Oecophylla smaragdina* Fabricius (Queen)



**Fig 2:** *Polistis (Gyrostoma) olivaceus* (De Geer)



**Fig 5:** *Lethocerus indicus* (Lep. & Serv)



**Fig 3:** *Parapolybia varia* (Fabricus)



**Fig 6:** *Laccotrephes ruber* (Linn)



**Fig 7:** *Tarbinskiellus portentousus* (Lichtenstein)



**Fig 12:** *Phlaeoba infumata* (Brunner Von Wallenwyi)



**Fig 8:** *Gryllotalpa Africana* (Beauvois)



**Fig 13:** *Oxya fuscovittate* (Marschall)



**Fig 9:** *Eupreponotus inflatus* (Uvrov)



**Fig 14:** *Mecopoda elongate elongate* (Linnaeus)



**Fig 10:** *Choroedocus robustus* (Serville)



**Fig 15:** *Mantis inornate* (Werner)



**Fig 11:** *Chondracris rosea* (De Geer, 1773)



**Fig 16:** *Ruspolia baileyi*



**Fig 17:** *Dytiscus Marginalis*



**Fig 22:** *Unidentified (Pompillidae)*



**Fig 18:** *Macrotermes*



**Fig 23:** *Unidentified (Lepidoptera)*



**Fig 19:** *Nephila*



**Fig 24:** *Unidentified (Odonata)*



**Fig 20:** *Unidentified (Coleoptera)*



**Fig 25:** *Unidentified (Odonata)*



**Fig 21:** *Unidentified (Coleoptera)*

### Discussion

Details on the taxonomic position as well as the vernacular names are given for insect species that are consumed by the Bodos of Assam. It was surprising to know that insects besides being used as food have also been used in treatment of certain diseases. The use of insect species for treatment of disease is regarded as a secret and passed on only to family members generation to generation among this tribe. Certain species are consumed during festivals for instance the larvae of *Oecophylla Smaragdina* is consumed in a festival called Bwisagw celebrated by the Bodos for welcoming the spring

season. *Gryllotalpa Africana* has been used as therapeutic food for healing certain childhood diseases and *Nephila* in preparation of folk medicines. The larvae of silk worms are sold at local markets all around the year and are mostly preferred by the locals for consumption but they have not been included into the list, because they are domesticated and locally reared by many bodo women for commercial purpose. Honey bee is also domesticated so it is also not included in the list.

There are about 751,000 known species of insects, worldwide, which is about three-fourths of all species of animals [7]. Insects offer a lot of ecological and social benefits. Some examples of the roles of insects that are fundamental to humankind are: Their role in biodegradation beetle larvae, ants, flies and termites can clean up dead plant matter. In plant reproduction they act as pollinators. Used in medicines, for instance the use of a rubber like protein called resilin that enable insects to jump has been used as medicine to repair arteries because of its elastic property [8]. The extensive information provided by the Bodo tribe with regard to the medicinal uses of insects, could bring a wider general awareness across the community of the usefulness of insects in health and healing. For some members of the rapidly growing upper and middle classes of urban society in some developing countries, insects are “nostalgia food” reminding them of earlier simpler days in the rural countryside [9]. Insects harvested from rural areas are often sold in the urban markets. Collection of wild species to supply the urban market can have both negative and positive effects on rural biodiversity [10]. Apart from the positive role of insects and other arthropods with regard to the extraction of compounds useful in the treatment of certain diseases, spider and insect phobias, allergies to insects and their compounds and food taboos related to insects need to be studied [11]. Insects are very abundant and contain many nutrients that are essential to humans. For example, they are known to have the same amino acid requirements as man [12]. However, many more insect species that were informed as edible by the informants could not be collected because certain species of insects have become very rare. At recent times this rich traditional knowledge has also started eroding which now requires special attention. More explorations, surveys and collection of ethnozoological information on insect fauna’s can provide logistic knowledge on edible insects [13]. Scientific investigation can provide reliable source of nutrition to the people. This investigation documents a list of species of wild edible insects belonging to different families.

### Conclusion

The study concluded that consumption of edible insects has remained undiminished over the years among the tribe. Insects have been utilised in Assam for a long time. The prevalence of entomophagy is still clearly seen among the Bodos, but many practices and experiences of the use of insects among the Bodos need further documentation. This tribe also utilizes a wide range of biological resources in diverse ways [14]. Insects, as an important natural resource needs to be further exploited and popularised. This can play an important role in tackling food crises and natural resource depletion in future. Proper scientific investigation on the nutritional and medicinal values of insects and their impacts on human health have to be done. It also has become mandatory to undertake research and studies on the edible insects related to traditional rearing, cultivation, sustainable use of edible insects and maintenance of insect biodiversity.

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