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BIOPROSPECTING WITH REFERENCE TO MEDICINAL INSECTS AND TRIBES IN INDIA : AN OVERVIEW

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Introduction

India is rich in biodiversity. Many rare plants and animals from India have been reported. Enormous work has been done on utilization of plants as medicine. Like plants, insects also possess medicinal properties that can be exploited for the benefits of human beings. Ample information is available on entomophagy (use of insects as food). A few significant publications include those by Bhattacharjee (1990) on the use of insects as food by three tribes namely, Bodo, Dimasa and Sonowal Kachari in different parts of Assam and Gope and Prasad (1983) on the use of nearly about eight species of insects as food and medicine among the various tribes in the State of Manipur in North-Eastern India. However, there is paucity of information on the medicinal uses of insects. An attempt has been made to explore the information available on the medicinal use of insects in North-East India.

Literature Survey

The glimpses of this information are presented in Table 1. From this review it is indicated that there is a tremendous scope in this new field of research.

Conclusion and Recommendations

From this review it is revealed that documentation of traditional and indigenous knowledge on medicinal significance of entomological products is important for value addition and benefit sharing for economic upliftment and poverty alleviation of local communities and indigenous people. The literature survey suggested that there is a need to document the medicinal and other uses of insects with the help of extensive survey.

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Table

List of insects and their

Sl. No.	Scientific name	Order/ Family	English Common Name	Vernacular/ local name (Tribe)
1	2	3	4	5
1.	*Batocera rubra* Linn.	Coleoptera Cerambycidae	Long-horned beetles	'Arulangtang' (Ao-Nagas)
2.	*Batocera titana* Thomas.	Coleoptera Cerambycidae	Trunk borer	'Sunglong' (Ao-Nagas) 'Aphisu kulho' (Sema Nagas)
3.	*Coelosterna scabrata*. Fabr.	Coleoptera Cerambycidae	Long-horned beetles	'Khuro tsükha' (Ao-Nagas)
4.	*Neocerambyx paris* Widemann	Coleoptera Cerambycidae	Long-horned beetles	'Tsükha' (Ao-Nagas)
5.	*Xysterocera globosa* Oliv.	Coleoptera Cerambycidae	Long-horned beetles - Pink wood borer	'Arulangtang tasula' (Ao-Nagas)
6.	*Balaninus c-album* Heller	Coleoptera Curculionidae	Weevil – Banana weevil	'Merong' (Ao-Nagas)
7.	*Rhynchophorus ferugineus Oliv.*	Coleoptera Curculionidae	Snout beetles – Palm weevil	'Morong' (Ao-Nagas)
8.	*Oryctes rhinoceros* Linn.,	Coleoptera Scarabaeidae	Scarab beetles	'Lessepo' (Ao-Nagas)
9.	*Xylotrupes gideon* Linn.	Coleoptera Scarabaeidae	Scarab beetles – Hercules beetle	'Lessepo' (Ao-Nagas)
10.	*Zonabris pustulata* L	Coleoptera Meloidae	Blister beetles	Unknown
11.	*Cantharis strygosa* ?	Coleoptera Meloidae	Soldier beetle – Spanish fly	Unknown

1

medicinal uses

Stages used	Medicinal uses	Used in form/ Preparation	Used by Tribes	References
6	7	8	9	10
Larvae	Wounds	Eaten live	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Larvae	Wounds	Eaten live	Ao & Sema Nagas	Alemla Ao and Singh (2004)
Larvae	Burns	Crushed live and applied	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Larvae	Expectorant	Tonic	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Larvae	Antiseptic	Crushed live	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Larvae	Respiratory disorders	Tonic	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Larvae	For bronchial catarrh	Tonic	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Larvae	Dissipates clots and bruises	Crushed live and applied	Ao-Nagas	Maxwell-Lefroy (1971)
Larvae	Scrofula and ulcer	Tonic	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Larvae	Problems in urino-genital system	Fresh extract	Tribes in Chattisgarh	Oudhia (2002)
Larvae	Skin disorders. kidney and urethra. Cauterizes tissues to control toxin spread (esp. used in rabid dog bites)	Eaten live. crushed for kidney disorders orders and applied for skin disorders	Tribes in Chattisgarh	Oudhia (2002)

Contd...

1	2	3	4	5
12.	*Hierodula coarctata* Saussure	Dictyoptera Mantodea	Mantid	'Aei changkok' (Ao-Nagas)
13.	*Hierodula westwoodi* Kirby	Dictyoptera Mantodea	Mantid	'Aei changkok' (Sonowal Kachari)
14.	*Eupolyphaga sinensis* Walker	Dictyoptera Blattodea Corydiidae	Cockroach	'Plau' (Sema Nagas)
15.	*Blatta orientalis* Linn.	Dictyoptera Blattidae	Cockroach	'Leplu' (Ao-Nagas)
16.	*Musca nebulo* Wiedemann	Diptera Muscidae	Housefly	Unknown
17.	*Phaenicia sericata* (Meifen)	Diptera Calliphoridae	Blow fly larvae	Unknown
18.	*Lethocerus* (= *Belostoma*) *indicus* Lep. & Serv	Hemiptera Belostomatidae	Giant water bugs	'Atsü leplo' (Ao-Nagas)
19.	*Belastoma indica* (Atkinson)	Hemiptera Belastomidae	Giant water bug	'Tsuleplo' (Ao-Nagas)

6	7	8	9	10
Adult	Resolves bruises and clots	Crushed live and applied	Ao-Nagas	Meyer-Rochow and Changkij (1997)
Adult	Strengthens kidneys and relieves convulsions	Eaten roasted	Sonowal Kachari	Gope and Prasad (1983)
Adult	Stop bleeding and heal bone fractures, swelling	Crushed live and applied	Sema Nagas	Jamir and Lal (2005)
Adult	Asthma and TB. Used as local anesthesia and for internal feverish chills; for breaking up retained blood clots and as a galactogogue (milk inducer)	Eaten roasted	Ao-Nagas	Jamir and Lal (2005)
Adult	>15 diseases eg., cold fever and used to dye hair black, eye and digestive system	Crushed live and applied	Tribes in Chattisgarh	Oudhia (2000a)
Larvae	Wound healing (larvae secrete an excretion called 'allontoin'. Used to prepare antiseptics and antibiotics. Allontoin now is used to treat osteo-myelitis, an infect-ious inflamm-atory disease)	Crushed live and applied	Tribes in Chattisgarh	Oudhia (2002)
Adult	Health tonic	Tonic	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Adult	Protein supplement	Eaten roasted	Ao & Sema Nagas	Alemla Ao and Singh (2004)

Contd...

1	2	3	4	5
20.	*Dolycoris indicas* Stal.	Hemiptera Pentatomidae	Sting bug Bamboo bug	Pollo (Ao-Nagas) 'Michikha' (*Sema Nagas*)
21.	*Bagrada picta* Fabr.	Hemiptera Pentatomidae	Painted bug Sting bug	'Tsüngi' (Ao-Nagas)
22.	*Coridius* (= *Aspongopus*) *chinensis* Dall.	Hemiptera Pentatomidae	Sting bug	'Tsüngi' (Miris)
23.	*Coridius* (=*Aspongopus*) *nepalensis* (Westwood)	Hemiptera Pentatomidae	Bugs	'Tsüngi' (Mishmas)
24.	*Cyclopelta siccifolia* Westw.	Hemiptera Pentatomidae	Bugs	'Tsüngi' (Abors)
25.	*Gerris spinole* Fab.	Hemiptera Gerridae	Water striders	'Tsümeroki' (Ao-Nagas)
26.	*Erthesina fullo* Thunb	Hemiptera Pentatomidae	Gmelina bug	'Tsüngi' (Ao-Nagas)
27.	*Nepa cinerea* L.	Hemiptera Nepidae	Water scorpion	'Tsu meruk' (Ao-Nagas) 'Ghoi' (Sema Nagas)
28.	*Lohita grandis* Gray (Lygaeus)	Hemiptera Pyrrhocoridae	Giant red bug, fire bugs	'Alu tsüngi' (Ao-Nagas)
29.	*Coccus cacti* L.	Hemiptera Coccidae	Cacti insect	Unknown
30.	*Cimex lectularis* L.	Hemiptera, Cimicidae	Bed bug	Unknown

6	7	8	9	10
Adult	Paralysis		Ao & Sema Nagas	Alemla Ao and Singh (2004)
Adult	Goiters	Eaten cooked	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Adult	Urino-genital disorder	Eaten cooked	Miris	Distant (1902) Strickland (1932)
Adult	Urino-genital disorder	Eaten cooked	Mishmas	Hoffmann (1947)
Adult	Paralysis	Eaten cooked	Abors	Maxwell-Lefroy (1971)
Adult	General weakness	Eaten roasted	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Adult	Paralysis	Eaten roasted	Ao-Nagas	Hoffmann (1947)
Adult	Protein supplement	Eaten roasted	Ao & Sema Nagas	Alemla Ao and Singh (2004)
Adult	Stop bleeding	Crushed live and applied	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Brood	Whooping cough	Decoction	Tribes in Chattisgarh	Oudhia (2002)
Adult	Epilepsy, piles, urinary disorder, snake bite and hair growth. Headaches, constipation, ulcers, arthritis to baldness	Eaten fresh extracts for snake-bite; external application for hair growth and piles and taken internally for urinary disorder as freshly prepared paste.	Tribes in Chattisgarh	Oudhia (2001a)

1	2	3	4	5
31.	*Cicada verides* (author)	Homoptera Cicadilidae	Cicada	'Loyang' (Ao-Nagas)
32.	*Pellis cicadae* Fabricius	Homoptera Cicadilidae	Cicada	Unknown
33.	*Nephotettix nigropictus* Stal	Homoptera Cicadellidae	Green leaf-hopper	Unknown
34.	*Nilaparvata lugens* Stal	Homoptera Delphacidae	Brown Plant-hopper	Unknown
35.	*Apis dorsata* Fabr.	Hymenoptera Apidae	Honey bee	'Ninang' (Sema Nagas)
36.	*Cerana indica* Fabr.	Hymenoptera Apidae	Honey bee	'Ninang' (Ao-Nagas)
37.	*Apis mellifera* Linn.	Hymenoptera Apidae	Honey bee	'Ninang' (Ao-Nagas)
38.	*Xylocopa violacea* (Linn.)	Hymenoptera, Apidae	Mason bees	Unknown

6	7	8	9	10
Adult	For skin eruptions and ulcers, urticaria, deafness with running pus from ear, eye. Growths after smallpox, for indigestion and vomiting and clear lungs.	Crushed live and applied for skin disorder. Tonic for indigestion	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Parasitised by fungus *Cordyceps soboliferea*	For infantile convulsions, tetany and tetanus; for night-crying and fear.	Tonic & Decoction	Tribes in Chattisgarh	Oudhia (2002)
Adult	Stop bleeding, asthma and gonorrhoea	Crushed live and applied & dried and burn and advised to inhale the fumes	Tribes in Chattisgarh	Oudhia (2000b)
Adult	Cure >40 diseases along with Green leafhopper	Powder & Decoction	Tribes in Chattisgarh	Oudhia (2002)
Larva and pupa	Fatigue and sun's heat	Tonic	Seema Nagas	Hutton (1921)
Bee sting, venom Bee wax	Arthritis Rheumatoid arthritis	Live animal sting and application of wax on knees	Ao & Sema Nagas	Alemla Ao and Singh (2004)
Egg, larva, pupa Bee hives	Spleen and stomach disorders. Relieves flatulence, counteracts toxicity and kills worms	Decoction Live hives eaten	Ao & Sema Nagas	Irvine (1957)
By sting	Arthritis	Live animal sting	Tribes in Chattisgarh	Oudhia (2002)

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1	2	3	4	5
39.	*Vespa orientalis* Linn	Hymenoptera Vespidae	Wasp	'Ninang' (Ao-Nagas)
40.	*Vespa mangifica* Smith	Hymenoptera Vespidae	Wasp	'Nati' (Ao-Nagas)
41.	*Oecophylla smaragdina* (Fab.)	Hymenoptera Formicidae	Ant	Unknown
42.	*Odontotermes feae* Wasmann.	Isoptera Odontotermitidae	Termite	'Eesal' (Ao-Nagas) 'Eechalu hula' (Sema Nagas)
43.	*Macrotermes gilvus* Hagen.	Isoptera Termitidae	Termite	'Anung' (Ao-Nagas) 'Alhu' (Sema Nagas)
44.	*Microtermes obesi* Holmgren.	Isoptera Termitidae	Termite	'Alhu' (Sema Nagas)
45.	*Diacrisia oblique* Walker	Lepidoptera Arctiidae	Tiger moth	'Wakak ' (Ao-Nagas)
46.	*Malacosoma indica* Wlk.	Lepidoptera Lasiocampidae	Tent caterpillars, lappet moths	'Mesang-long ' (Ao-Nagas)
47.	*Bombyx mori* (Linn.)	Lepidoptera *Bombycidae*	Mulberry *silkworm*	'Mugamesen' *'mango longpen'* (Ao-Nagas)
48.	*Antheraea assama* Westw.	Lepidoptera Saturniidae	Giant silkworm moths	'Mugamesen'
49.	*Antheraea paphia* (Linn.)	Lepidoptera Saturniidae	Muga silkworm	'Mesen' (Ao-Nagas)

6	7	8	9	10
Larvae	Arthritis	Crushed live and applied	Ao & Sema Nagas	Alemla Ao and Singh (2004)
Larvae	Bone building	Tonic	Ao & Sema Nagas	Alemla Ao and Singh (2004)
Larva and adult	Resistance to fatigue and sun's heat. Hepatitis B – (~60% efficiency to convert hepatitis B surface antigen (HBsAg) to serum negative compared to ~30% conversion efficiency using interferon)	Prepared as tonic and eaten roasted	Ao & Sema Nagas	Long (1901); Bingham (1903)
Adults	Anemia	Eaten fried	Ao & Sema Nagas	Bodenheimer (1951); Rajan (1987)
Adults	Anemia and Weakness	Eaten roasted	Ao & Sema Nagas	Alemla Ao and Singh (2004)
Adults	Antidiarrhoeal agents	Eaten live	Sema Nagas	Bodenheimer (1951)
Pupa	Cough, shortness of breath	Eaten cooked	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Pupa	Weak lungs and weak kidneys	Eaten cooked	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Pupa	Relieves flatulence and loosens congestion	Eaten cooked	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Pupa	Impotence	Eaten live	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Pupa	Diarrhea	Eaten cooked	Ao-Nagas	Meyer-Rochow and Changkija (1997)

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1	2	3	4	5
50.	*Antheraea roylei* Moore	Lepidoptera Saturniidae	Muga silkworm	'Sarang mesen' (Ao-Nagas)
51.	*Samia cynthia ricini* Hutt.	Lepidoptera Saturniidae	Eri Silkworm	'Mugamesen' (Ao-Nagas) *Erimesen,* 'Allishi mesen' (Sema Nagas)
52.	*Hepialus armoricanus* Oberthuer	Lepidoptera: Hepialidae		Unknown
53.	*Pericyma cruegri* (Butler)	Lepidoptera Noctuidae	Semilooper	'Mesen' (Ao-Nagas)
54.	*Helicoverpa armigera* Hubner	Lepidoptera Noctuidae	The Gram Pod borer	Unknown
55.	*Acisoma Panorpoides* Rambur	Odonata Libellulidae	Darner	'Atsü-kumbo' (Ao-Nagas)
56.	*Aeschna petalura* Martein	Odonata Aeschnidae	Dragon fly	'Anga-mechep' (Ao-Nagas)
57.	*Hieroglyphus banian* Fabricious	Orthoptera Acrididae	Rice grasshopper	'Changkok' (Ao-Nagas) 'Atukha' (Sema Nagas)
58.	*Acrida exaltata* Walker.	Orthoptera Acrididae	Grasshopper	'Chupong' (Ao-Nagas)
59.	*Acridium (= Agridium) malanocorne* Linn.	Orthoptera Acrididae	Brown locust	'Koropong changkok' (Ao-Nagas)
60.	*Acridium (= Agridium) peregrinum* Oliver	Orthoptera Acrididae	Locust	'Wara serapong' (Ao-Nagas)
61.	*Locusta migratoria* L	Orthoptera Acrididae	Locust	'Wara serapong' (Ao-Nagas)

6	7	8	9	10
Pupa	Stomach disorder	Eaten cooked	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Pupa	Back pain	Eaten cooked	Ao & Sema Nagas	Alemla Ao and Singh (2004)
Infected with ento-mopatho-genic fungus *Cordyceps sinensis* (Clavicipitales, Ascomycotina)	Weak lungs, coughing and shortness of breath, weak kidney, back pain	Eaten cooked	Tribes in Chattisgarh	Oudhia (2002)
Pupa	Stomach disorder	Eaten cooked	Ao & Sema Nagas	Alemla Ao and Singh (2004)
Larvae	>50 diseases eg, fever, nervous break down, hair growth, eosino-philia and asthma	Powder after drying, Tonic and fresh extracts	Tribes in Chattisgarh	Oudhia (2001b)
Nymphs	Blood purifier	Tonic	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Nymphs	Anemia	Tonic	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Nymphs & adults	Liver disorders	Eaten roasted	Ao & Sema Nagas	Alemla Ao and Singh (2004)
Nymphs & adults	Anaemia	Eaten roasted	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Nymphs & adults	Protein supplement	Eaten roasted	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Nymphs & adults	Protein supplement	Eaten roasted	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Nymphs & adults	Substitute for fish meat as protein supplement	Eaten roasted	Ao-Nagas	Meyer-Rochow and Changkija (1997)

Contd...

1	2	3	4	5
62.	*Schistocerca gregaria* Forskal	Orthoptera Acrididae	Migratory locust	'Wara serapong' (Ao-Nagas)
63.	*Thylotropides vericornis* Wlk.	Orthoptera Acrididae	Grasshoppers	'Aya changkok' (Ao-Nagas)
64.	*Holochlora albida* Kirby	Orthoptera Tettigoniidae	Long-horned grasshoppers	'Aya changkok' (Ao-Nagas)
65.	*Mecapoda elongata* Linn.	Orthoptera Tettigoniidae	*Katytids*	*'Serapong changkok'* (Ao-Nagas)
66.	*Holochlora indica* Kirby	Orthoptera Tettigoniidae	Bush crickets	'Aya changkok' (Ao-Nagas)
67.	*Lima cordid* (author?)	Orthoptera Tettigoniidae	Katytids	'Alu changkok' (Ao-Nagas)
68.	*Acheta domestica* Linn.	Orthoptera Gryllidae	House cricket	'Chokokza' (Ao-Nagas)
69.	*Gryllus bimaculatus* De Geer	Orthoptera Gryllidae	Field Cricket	'Chokok' (Ao-Nagas) 'Awusho' (Sema Nagas)
70.	*Brachytrypes portentosus* Licht	Orthoptera Gryllidae	Gryllid	'Shati-chokok' (Ao-Nagas)
71.	*Gryllodes singullatus* Walker	Orthoptera Gryllidae	Gryllid	'Chokok' (Ao-Nagas)
72.	*Liogryllus saussure* Chopard.	Orthoptera Gryllotalpidae	Mole cricket	'Metsü-chokok' (Ao-Nagas)
73.	*Gryllotalpa fossor* Scudder	Orthoptera Gryllotalpidae	Mole cricket	'Chokok' (Ao-Nagas) 'Sulili' (Sema Nagas)
74.	*Gryllotalpa ornate* Walker.	Orthoptera Gryllotalpidae	Mole cricket	'Chokok' (Ao-Nagas)
75.	*Hydropsyche sikkimensis* Mey.	Trichoptera Hydropsychidae	Caddis fly	'Tsü-longben' (Ao-Nagas)

6	7	8	9	10
Nymphs & adults	Substitute for fish meat as protein supplement	Eaten roasted	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Nymphs & adults	General weakness	Eaten roasted	Ao-Nagas	Meyer-Rochow and Changkija, (1997)
Nymphs & adults	Ulcer	Eaten fried	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Nymphs & adults	Health tonic	Tonic	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Nymphs & adults	Ulcer	Tonic	Ao & Sema Nagas	Gope and Prasad (1983)
Nymphs & adults	Protein supplement	Eaten roasted	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Nymphs & adults	Promotes diuresis	Eaten cooked	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Nymphs & adults	Skin diseases	Crushed live and applied	Ao & Sema Nagas	Alemla Ao and Singh (2004)
Nymphs & adults	Skin diseases	Crushed live and applied	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Nymphs & adults	Skin diseases	Crushed live and applied	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Nymphs & adults	Eliminates oedema	Crushed live and applied	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Nymphs & adults	Wound healing	Crushed live and applied	Ao & Sema Nagas	Alemla Ao and Singh (2004)
Nymphs & adults	Wound healing	Crushed live and applied	Ao-Nagas	Meyer-Rochow and Changkija (1997)
Larvae	Stomach disorder	Tonic	Ao-Nagas	Meyer-Rochow and Changkija (1997)

SUMMARY

Entomophagy (i.e. use of insects as food) is practiced in many parts of the world including India but the use of insects, as medicine is done in very few parts of the world and we are fortunate that North-East people of India are rich in this traditional medicinal knowledge. Tribes of North-East India have been using several insect based traditional drugs to cure several diseases. Over 500 species of insects are used as medicine to cure common ailments to complicated ailments in the North-East from time immemorial. Some valuable information regarding traditional medicinal uses of common insects by folk doctors has been summarised.

Key words **: Entomophagy, Medicinal Insects, Tribes, North-East India.**

भारत में चिकित्सा में काम आते कीड़ों और जनजातियों के सन्दर्भ में जैव संभावनाएं

एन० सेन्थिलकुमार, निजारा डी० बरठाकुर व एम० लोकेश्वर राव

सारांश

कीटभक्षिता (भोजन के लिए कीड़ों का उपयोग) संसार के अनेक भागों में जिनमें भारत भी सम्मिलित है, व्यवहार होती है, परन्तु चिकित्सा के लिए कीड़ों का उपयोग संसार के कुछ ही भागों में किया जाता है और हम सौभाग्यशाली हैं कि उत्तरपूर्वी भारत वाले लोग अपनी इस पारम्परिक चिकित्सा ज्ञान में सम्पन्न हैं। उत्तरपूर्वी भारत की जनजातियां कितने ही रोगों का इलाज करने में अनेक कीट आधारित औषधियां उपयोग करती हैं। 500 से अधिक कीट जातियां औषधियों की तरह सामान्य से लगाकर जटिल रोगों तक का उपचार करने के लिए अविस्मरणीय काल से उत्तरपूर्वी भारत में उपयोग होती चली आ रही हैं। लोक चिकित्सकों द्वारा सामान्य कीड़ों की उपयोग में लाकर बनाई कुछ पारम्परिक औषधियों की मूल्यवान जानकारी का सारांश यहां दिया गया है।

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