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Medicinal plants found in Andaman and Nicobar Islands

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Abstract
This study aimed to document the indigenous healthcare knowledge of the Andaman and Nicobar Islands tribes (Nicobarese, Shompens, Jarawas, Onges). Many plant species are used as medicines by the Nicobarese. Unfortunately, many of the species they harvest are on the verge of extinction in their natural habitat. Among these, 39 endemic species belonging to 38 different genera and families have been identified, and their populations are steadily eroding. More than a dozen of these 17 species were utilized to treat various diseases, including intestinal disorders, malarial fever, asthma and cough-related ailments in 25 families, and malignant blisters. Consider the biochemical processes that these organisms engage in. In this message, conservation measures have also been mentioned. Therefore, it is important to investigate these species' phytogeography to apply conservation measures.

Keywords: Andaman & Nicobar Islands, conservation, endemic, medicinal plants, tribes

Introductions
Andaman and Nicobar Islands are a biodiversity hotspot due to their unique environmental conditions and the abundance of wildlife. Due to their location between two major biodiversity hotspots, the Indian subcontinent and Malaysia-Indonesia, the richness of the islands should come as no surprise. Located close to the equator, these islands have humid tropical conditions with temperatures ranging from 18 degrees to 35 degrees. Approximately 84.4 percent of the Andaman & Nicobar Islands are covered with forest. 42.1 percent of the entire forest cover is covered by thick forest, 34.1 percent by moderate dense forest, and 8.2 percent by open forest, while 9.6 percent of the total forest cover is mangrove (Sankaran *et al*., 2015) [1]. It has mangroves, coastal littoral, and island deciduous and evergreen forests on the island. In 1083 genera, there are 2654 species and 237 families. The endemicity of 308 of these is stated. The island's tropical forests are a major source of chemicals for the fragrance, cosmetics, and pharmaceutical industries. ' For centuries, British settlers from Myanmar and Thailand's border territories brought the indigenous Nicobarese, Shompen, Jarawa, Sentinel and Onges tribes to the islands and preserved their ethnobotanical wisdom in the islands' forests, which are now a rich trove of ethnobotanical information. In addition to using plants for food and medicine, tribal people rely on the forest for their necessities. Without support and attention and rapid degradation of their natural habitats, indigenous healing systems have been mostly obliterated. Additionally, the island's human population is fast increasing, exceeding its ability to support its current population (Abirami *et al*., 2012) [2]. Conservation of medical plant genetic resources, sustainable use of medicinal plants, and public education on the importance of preserving medicinal plants are all goals of the IUCN's Medicinal Plant Specialist Group (MPSG). Except for the Sentinels, no one has documented the folklore medicinal use of the tribes studied thus far (Chander *et al*., 2015a) [3]. More than 70 indigenous medicinal plants can be found on the island. The ethnomedicinal usage of plants by the island's numerous cultures should be documented. The medicinal plant bioresources must be preserved and utilized sustainably for the island aboriginals. There may be management implications for some of these species based on their biogeography. Conservation and sustainable usage of medicinal plants must be prioritized in light of present conditions.

Literature review
Indian medicinal plants are a treasure trove of over 250,000 species, many of which have medicinal properties. The Andaman and Nicobar Islands' medicinal plants are an important aspect of the region's diverse plant life.

In the international florist trade, orchids are prized for their distinctive look, dazzling colors, pleasant textures, a wide range of sizes, and long-lasting properties. Among the cotyledons, orchids are the most highly evolved members of the Orchidaceae family. Internationally, orchid flowers have taken the top spot and have significantly impacted many countries economies. The Andaman and Nicobar Islands are home to over 110 species of flora and fauna, 25 of which are endemic (Balangcod *et al*., 2011) [5]. Some of them have been classified as endangered or unusual. As a result, now is a crucial time to gather and store them. An array of natural materials, including plants and animals, are used in the ethnomedicines of the Bay Islands. Folk medicine practitioners in the Bay Islands have long relied on plants like Alstonia macrophylla, *Morinda citrifolia*, and other ethnomedicinal species to cure stomach pain, joint discomfort, and fractures (Sankaran *et al*., 2015) [1]. Several of these medicinal plants and their applications in the Andaman and Nicobar Islands will be examined in this research. Additionally, the study will discuss indigenous medicinal herbs and their functions.

Methodology

Study area

Islanders from various parts of the Nancowry chain live on the inhabited Chowra (8 km^2), Teressa (101 km^2), Katchal 174 km^2, Kamorta 188 km^2, and Nancowry 67 km^2 islands, in addition to Bompooka (10 km^2), Trinket (86 km^2), Isle of Man, and Tillangchong (17 km square). Administrative headquarters for Nancowry's group of islands is located in Kamorta. Of the 9140 Nicobarese living in the country, 3557 live on Kamorta Island, 1298 in Chowra, 1934 in Teressa, 1016 in Nancowry, and 1335 in Katchal (9140, 2011). In addition, the Nancowry Islands are home to 42 communities of Nicobarese people who write their language in Roman script and speak Nicobarese.

Study participants and interviews

The Regional Medical Research Centre in Port Blair, the Andaman and Nicobar Islands (IUCN, 2011) [6]. In 2012 and 2013, we visited all 42 settlements on the five inhabited islands. The survey of these islands was authorized in advance by the local authorities. A meeting of Tribal Councils from the Nancowry group of islands was held to discuss issues. As a whole, the Tribal Council is comprised of a Chairman, Vice-Chairman, Secretary, and the Heads of each Village. TKPs (traditional knowledge practitioners) were identified in each village during the survey.

An interview questionnaire was utilized to gather information on the disorders that each TKP has treated, the medicinal plants they have used, the preparation procedure for drugs, and the administration methods and dosages of the preparations they have used (Gupta *et al*., 2004) [7]. During the survey, teachers and literate people of the community offered to serve as translators and interpreters because many of the TKPs spoke Nicobarese. The interviews were done numerous times over a week to confirm that the TKPs' statements were accurate.

Plant specimen collection and identification: We used TKPs and images of specimens to collect the plants around the communities, and we also recorded the plants' GPS coordinates. The Botanical Survey of India, Andaman & Nicobar Circle, Port Blair, classified the specimens. Voucher specimens have been sent to the ICMR in Port Blair. In addition, TKPs, illnesses, formulations, dosage, and therapy duration were gathered from the Community Biodiversity Registers.

Results

According to the Nancowry group of islands, 77 TKPs (46 men and 31 women) practice traditional medicine in the survey (Table I). These tips contained 132 species from 113 genera and 62 families of plants. Seventy-one previously unstudied medicinal plant species were discovered. One of the most comprehensive databases, the Community Biodiversity Register contains data compiled from each TKP, including the ailments treated, the plants used, and how they were administered, all organized alphabetically by the ailments they treat (Table II). After Euphorbiaceae were Verbenaceae, FabACEAE, MalvacACEAE and AsterACEAE in the number of medicinal plant species they contained (6).

Table 1: Traditional knowledge practitioners (TKPs) interviewed in different Islands.

Name of the Island	Villages	No. of TKPs		
		Male	Female	Total
Nancowry Island	9 villages	8	4	12
Kamorta Island	15 villages	8	13	21
Katchal Island	5 villages	9	5	14
Teressa Island	8 villages	12	4	16
Chowra Island	5 villages	9	5	14
	42 villages	46	31	77

A list of disorders and their botanical names and their method of administration by alphabetical order were included in the list of diseases of the TKPs (Table II). The most medicinal plant species were found in the Euphorbiaceae (12) family, followed by the Verbenaceae (7), Fabaceae (7), Malvaceae (6), and Asteraceae (6) families (6). (6). Medicinal plants from seven indigenous and three rare varieties were documented in this study (Table III).

Using three rare plant species was uncommon in the Nicobar Islands. More than 130 plant species were employed to treat 43 illnesses in Nancowry through TKPs. Different kinds of plants were used to treat different kinds of illnesses. The following fever and abdominal discomforts were headaches and a few treatments for other ailments,

such as a cold or flu (Table II). Trees (38), shrubs (35), herbs (30), and climbers (14) were all used in TKPs. Follicles were the most commonly used component of plants in the earliest days of agriculture (122 species). This included the plant's root and stem and its nut/seed/fruit/flower. Water and coconut oil were the most commonly utilized excipients in herbal remedies, while honey, pig blood, and pig fatty acids were also employed more infrequently. Some drugs were given straight to the patient (Gupta *et al*., 2004) [7]. As a result, patients were provided several options for receiving medicinal plant compositions. The second and third most commonly used administration means were oral (94 preparations) and other channels, such as ear and ocular drops (28 preparations).

Table 3: Showing details of rare and endemic plants used as medicines by traditional knowledge practitioners (TKPs)

Local name	Botanical name	Family	Category
Kőlőtseint/ Lūnguńh	*Memecylon edule* Roxb. var. *ovatum*	Memecylaceae	Rare
Samôk	*Toxocarpus kleinii* Wight & Arn	Asclepiadaceae	Rare
Mőt tāmp	*Begonia andamanensis* Parish ex C. B. Clarke	Begoniaceae	Rare
Topilē	*Miliusa andamanica* (King) Finet & Gagnepain	Annonaceae	Endemic
Uk-hiak/ Kőn-uńh	*Calamus nicobaricus* Becc. & Hook. f.	Arecaceae	Endemic
Kð ðny/ Em	*Dillenia andamanica* C.E. Parkinson	Dilleniaceae	Endemic
Kinsan/ Hinyôyő/ Ungchöngsë	*Glochidion calocarpum* Kurz	Phyllanthaceae	Endemic
Mirőőnlő	*Glyptopetalum calocarpum* (Kurz.) Prain	Celastraceae	Endemic
Hikē	*Pandanus lerum* Jones ex Fontane var. *lerum*	Pandanaceae	Endemic
Nyōt/ Nguńt	*Leea grandifolia* Kurz.	Leeaceae	Endemic

Discussion

The bulk of the population on the Andaman and Nicobar Islands is Nicobarese. The indigenous inhabitants of the Nicobar Islands still rely significantly on traditional medicine, despite a rise in modern medicine. The Nicobarese people have a wealth of knowledge about the flora in their immediate environs. Knowledge of traditional healing practices among the Nicobarese, particularly those in the Nancowry group of islands, is passed down from generation to generation through oral stories and informal training as aids to the folk healers. There are no records of any type, written or otherwise. It was notable that some plants previously recorded in surveys did not show up during our encounters with THPs. According to a 1989 study, 23 plant products were employed in folk medical practices on Bompoka Island in the Nancowry group of islands. However, the documentation was poor despite this (Murugan *et al*., 2015) [8]. According to the findings of this study, the Nicobarese people had a significant rate of fever.

Snakebite, abdominal pain, diarrhea/vomiting/nausea, coughing for a brief time and paralysis/giddiness/extended labor were among the more common afflictions.

Even within the same hamlet, TKPs used a wide range of treatments for the same disease. Multiple TKPs frequently used the same medicinal plant to cure a wide range of diseases. For example, using *Claoxylon indicum* (Reinw. ex Blume) Hassk., 17 different ailments have been successfully treated. Indigenous populations on the islands have distinct names for plants. It's known as Kheokfang on Chowra Island; Hunguh Kap in Kamorta and Nancowry; Kamong hey in Teresso; and Lanan Kp in Katchal, among other names. Similar results have been seen in ethnobotanical investigations. The majority of drugs are prepared and prescribed using a variety of medicinal herbs. This has been made known to the Kani community in India. Leaves were used extensively as an excipient in extracting most of the herbal remedies of the indigenous population. The Nicobarese regularly used excipients such as coconut oil and water since they were easily accessible and affordable. Similar findings have been made by the Kalanguya tribe (Pandey *et al*.). The Nancowry Islands are home to a wide variety of medicinal plants. However, there hasn't been much published in in-depth studies on this topic. Ethnomedicine TKPs' first-hand knowledge has not been documented systematically so far. In most cases, this survey has addressed this gap and created comprehensive Nicobarese Community Biodiversity Registers in Nancowry Islands Nicobarese communities.

Conclusion

75.90% of rural people worldwide use traditional herbal medicine as their primary health treatment. As a result, traditional medicine and herbal remedies are gaining popularity. However, with the rising usage of medical plants and the depletion of natural resources, it is clear that research of medicinal plants must be supported with conservation measures to protect their genetic resources and assist rural communities who use medicinal plants most directly. Medicinal plants are an important but neglected plant group in need of protection. Unprecedented deforestation has resulted in habitat loss and species extinction in tropical countries like India. This has already started affecting health care services and other plant-based enterprises in biodiversity-rich developing countries. Andaman and Nicobar conservation strategies are urgently required. Before it is lost, traditional knowledge of these islands' six ethnic tribes and Karens should be used. Habitat loss, urbanization, industry, etc., are threatening this ethnomedicinal wisdom (Chander *et al*., 2015b) [4]. The protection of unique medicinal plants on these islands should be a great concern for the authorities. The right organizations should fund the development of conservation

plans for threatened or endangered species and specialized programs to help identify the plants at risk. Ex-situ conservation of Andaman & Nicobar's unique medicinal plants requires field gene banks or herbal gardens. Medicinal Plant Conservation Areas (MPCA) and ethnobotanical conservation parks should also be constructed in biodiverse areas. The 'Green Health Campaign' should encourage rural people to use medicinal plants. Farm-fresh seedlings should be encouraged to be grown in village kitchen gardens, backyards, etc. These gardens should be planned in Car Nicobar and Rutland for the Nicobar and Andaman groups.

Recommendation

Plans should include

- Collecting data on medicinal plants and their bioactive components.
- Validating tribal medicine.
- Conserving them to achieve this purpose.

For conservation and management planning, studies on unique, endangered, and uncommon medicinal plant species should be undertaken in Andaman and Nicobar. Create a multidisciplinary, multi-institutional, and action-oriented research program to conserve tribe traditional life, knowledge, and resource use patterns. More attention should be paid to under-explored areas/tribes for ecologically and economically sustainable resource use. A network for updating/reviewing existing literature on medicinal plants that Andaman and Nicobar tribes utilized should be built (Chander *et al*., 2015b) [4].

Survey and documenting of ethnomedicinal essential plants should be done, especially among primitive and lesser-known tribes like Shompens, Onges, Jarawas and Sentinelese (if possible).

MPCA and ethnomedicinal plant gardens could be established in Onges, Nicobarese, Shompens, Great Andamanese, and Karen settlement regions. This would aid in the conservation and sustainable use of local natural resources. As a start, medicinal plant gardens for Onges, Great Andamanese at Great Nicobar, Shompens, Nicobarese, and Karens should be constructed in Dugong Creek, Strait Island, and Campbell Bay National Park. Botanical Survey of India (BSI), Central Island Agricultural Research Institute (CIARI), and Regional Medical Research Centre (RMRC) departments could collaborate to collect medicinal plant germplasm in these islands. CIARI can work with A&N Agriculture to multiply and distribute medicinal plants to tribal farmers/users (Gupta *et al*., 2004) [7]. An ethnopharmacology and phytochemistry branch in either CIARI or RMRC would be useful for studying the pharmacological and toxicological actions of plant-derived pharmaceuticals. Phytochemistry will investigate active ingredients, validate tribal claims, develop new medications, and screen for therapeutic efficacy, safety, and other factors. For medicinal plant micropropagation, a cryo-preservation unit, field genebank, etc., should be put up in CIARI. Plants include betel vines (Great Nicobar), wild ginger (Rutland, Dhanikari), and wild mangoes (Wild Mangoes) require field gene banks (in Chidiatapu and Mt. Harriet). Eco-rehabilitation and genepool development of endangered medicinal plants are possible. It can be equipped with modern amenities like glasshouses/ greenhouses, net houses, etc. The conservatory could display rare/endangered medicinal tree bonsai (trees in trays). In the deep forest of these remote islands, these miniature/dwarf plants would represent enormous medicinal tree species. It would help scientists, researchers, and environment lovers who cannot study trees in their natural habitats due to lack of time and inaccessibility.

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