

## ENVIS CENTRE ON FLORAL DIVERSITY



### From Director's Desk

Many appealing reports comprise this issue of ENVIS Newsletter. An account on the recollection of, almost after a gap of century, *Argyrea coonoorensis* (Convolvulaceae), an endemic to Nilgiris, the results of bryological exploration in Great Himalayan National Park, Himachal Pradesh, principally stressing the collection of five little known species and recognition of luxuriously growing *Helminthostachys zeylanica* (Ophioglossaceae) in a significant patch in Dakshin Dinajpur, West Bengal, whose existence is hitherto regarded as rare / little known. Further, the luxuriously thriving of *Nepenthes khasiana* (Nepenthaceae) at National Orchidarium & Experimental Garden, Southern Regional Centre, Yercaud and the flowering of *Ensete superbum* (Musaceae), an endemic from Western Ghats in the Acharya Jagadish Chandra Bose Indian Botanic Garden, Howrah as well emphasize the conservation efforts being undertaken by the Botanical Survey of India. All the included articles will go with the assigned theme on plant diversity and conservation. I appreciate the efforts of ENVIS team for its timely publication and the contributors for valued information.

**M. Sanjappa**  
Director  
Botanical Survey of India

### Articles



*Argyrea coonoorensis* W.W. Sm. & Ramaswami (Convolvulaceae), an endemic species from Nilgiris, Tamil Nadu, relocated after nearly a century from its first collection

**V.S. Ramachandran & R. Sasi**

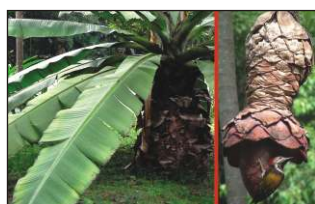
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## *Argyreia coonoorensis* W.W. Sm. & Ramaswami (Convolvulaceae), an endemic species from Nilgiris, Tamil Nadu, relocated after nearly a century from its first collection

V.S. Ramachandran\* & R. Sasi

Taxonomy and Floristic Laboratory, Department of Botany,  
Bharathiar University, Coimbatore 641 046

\*e-mail: vsrbotany@gmail.com (author for correspondence)

*Argyreia* Lour. comprises 90 species and are distributed from Indo-Malesia to Australia (Mabberley, 2008). In India, the genus is represented by 40 species (Santapau & Henry, 1973).

*Argyreia coonoorensis* W.W. Sm. & Ramaswami (Fig. 1) was described in 1913 based on the collection viz., Coonoor, Nilghiri's [6000 ft], Nov.- Dec. 1910, A. Meebold 12397 (CAL!). This species, endemic to Nilgiris in Tamil Nadu, has been relocated and recollected (Kilkothagiri, ± 1650 msl, 20.6.2009, V.S. Ramachandran & R. Sasi 5071 - Bharathiar University Herbarium) by the authors during the survey for a project on 'Inventorization, Documentation and Conservation of Endemic Angiosperms in Nilgiris' after nearly a century from its first collection. This species has been included in the 'List of Threatened Species Prepared for Assessment and Conservation' (<http://envfor.nic.in/bsi/research.html>).

A brief morphological description of the species along with photograph is given to facilitate easy identification.

Large scandent climbers. Leaves broadly ovate, 15–20 x 12–15 cm, sparsely pilose above, strigose beneath, cordate at base, acute to acuminate at apex, 10–12-nerved; petioles 4–5.5 cm long. Cymes few flowered; bracts linear, up to 2 cm long, strigose; peduncles up to 26 cm long. Calyx 5-lobed; lobes c. 1.5 cm long, pubescent. Corolla pink, c. 7 cm long, campanulate, sparsely hirsute; pedicel shorter than peduncle. Stamens 5, included; anthers oblong. Ovary subsessile; style straight; stigma globose.



Fig. 1 : *Argyreia coonoorensis* W.W. Sm. & Ramaswami

Flowering: May–July.

Distribution: Tamil Nadu (Nilgiris).

Ecology: Occasionally along the fringes of riparian zones of evergreen forest.

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# Conservation of *Nepenthes khasiana* Hook.f. (Nepenthaceae) – 'The Pitcher Plant'

M.U. Sharief\* & G.V.S. Murthy\*\*

\*Botanical Survey of India, National Orchidarium & Experimental Garden, Nagalur Road, Yercaud 636 602

\*\*Botanical Survey of India, Southern Regional Centre, Coimbatore 641 003

One of the great miracles and mysteries of plant life is the ability of some plants to trap moving or flying insects. Such plants are categorized as 'insectivorous plants'. They possess an extraordinary habit of adding to their supplies of nitrogenous salts by capturing and digesting the proteins of trapped insects. To catch the insects, they have developed curious mechanisms like closing of traps, formation of attractive pitchers, using sensitive sticky hairs or grabbing with tentacles thereby ensnaring the unwary insects.

The species of *Nepenthes* (Nepenthaceae) are pitcher forming insectivorous plants and are popularly known as 'Pitcher Plants'. It includes about 70 species distributed from Southern China to North-Eastern Australia and New Caledonia and extending westwards to Seychelles and Malagasy. Pitcher plants thrive well in moist atmosphere, where temperature ranges from 21° – 30° C. They are propagated by cuttings, layers and seeds. The stems of the pitcher plants are very tough and are used for rough cordage.



**Fig. 2 :** *Nepenthes khasiana* Hook.f. growing in the National Orchidarium & Experimental Garden of Botanical Survey of India, Yercaud, Salem District, Tamil Nadu

In India, only one species of *Nepenthes* occurs viz., *N. khasiana* Hook.f. The plants are short, stout, prostrate undershrubs with subcylindrical pitchers (Fig. 2) and can tolerate lower humidity than most *Nepenthes* species. It is a highland plant which can also survive in freezing-cold, but actually grows luxuriantly in intermediate conditions. *N. khasiana* is found in Khasia and Jaintia Hills of Meghalaya and it is a protected species, classified as Endangered and is included in the Appendix-I of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) and Negative List of Exports of Government of India. In height, the plants vary from 0.35 – 4 m, while in thickness, the stem varies from 0.8 to 2.5 cm. The plants spread their roots abundantly through the decaying humus of moist land in such a way so that the roots remain near the surface and obtain free oxygen. Leaves may be either sessile or stalked, but always have a lower flattened blade portion with 2-10 veins. The midrib is prolonged as a tendril of varying length, but of great tenacity. These tendrils wind around the supports and help the stem to bear crown of leaves and also support the weight of the

pitchers even when they are filled with water and trapped insects.

The species of *Nepenthes* are characterized by the peculiar pitcher-like appendages terminating the leaves. These pitchers are used by the plant for trapping insects. The pitchers vary greatly in shape and size and are often brightly colored. The margin of each pitcher is widened or thickened into a collar-like 'rim' or 'peristome'. The inner or the outer, or both the rim margins are curved downwards so as to give a cylindrical shape to the peristome which is shining in nature. At the back of the peristome, there is a lid which represents two terminal lobes of the leaf formed on either side of the spur.

Inside the pitcher, the upper 1/3 – 1/2 of the surface is extremely smooth and purplish with waxy coating. This forms a 'sliding' or 'conducting' surface, thereby assisting in dropping of insects into the lower area. The pitchers generally contain two types of glands viz., nectar glands and digestive glands. The inner surface of lid and inner edge of peristome bears sunken discoid nectar glands which secrete nectar to attract insects. In attempting to reach the droplets of nectars, the insects often slide down into the pitcher (Fig. 3). By this interesting mechanism the pitcher plants trap the insects. The lower most area inside the pitcher possesses the digestive glands which secrete proteolytic enzymes to digest the trapped insects. By this mechanism the pitcher plants obtain their nitrogenous salt supplements.

*Nepenthes* plants are dioecious. Flowers appear in panicles or simple racemes on the tip of the young branches. Each raceme is opposite to a bract leaf which usually differs in shape and venation from the other foliage leaves. Each staminate flower consists of four green, yellowish, red or claret perianth c. 6 mm in



**Fig. 3 :** Vertical section of the pitcher showing trapped insects

length and thick texture. The inner surface is closely dotted with nectar glands. The stamens vary from 8 – 10 in number and filaments are fused to form a short pillar that bears the terminal anthers. When the latter dehisce, they appear as a dusty ball of pollen. The pistillate flowers also bear 4 thick, obovate, perianth lobes with a superior ovary in the centre. Pistil consists of 4 carpels that are united to form 4-celled ovary with many minute elongated ovules. The style is very short and thick or is practically absent. The sessile stigma is 4-lobed to rounded and forms a thick expanded mass on top of the short style. The fruit is a dry shining capsule.

*N. khasiana* has been grown, maintained and conserved in live condition for the past 37 years in the National Orchidarium & Experimental Garden of Botanical Survey of India, Yercaud, Salem District, Tamil Nadu. The original plant was brought from Shillong along with soil and planted in the Yercaud Botanical Garden where it has established well, producing large number of pitchers. Maximum numbers of pitchers were observed during October to December and it is at that time only, pitchers attain a maximum length of c. 30.5 cm. A further interesting point is that this plant flowered for the first time during the last 37 years in this garden in the month of July 2009. In fact, it is a rare opportunity for the public to see this insectivorous plant which is a native of North East India being maintained in live condition in a garden of South India.

## ***Ensete superbum* (Roxb.) Cheesman [Musaceae], a curious banana plant endemic to Western Ghats, flowered in Acharya Jagadish Chandra Bose Indian Botanic Garden, Howrah**

**S.S. Hameed, P.V. Sreekumar, H.S. Mahapatra & G.S. Giri**

AJC Bose Indian Botanic Garden, Howrah 711 103

The *Ensete* Bruce ex Horan. (Musaceae) species are the 'wild bananas', cultivated in tropical and subtropical regions of Africa and Asia. Some of the species of *Ensete* are popularly known as 'false bananas' for its close resemblance to the domesticated banana plant. It is a staple food of almost 10 million people (Pijls *et al.*, 1995).

The rhizomatous root stock of *Ensete* is the main edible portion as its fruit is not palatable. The pulp of the fruit is given to diabetics in Ayurvedic practice. The grounded seeds are also used in Ayurveda for the same purpose. Each plant takes 4-5 years to mature and at that time a single root stock provides c. 40 kg of food. The genus comprises 7–8 species and is known for its broad genetic base and possession of several desirable genes (Kulkarni *et al.*, 2002).

*Ensete superbum* (Roxb.) Cheesman (Fig. 4) is a curious banana plant endemic to Western Ghats of India. In Kerala, the plant is locally known as 'Kallu Vazha' or 'Stone Banana' and it grows almost in hilly areas or rocky places. A brief description is given below :

The plants are 3 – 3.6 m high; pseudo-stems 1.5 – 1.8 m tall, with an enormous swollen base of 2.1 – 2.4 m circumference, narrowed to c. 91 cm below leaves. Leaves bright green, 1.5-1.8 m long, c. 70 cm broad; petioles very short, deeply channelled. Leaf-sheaths persistent at base leaving closely set scars on corm. Inflorescence (Fig. 4: Inset) globose at first, c. 30 cm across, drooping and elongating later to one third the length of trunk. Bracts orbicular to ovate, maroon to dark brown, reaching 30 cm in length, subtending dense biseriate rows of flowers, each with 10 – 15 in number. Ovary white, cylindrical, c. 2.5 cm long. Outer perianth whitish, as long as the ovary, three-lobed or formed of three loosely coherent segments; inner perianth shorter than outer, tricuspidate, with a long, linear central cusp. Fruits subcoriaceous, c. 7.6 cm long, c. 3.8 cm across, more or less triangular, containing numerous dark brown seeds. Seeds subglobose, angled by pressure, 7 – 13 mm across.

Historical records reveal that *E. superbum* was introduced in the Acharya Jagadish Chandra Bose Indian Botanic Garden (AJCBIBG), Howrah in 1800 AD and it might have been under cultivation there for quite some time. However, there is no clear or authentic evidence to show how long the cultivation existed in AJCBIBG.

In April 2004, the AJCBIBG team had undertaken a collection tour to southern part of Western Ghats. During this trip, the team visited the Tropical Botanic Garden & Research Institute, Thiruvananthapuram, Kerala, where they saw the plants of *E. superbum* in the arboretum in which some of them were in flowering. In fact, the team was astonished or even envied by that sight and requested the In-charge of the Arboretum to spare them a few suckers of this curious banana plant for its introduction at the historic AJCBIBG. He happily provided two suckers.

Thus by the end of April 2004, *E. superbum* was introduced in AJCBIBG for the second time after a lapse of over two centuries. It was planted in Nursery No.1 of AJCBIBG at an elevated place, adjacent to a pond.



**Fig. 4 :** *Ensete superbum* (Roxb.) Cheesman; Inset: Inflorescence

Emergence of every leaf was curiously observed. However, in the meantime, one of the suckers died due to some unknown cause. All possible efforts were made to salvage the second one. Its broad and long leaves and formations of pseudo-stem with an enormous swollen base attracted every one.

By early winter, the size of the leaves as well as the growth of the plant slowed down considerably. At the end of the year the plant perished leaving an underground corm. This roused suspicion among the people whether it would come up again in monsoon or would disappear for ever.

Fortunately, by surpassing all doubts and presumptions, new leaves emerged out at the onset of the monsoon. The same process continued for four consecutive years. After completion of 4 years and a few months, the stem of the plant suddenly shot upwards within a couple of week's time by hoisting a pretty inflorescence at the top and showering a massive amount of curiosity and cheerfulness to the nature lovers and the scientists as well.

Now every people who visit AJCBIBG admire the sight of this unique plant, especially the size of its pseudo-stem and flowers. The authorities are eagerly waiting for the fruits to mature so that a number of seedlings can be raised from its viable seeds.

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## Some rare and interesting liverworts from Great Himalayan National Park, Kullu, Himachal Pradesh, India

S.K. Singh

Botanical Survey of India, Eastern Regional Centre, Shillong 793 003  
e-mail: sksbsinc@rediffmail.com

During bryological exploration in and around Great Himalayan National Park, Kullu, Himachal Pradesh, India, Singh & Singh (2009) documented 104 taxa of liverworts and hornworts. Of these, five little known species have been discussed in the present article.



Fig. 5 : *Jungermannia subrubra* Steph.

*Jungermannia subrubra* Steph. (Jungermanniaceae): This species was described from Darjeeling, Eastern Himalaya by Stephani (1917-1924). Later it was again collected from the type locality (Amakawa, 1967; Srivastava & Singh, 1986). The species has also been reported from Nepal (Hattori, 1975), Bhutan (Long & Grolle, 1990) and China (Piippo, 1990). The author collected it from Great Himalayan National Park (Singh & Singh, 2009). It is rare in India and has been recorded only thrice from two localities i.e., Darjeeling and Great Himalayan National Park (Fig. 5).

*Porella variabilis* (Kashyap) Parihar (Porellaceae): This species was originally described by Kashyap (1932), as *Madotheca variabilis* from Mussoorie, Uttarakhand. Apparently the species could not be collected afterwards, either from its original locality in Uttarakhand or elsewhere in Western Himalaya. Recently, Singh & Singh (2009) recorded it from Great Himalayan National Park after a gap of about seven decades (Fig. 6).



Fig. 6 : *Porella variabilis* (Kashyap) Parihar

*Blasia pusilla* L. (Blasiaceae): Kashyap (1929) reported this species for the first time in India from Himachal Pradesh (Kullu, Nagar Karaon) and Uttarakhand (Garhwal, Gangotri Road) in Western Himalaya. Later it was reported from Kameng in Arunachal Pradesh (Singh, 1982). During the



Fig. 7 : *Blasia pusilla* L.

studies on the Hepaticae of the protected areas of Himachal Pradesh between 2001 – 2003, the author collected it from Sainj valley of Great Himalayan National Park and Rohtang pass in Kullu district of Himachal Pradesh (Singh & Singh, 2009). Long (2006) recorded it from the State of Sikkim (Fig. 7).

This monotypic liverwort has unique morphological features as it bears paired *Nostoc* colony (usually present in the members of the order Anthocerotales) and dimorphic gemmae i.e. star-shaped situated behind the apex of the thallus and discoid form borne in flask-shaped receptacle.

*Mannia perssonii* Udar & V. Chandra (Aytoniaceae): This species was described by Udar & Chandra (1965) from Gangotri (Uttarakhand).



Fig. 8 : *Mannia perssonii* Udar & V. Chandra

Since then, this species was not collected again from its type locality or elsewhere. Recently the author collected it from Bathad in Tirthan valley of Great Himalayan National Park (Singh & Singh, 2009). This is distinct from other Indian species of the genus in having lamellate spores (Fig. 8).

*Sauteria spongiosa* (Kashyap) S. Hatt. (Cleveaceae): This species was

originally described by Kashyap (1916) as *Sauchia spongiosa* from Sauch Pass located in between Chamba-Pangi road, Himachal Pradesh. Subsequently, Kashyap (1929) recorded the species from various localities in Himachal Pradesh (above Alwas on Pangi Road, Rohtang Pass, Chandra valley, Manh Pass). Later it was reported from Nepal (Grolle, 1966; Hattori, 1975), Pakistan (Furuki *et al.*, 1993) and from Tibet (Wu & Wang, 2000). More recently Long (2006) reported it from Yunnan. The author collected this species from Rohtang pass and Jalori pass in Kullu district of Himachal Pradesh and Mussoorie in Uttarakhand after a gap of more than



Fig. 9 : *Sauteria spongiosa* (Kashyap) S. Hatt.

seven decades (Singh & Singh, 2009). This species prefers to grow in much cooler areas at elevations between 2000 and 4500 m (Fig. 9).

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**Luxuriant growth of *Helminthostachys zeylanica* (L.) Hook. [Ophioglossaceae] in a pocket of Danga forest, Dakshin Dinajpur, West Bengal**

**P. Kamilya**

Department of Botany, Balurghat College, Balurghat, Dakshin Dinajpur 733 101

*Helminthostachys zeylanica* (L.) Hook., a rare species (Ghosh & Ghosh, 1997) belonging to Ophioglossaceae, grows luxuriantly in a pocket at the south-east margin of the Danga forest at Raghunathpur of Balurghat subdivision in the Dakshin Dinajpur district, West Bengal. There is, however, no published record of its occurrence from this region.

In the Danga forest the soil is clayey-sandy-loam. The maximum annual rainfall is c. 1921 mm and the temperature varies from 7°C to 39°C. The area where *H. zeylanica* grows is more than 10 acres. During the survey, the author has observed the plants to be growing gregariously at the sides of a narrow canal. The plants bear 2 (-3) fertile spikes from April to August. Quadrants of c. 9 x 9 m size (minimum size) reveal the density/m<sup>2</sup> of this species to be 2.42. The density of other associated species are 4.25 in *Vetiveria zizanioides* (L.) Nash, 0.15 in *Antidesma acidum* Retz., 0.17 in *Barringtonia acutangula* (L.) Gaertn., 0.09 in *Brachiaria reptans* (L.) C.A. Gardner & C.E. Hubb., 0.27 in *Evolvulus nummularius* (L.) L., 0.02 in *Merremia hederacea* (Burm.f.) Hallier f., 0.26 in *Melochia corchorifolia* L., 0.27 in *Mitracarpus* sp. and 0.22 in *Polygala chinensis* L.

A luxuriant growth of *Helminthostachys zeylanica* (Fig. 10) has not been reported anywhere from West Bengal earlier. The species possibly grows here luxuriously because it is an undisturbed pocket. The rhizomes of the species remain entangled with the tuft of rigid aggregate roots of *Vetiveria zizanioides* and thus the plants do not get washed away during the rainy season.

This species is very much important from the view point of evolution and economic importance. The young fronds are eaten raw or cooked, used in sciatica, also considered as aperient; rhizomes used for whooping cough and also for dysentery, cataract and in the early stages of phthises (Ghosh *et al.*, 2004).

It is apprehended that the extension of the crop fields at the south-east part of this pocket, grazing of animals and other biotic factors will pose a threat to the survival of this species in near future. Thus, to protect this primitive pteridophyte which is at risk (Chandra *et al.*, 2008), *in situ* conservation should immediately be undertaken by the concerned authorities.

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**Fig. 10 :** *Helminthostachys zeylanica* (L.) Hook.

**International Biological Diversity Day celebrations by Botanical Survey of India on 22.5.2010 in Acharya Jagadish Chandra Bose Indian Botanic Garden, Howrah**



**Fig. 11 :** A. Dr. M. Sanjappa giving a talk on Conservation of Biodiversity; B. Dr. D.K. Singh giving a talk on Biodiversity of Antarctica; C-D. Drs. M.S. Mondal, D.K. Singh, M. Sanjappa, P.K. Hajra and others watching a video show of "Inside Story of Eden Project"; E. Visitors viewing the photographs on various themes displayed



Shri Jairam Ramesh, Hon'ble Minister of Environment & Forests seen interacting with Dr. John D. Mood (Zingiberaceae Taxonomist, Hawaii) on 24.6.2009 in Type Section II of Central National Herbarium, BSI, Howrah (CAL)

Mr. B.P. Dhungel, Hon'ble Minister, Tourism, Forest Environment & Wildlife Management, Mines, Minerals & Geology and Science & Technology and Climate Change Dept., Govt. of Sikkim releasing BSI, ENVIS Newsletter Volume 14(2), 2009 at Gangtok on 5.4.2010 during National Evaluation Workshop of ENVIS Centres

On the dias from left: Mr. D. Lachungpa, Forest Secretary & PCCF; Mr. M.L. Arrawatia, Secretary, Science & Technology and Climate Change, Govt. of Sikkim; Mr. B.P. Dhungel, Hon'ble Minister, Govt. of Sikkim; Mr. Nilkanth Ghosh, Statistical Advisor, Ministry of Environment & Forests, New Delhi; Ms. Madhumita Biswas, Joint Director, Ministry of Environment & Forests, New Delhi; also seen near to podium is Mr. D.T. Bhutia, Sr. Scientific Officer (Coordinator, ENVIS Centre), Sikkim State Council of Science & Technology



# ENVIS Centre

**Established** April, 1994  
**Subject Area** Floral Diversity  
**Contact person** Dr. P. Lakshminarasimhan  
**Address** Scientist – D, CNH, BSI & Scientist-in-charge, ENVIS Centre  
 Botanical Survey of India, Central National Herbarium  
 P.O. Botanic Garden, Howrah 711 103  
**Telephone** (033) 2668 0667  
**Fax** (033) 2668 6226  
**e-mail** [envis@cal2.vsnl.net.in](mailto:envis@cal2.vsnl.net.in); [bsi@envis.nic.in](mailto:bsi@envis.nic.in)  
**Website** <http://www.bsienvis.nic.in>

**Activities of the Centre** The centre has enormous data on many areas and wants to create database / publish the following information

State wise / phytogeographical distribution of Rare, Endangered, Threatened and Endemic taxa of India; Documentation of traditional / ethnobotanical knowledge of plants of India; Mangroves of India; Carnivorous plants of India; State wise Bibliography and Abstracts of papers pertaining to plants of India  
 User service will continue

**List of publications brought out so far**

**Books :**

1. Mangroves, Associates and Salt Marshes of the Godavari and Krishna Delta, Andhra Pradesh – India
2. Diversity of Coastal Plant Communities in India. (Priced publication) Rs.804.00 \*
3. Red List of Threatened Vascular Plant Species in India
4. Bibliography and abstract of papers on flora of West Bengal
5. Bibliography and abstract of papers on flora of North East India – I
6. Bibliography and abstract of papers on flora of West Bengal – II

**Newsletters :** Up to Vol.15(1). Vol. 15(2) (in press).

\*DD is to be drawn in favour of ACCOUNTS OFFICER, P.A.O. (BSI/ZSI) and to be sent to the above address of ENVIS Centre