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From Director's Desk

Van Mahotsava, an annual tree plating festival, is celebrated in the first week of July in India during which millions of trees are planted all over India. The first week of July is just the right time for planting trees in most parts of India since it coincides with the monsoon and the survival rate of the saplings is more at this time than at any other time of the year. It was started in 1950 by Dr. K. M. Munshi, the Union Minister for Agriculture and Food at that time. It is celebrated as a festival of life. It was started to create awareness among people for the conservation of forests and planting of new trees for maintaining ecological balance, and also to augment provision of food, fodder and fuel wood. It also helps to spread awareness amongst people about the harm caused by the cutting down of trees.

AJCB Indian Botanic Garden, Howrah and BSI ENVIS RP celebrated Van Mahotsava 2020 and foundation Day of AJCB Indian Botanic Garden on 6th July 2020 by planting mangrove saplings along the Ganges adjacent to the AJCB Indian Botanic Garden, Shibpur. More than 1000 mangrove saplings were planted in this programme. Plants which were destroyed in the devastating Super Cyclonic Storm 'Amphan' in May 2020 were also planted in the garden. Some of the plants planted in this programme are Baobab, Debdaru, Mahogany, Kanak Champa, Indian Trumpet flower, etc.

The International Day for the Preservation of the Ozone Layer or 'World Ozone Day' is celebrated on 16th of September every year. This day was designated by the United Nations General Assembly on December 19, 2000, commemorating the date of the signing, of the Montreal Protocol in 1987 on Substances that Deplete the Ozone Layer. This year's theme was 'Ozone for life: 35 years of ozone layer protection', marking 35 years of adopting the Vienna Convention for the Protection of the Ozone Layer.

BSI ENVIS-RP in collaboration with Central National Herbarium, Howrah also Celebrated World Ozone Day-2020 on 16th September 2020. In order to raise awareness among children about the importance of ozone layer and the hazards of ozone layer depletion, online drawing and slogan writing competitions were organized for the school students of different age groups.

Like earlier issues, hope this issue will also be well received by readers for its contents. I appreciate the efforts of entire team of ENVIS Resource Partner on Biodiversity in bringing out this informative Newsletter.

(Dr. A.A. Mao)
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DISCLAIMER

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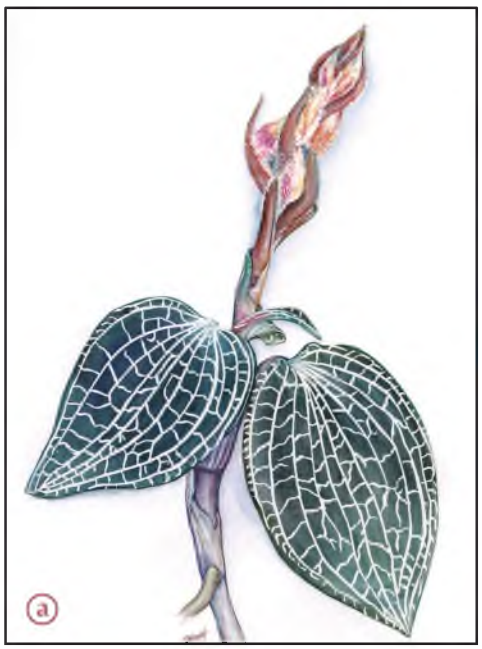
Hemsley's Jewel orchid

Botanical Name: **Goodyera hemsleyana** King & Pantl.

Family: **Orchidaceae**

Common Names: Jewel orchid

General Morphology: Terrestrial herbs usually receiving 6 to 15 cm or rarely up to 25 cm height. Leaves 3 to 6, lamina ovate, 1.2–5.2 x 0.5–2.2 cm, rarely oblique, adaxially green or bluish-green with white reticulations, abaxially pale green or pale purplish-green, petiolate, sheathing at base. Inflorescence terminal raceme, sometimes secund or subsecund, laxly 4 to 10 flowered, pubescent, with 2 to 3 sheathing bracts. Floral bracts ovate-oblong to ovate-lanceolate, longer than ovary, glandular pubescent near base. Flowers 1.5–2.0 cm long, resupinate, usually opening weakly; sepals pinkish-green or pinkish-white, sometimes with reddish-brown tinge; petals pinkish-white; labellum white, sometimes with light pinkish tinge. Pedicel and ovary terete to cylindric-fusiform, glandular pubescent. Sepals glandular pubescent; dorsal sepal oblong-lanceolate to ovate-lanceolate, 0.6–1.0 x 0.3–0.4 cm; lateral sepals oblong-ovate to ovate-lanceolate, 0.8–1.1 x 0.25–0.35 cm. Petals obliquely ovate-oblong, 0.6–0.9 x 0.2–0.3 cm, falcate, glabrous. Labellum oblong-ovate, 0.7–0.9 cm long; hypochile saccate, with numerous papillose hairs/appendages within; epichile oblong to oblong-lanceolate, subacute or obtuse at apex,with 2 central lamellae arising from base, lamellae scabrid. Column 0.2–0.3 cm long; rostellum 0.45–0.55 cm long, bifid. Pollinarium 0.42–0.48 cm long; pollinia oblong-obclavate, 0.13–0.16 cm long.



Goodyera hemsleyana: **a.** Habit (Colour drawing by D.K.Sah, Artist BSI); **b.** Leafy floweing twig

Distribution and Ecology: *Goodyera hemsleyana* is known to occur from Central and Eastern Himalaya to China (North-west Yunnan) and Northern Myanmar, more specifically in Nepal, Bhutan, India, China and Myanmar. In India it is found in the dense forests of Uttarakhand, Sikkim, West Bengal and Arunachal Pradesh between 1500–3500 m elevation. The species prefers growing under the shade of trees, on moist soil usually covered with leaf-litters. In India, it usually flowers between July to September.

Uses: Though orchids are usually praised for flowers, *Goodyera hemsleyana* is admired for its beautifully reticulated foliage. The species is known as one of the 'Jewel orchids' and traded in local as well as international markets as a potted ornamental plant. It has high potential for commercial utilization through micropropagation or artificial cultivation.

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Prickly Wild Edible Yellow Brinjal – A local medicinal plant of Tamil Nadu

Botanical Name: **Solanum melongena** L. var. **insanum** (L.) Prain

Family: Solanaceae

Tamil Names: Karimulli, Karimullikkattari, Mullikai, Mullukathiri.

Introduction: In India, the family Solanaceae is represented by 122 taxa (116 species, 2 subspecies, 3 varieties and 1 forma) belonging to 29 genera (Reema Kumari, 2004). In India, *Solanum* L. is represented by 49 species, and is distributed almost throughout the country (Kalidass & Panda, 2019). The wild eggplant, *S. insanum* L. has been recognised as a variety of *S. melongena* L. (*S. melongena* var. *insanum* (L.) Prain, due to its close resemblances with the cultivated *S. melongena* and the wild species *S. incanum* L. from the Middle East and northern Africa (Ranil & al., 2017; Vorontsova & Knapp, 2016). However, *S. melongena* var. *insanum* can be distinguished from these two species, by having sparsely pubescence indumentum, less robust and usually straighter prickles, larger flowers, and its confined distribution in Asia. In the state of Tamil Nadu, this variety is commonly growing in disturbed areas and is morphologically variable both across its range of distribution and within population.

General Morphology: Erect or prostrate branched shrub, armed; stems stellate-pubescent and occasionally purplish when young, glabrescent on maturity. Leaves ovate, 2.5–12 x 1.3–8 cm, truncate at base, sometimes obtuse, 2- or 3-lobed at margins, rounded at apex, chartaceous, stellate-pubescent, with 2–20 green or purple prickles on both surfaces; petioles 0.7–3 cm long. Cymes apparently terminal or lateral, with 1–3 flowers; peduncles moderately stellate-pubescent; pedicels articulated at base, stellate-pubescent. Flowers 5(or 6)-merous. Calyx 0.5–1 cm long, stellate-pubescent; lobes deltate, 4–6 mm long, acute. Corolla almost rotate, 1.5–2.6 cm across, sparsely stellate-pubescent abaxially, purple. Stamens equal; anthers connivent, yellow, poricidal. Ovary stellate-pubescent; style curved, white; stigma capitate, green. Berries globose, 1.5–3 cm, smooth, dark green with pale green and cream markings when young, yellow at maturity; fruiting pedicels woody, pendulous, with 0–5 prickles; fruiting calyx lobes reflexed, with 2–30 prickles; seeds 50–150, flattened reniform, orange-brown.


a. Habit


b. Entire Plant


c. Leaf


d. Flower


e. Young fruit


f. Mature fruit


g. Half Ripened fruit


h. Ripened fruit

Flowering & Fruiting: June–December.

Distribution: World: Paleotropical region. It is also cultivated in the warmer regions of the world including India, China, Laos, Madagascar, Malaya, Mauritius, Myanmar, Philippines, Reunion, Sri Lanka, Thailand and Vietnam. **India:** Almost throughout the country.

Chromosome Number: n = 12 (Meyer & al., 2012).

Uses: Due to close similarities and taxonomic confusions between *S. insanum* and *S. melongena* (Knapp & al., 2013) and to the unfortunate similarity of the spelling of the specific epithet to that of *S. incanum* L. (Hepper & Jaeger, 1985), it is often difficult to separate the information on medicinal uses and food value of *S. insanum* from the literature. In Tamil Nadu, fruits of this plant are widely used as nutrients supplement by majority of the tribal communities. Ripen yellow fruits used as vegetable to make curry. Roots, leaves and fruits or the paste of fruits are used as vermifuge for Ascaris. The fruits are used in treating liver problem and

enlarged spleen (Sivarajan & Balachandran, 1994; Elias & al., 2010). The fruits are also used in Ayurveda, Siddha and Folk medicinal systems as anti-asthmatic and general stimulant (Kudlu & Stone, 2013; Meyer & al., 2014).

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Morphology of the monstrous inflorescence in Indian *Maesa* Forssk. (Myrsinaceae): an overlooked attribute in recent past.

External morphological characters are the key drivers in identifying and classifying the taxonomic groups. Sometimes confusion in morphological characters with deviation from normal states due to environmental variations, infection, predation etc. misleads the identification until different populations are critically examined. But morphological anomaly evidenced in successive populations, irrespective of spatio-temporal biotic and abiotic interaction along the geographical template or altitudinal gradient sometimesmake thesystematists confused. These variations often seen in the transformation of reproductive to vegetative conditions of many flowering plants isconsidered to be as the monstrosity,sometimes told as a basis of evolution of floral development from vegetative to reproductive structures.

The teratological studies in plants was conceptualised by Theophrastus (before 286 BC) and a centre of attraction to developmental botanists and herbalists both in fundamental and applied research, particularly evident in commercial double rose production (Meyerowitz, Smyth & Bowman, 1989). Monstrosity, often referred as proliferation, is basically the extension of the axis beyond its normal limit which when seen in the inflorescence can be reproductive or vegetative in character (Worsdell, 1916). Usually three stages of monstrosity are found in case of proliferation, unbranched median extension of the axis or axillary branching without any abnormal extension of the main axis or sometimes both (Worsdell, 1916). This unique feature, monstrosity, has also been reported in many families like Rosaceae, Asteraceae, Fabaceae, Poaceae, Euphorbiaceae, Apiaceae, Primulaceae, Taxaceae and many others (Worsdell, 1916).

In India, the genus *Maesa* is one of the wide spread genera of the family Myrsinaceae. The herbarium records and earlier works reveal that the species diversity of the genus is more confined to the north-eastern part of India than the southern part. Roxburgh (1824) and Clarke (1882) while describing the diagnostic features of *Maesa*, based on Indian materials, addressed the anomaly mentioning as 'monstrous or proliferative growth'. Wallich in Roxburgh's Flora Indica (1824) being more specific about such growth described the inflorescence to be more branched panicles with abortive flowers that did not open. Clarke (1882) depicted, the inflorescence of *Maesa* with flowers getting replaced by densely imbricating bracteoles. But, this attribute in the genus has been largely overlooked in recent past. Attempt in unravelling the morphological features of monstrous inflorescence in *Maesa* of Indian region is still awaiting and would be helpful

for correct identification of its members and logical taxonomic decision as well.

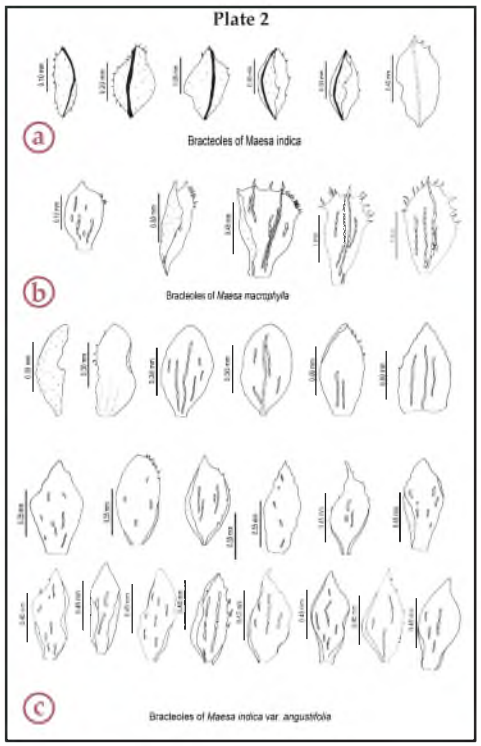
The present study was carried out mainly based on the specimens of selected species of *Maesa* deposited at APFH, ARUN, ASSAM, BSHC, BSI, CAL, DD, BSD, LBG, MH, OHT, RHT, TBGT and field observations in the selected distributional regions of Arunachal Pradesh, Darjeeling and Sikkim. The twigs with this anomaly were identified by their much branched inflorescence. To avoid erroneous sampling, the sheets were observed under a simple dissecting microscope (OLYMPUS SZ 61). The anomaly was confirmed and for more clarity of the anomalous units, the dissected parts were viewed under a stereoscopic zoom microscope (OLYMPUS SMZ 1500).

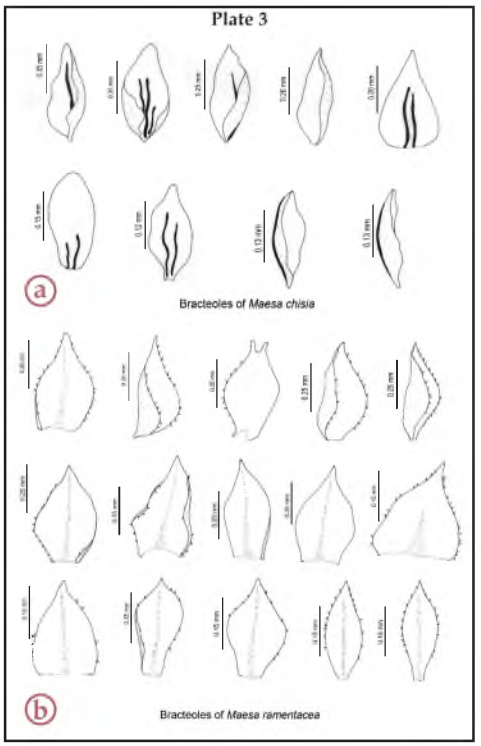
A search for this much branched inflorescence (here considered as anomaly) within the family Myrsinaceae by searching the specimens deposited at CAL and other Indian herbaria reflects that this proliferative feature was found only in the genus *Maesa* and not in any other member of the family. The proliferative state was found in the following members of *Maesa*: *M. ramentacea*, *M. chisia*, *M. indica*, *M.indica* var. *angustifolia*, *M. macrophylla* and *M. rugosa*. The flower selected from the normal grown twig had both essential and accessory whorls marked with sepals, petals, androecium and gynoecium along with bracts and bracteoles.

In normal condition, *Maesa* has 1 bract at the base of the pedicel and 2 lateral bracteoles almost at the base of the calyx. Calyx-teeth and petals range from 5–7 and are fused below. Distinct resin deposits are seen on both sepals and petals along with visible petal veins wherever present. Stamens range between 5–7 and have bi-celled anthers. Anthers are dorsifixed with longitudinal dehiscence. Ovary is globose and half-superior, making the genus completely distinct from other members of the family. But, the twigs with proliferative growth show only the bracteoles arranged alternately or sub-oppositely along the inflorescence axis.

The number of bracteoles was found to vary in different species. In *M. rugosa* the number of bracteoles was found to be highest and ranging between 30–40, followed by *M. indica* var. *angustifolia* and *M. ramentacea*, number ranging between 15–25. While in the remaining three species, *M. chisia*, *M. indica* and *M. macrophylla*, the number of bracteoles decreased respectively ranging within 5–10. These 6 members of *Maesa* maintained the variation in the shape and size, margin characters, texture and resin deposition of the bracteoles even in their proliferative state. The bracteole shape in different species of *Maesa* broadly ranged within ovate–lanceolate–obovate and the size usually reduced from base towards apex. But a sudden increase in length or width and a variation in the shape were also noticed in cases. Though the bracteoles of *M. chisia*, *M. indica*

Plate 1: (a) Normal inflorescence of *M. indica* var. *angustifolia*, (b) Normal flowers of *M. chisia*, (c) Twig of *M. chisia* in normal bloom, (d) Fruiting twig of *M. indica* in normal condition, (e) Twig of *M. indica* in monstrous condition, (f) Monstrous inflorescence of *M. chisia*, (g) Monstrous inflorescence of *M. macrophylla* in natural habitat (h) Close- view of *M. macrophylla* (i) Monstrous twig and normal fruiting twig in same plant of *M. indica*





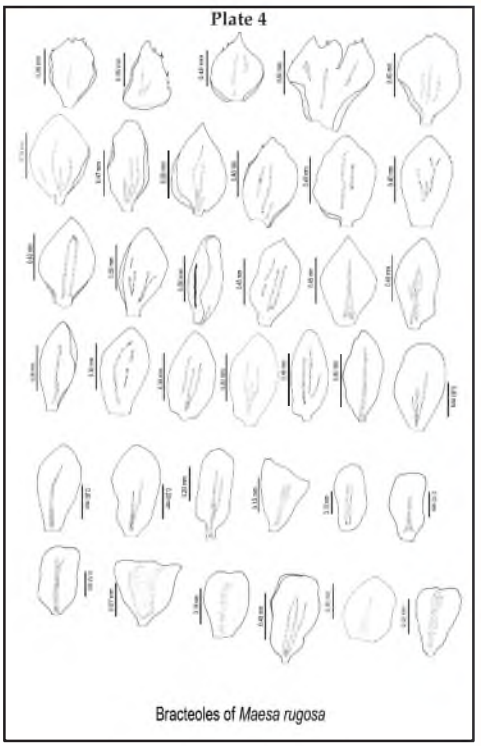


Plate 2: (a) Bracteoles of *M. indica*, (b) Bracteoles of *M. macrophylla*, (c) Bracteoles of *M. indica* var. *angustifolia;* **Plate 3:** (a) Bracteoles of *M. chisia*, (b) Bracteoles of *M. ramentacea;* **Plate 4:** Bracteoles of *M. rugosa*

and *M. indica* var. *angustifolia* maintain the range of shape, but *M. ramentacea*, *M. macrophylla* and *M. rugosa* show deltate, cuneiform and flabellate shape respectively in some of the bracteoles. The presence or absence of resin was specific and followed a pattern which was distinct from one another. Assessing the deposition of resin, the members can be grouped into two: ventral and dorsal (Table 1).

Table 1: Pattern of resin deposition in six members of *Maesa*

Resin ventrally deposited	*Maesa chisia*	deposits in distinct continuous 2–3 lines
	Maesa macrophylla	deposits broken frequently, stacked one above the other forming column
	Maesa indica var. *angustifolia*	deposits broken into small cylindrical units but not stacked
Resin dorsally deposited	*Maesa indica*	deposits in 1–4 branched or unbranched lines or form loops
	Maesa rugosa	deposits in single line or streaks of resins throughout
	Maesa ramentacea	deposit in single thick line running from middle

M. chisia was very much distinct from other members as it was completely glabrous followed by *M. rugosa*, where very rarely the hairs were found. *M. macrophylla* Wall had a complete distinct type of trichome spreading in the apical to middle region and never below that. Hairs were most frequent and uniform in *M. ramentacea* followed by *M. indica*. *M. indica* var. *angustifolia* showed hairs not uniformly and are protrusion of the margin in branched or unbranched fashion. Often it was found in herbarium sheets and also in field that same plant bearing normal flowers or fruits can also bear the monstrous inflorescence in same twig (Figure 1f, 1i). Sometimes a healthy plant had separate twigs only with proliferative inflorescence (Figure 1e). Even sometimes the whole plant had the much branched panicle inflorescence.

Identifying the members in the state of proliferation or specimens collected in proliferative state turn to be important for the workers to avoid misidentification. It is interesting and noteworthy that the proliferative state in the inflorescence of *Maesa* observed in 19th century persists in 21st century also. A search in the anomalous features of *Maesa* at different herbaria throughout the country reflects that this 'monstrosity' is found only in the specimens that are from north-eastern region of the country and not from the peninsular part. Field survey in the localities where the members of *Maesa* are growing also supports this finding. In north-eastern region the members are found to grow along the road or near the edge of the mountain nearing gorge. In such microclimatic conditions the floral units getting converted into bracteoles may have trend towards sterility due to some biotic or abiotic stress causing hindrance in the natural growth. As witnessed in the field, *Maesa* in normal growth blooms heavily and is pollinated mainly by bees and flies. This may be a trend toward sterility for the reduction of seed production vis-a-vis *in-situ* germination-competition through the

transformation of the inflorescence or some portion of inflorescence into monstrous condition

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Fathoming the life of a taxonomist during field surveys

Field work is a part and parcel of being a taxonomist. Both revisionary and floristic studies need tour and routine field visit. Among them, Plant taxonomists are those group of researchers who explore the flora of places unharnessed, for the sake of biodiversity documentation and conservation. Quoting "Lao Tzu", "The journey of a thousand miles begins with a single step" and the first step of a taxonomist is his/her love for nature and his work.

The authors being able to work on Indian flora got this opportunity to invade and discover the hidden vegetation. India being one of the floristically rich country has an immense climatic and altitudinal variation. The ecological habitats comprise of the Trans Himalayan zone (the sub-alpine vegetation), the Himalayas (covering subtropical, temperate, subalpine and alpine forests), the Indian desert, the Semi-arid zone (mainly comprises of thorn scrub forests), the Indo-Gangetic plain (chiefly consists of cultivated species and some natural vegetation of the tall grasses), the Western Ghats (deciduous and evergreen forests), Deccan Peninsula (tropical thorn forests and tropical dry and moist deciduous forest), the Coastal zone (mangrove forests) and the Islands (littoral and inland vegetation) (Rao, 1997). The recent status of plant species in India is: Gymnosperms 82, Angiosperms 18666, Bryophyte 2780, Pteridophyte 1302, Algae 7411, Fungi 15396, Lichens 2581 ('Plant Discoveries 2018'). Based on some personal experiences of the authors, from floral and revisionary works, here are some challenges.

- While collecting specimens, interest among the local people may be invoked. Communicating with them can help in obtaining information like indigenous uses. For instance, many plants are used for the ethno veterinary practices. *Solanum virginianum* L., *Withania somnifera* (L.) Dunal, *Glycyrrhiza glabra* L. are often used by the local and tribal people for common health disorders. Also some products from neem tree, tamarind, turmeric and Darjeeling tea have been patented to restrict any bio-piracy. Any superstition practiced among the common mass, should never be taken lightly.

- Due to bio-piracy of medicinal plants, some states of North-East India have high restrictions in providing permission for field surveys. It is very tough and time taking process to convince forest, military and police officials to get multi-layered permissions for survey of military controlled areas.

- High resolution lens, macro lens and good quality camera are essential to photograph and document minute plants and cryptogams. A GPS is also needed to track the sites of the collections. However, these equipment are costly and difficult to carry.

- During the rains, the hilly areas are very difficult to visit. The random and frequent landslides eventually block many roads. There is always a probability of disruption of the transportation routes, getting stranded in between the journey, car accidents, floods and damage of the forest. During journey from Dirang to Tawang, the road via Sela Pass (Arunachal Pradesh) was drastically damaged due to the landslide in July, 2019. Lachen, Thangu Valley, Gurudongmar Lake (North Sikkim) were closed for collection due to road blockage in September, 2019.

- PWD/CPWD or the forest guest houses are preferable and safe for accommodation during field surveys. But these guest houses almost always face a high demand, and booking should be done prior to a minimum of 3 months. Shortage of food, water supply, electricity increases the hardship. For the survey tours in the localized area, a rented car and a local guide are always required.

- Leech bites, snakes, the threat of forest animals, losing track in the forest adds more challenge to the task. Coming to the real work of a plant taxonomist in the field, the methods of collection and preservation vary among plant members according to their nature, habit, growing places etc. Stated below are some basic rules to look out for while on the survey.

- Healthy, disease free plant specimens representing the range of variation in its population should be selected in the field.

- During collection, threatened, endangered and rare plants should be collected cautiously. Collection should be avoided if there is less

number of plants growing in that particular site. For herbs, one plant sample can be collected out of 20 samples present in the surrounding population (in case of shrubs and trees, twigs are counted). If the number is very less, detail study of the plant should be carried out in field without damaging the plant(s).

- Plant specimens in its flowering and fruiting condition are preferable.
- At least 5-6 plant material should be collected for standard herbarium sheets and further study, if sufficient number of specimens of that particular taxon is available in that particular site.
- Based on the characteristic features and size, whole plant in case of herbs with special plant parts (rhizomes, stolon, corm, root etc) are collected and preserved. For example, in case of Zingiberaceae, since rhizomes and the floral parts remain underground, careful digging and collection is of vital importance.
- The length of twigs must be minimum 30 to 35 cm long for collection and further herbarium preparation.
- Extra flowers and fruits should be collected for future dissection (further study).
- Creepers, climbers should be collected along with the roots, both main and adventitious.
- The habitats of aquatic plants itself play as a barrier. One needs to carry dragging hook for collection. The flowers in most of the aquatic plants are fragile and thus they must be handled with good care during collection (e.g. *Heteranthera* Ruiz & Pav., *Urticularia* L. etc.). Also the major identifying characters need to be recorded immediately after extracting the plants, for example the dissection of leaves in *Myriophyllum* L., and cross-section of *Nuphar* Sm. petioles should be done to know the prominent identifying characters.
- On the other hand, succulent plants such as agaves, aloes, cacti etc. store lots of water. It must be collected in paper bags instead of plastic bag to avoid rotting. After collection, plants may be dipped in boiling water to avoid senescence. Longitudinal section should be made to scoop out the flesh for better preservation. Cross section is also helpful for proper characterization. For instance, in *Bryophyllum* Salisb., preservation after collection requires more diligent efforts as they need a longer time to dry and thus always have a chance of fungal infestation.
- Bamboos flower at an interval of 15 to 120 years. Identifying them with vegetative characters like culm, culm sheath, node, internodes, nodal buds, rhizome and leaves seems to be the reasonable solution.
- Orchids have the unparalleled distinction of being the most diverse plant family on earth, but also the most vulnerable to extinction. They are represented by lithophytes, terrestrial and epiphytes. Collection

Fig. 1: a. A wooden bridge to enter the forest (Sikkim); b. Field survey along a riverside in Arunachal Pradesh; c. A landslide affected road (Arunachal Pradesh); d–f. collection of specimens in different parts of India forests.

of epiphytic orchids are quite challenging as they often grow on great heights. Thus, help of a field assistant may be required.

- Tall tree palms on the other hand can be very difficult to collect. There are three main methods of collection which are the most effective – 1. Hiring tree climbers; 2. Climbing irons, loops and ropes; 3. During collections, it is advisable to cut the large sample into pieces according to the approximate size of a folded sheet of newspaper. It may not be possible or desirable in some instances like prophylls or peduncular bracts to cut the object at all, and such larger objects may always be treated separately (Dransfield, 1986)

- For bigger plants of the three genera of Pandanaceae i.e, *Freycinetia* Gaudich., *Pandanus* Parkinson and *Sararanga* Hemsl., some careful sampling has to be done. Where the leafy stems and leaves are more than 2-3 cm in diameter, they can be split longitudinally and dried separately (Soderstrom, 1983).

- Parts of leaves and cones, both male and female are collected in gymnosperms.

- In aroids, the spadix inflorescence is often covered by a spathe. Careful collection of the spadix along with the spathe, which is an important identifying character, should be done.

- In cryptogams (algae, fungi, slime molds, lichens, liverworts, mosses and hornworts), most of these non-flowering organisms are very small and even microscopic and so special equipment should be carried in the field for the collection, particularly in case of certain fungi and algae.

- Extraction and collection of algae from different habitats (benthic, thermophiles) require varied techniques. Larger algae may be floated on paper or mounted like any other plant but smaller algae should be preserved in bottles in the formalin to avoid any infection, but the natural color of the specimens fade. For desmids and diatoms, microscopic mounts are prepared.

- In case of Lichens, soil lichens such as *Cladonia* P. Browne may be placed in boxes or envelopes like bryophytes after collection. On the other hand, chisels or hammers are needed for scrapping of the crustose lichens from the rock surfaces because of the strong adherence. They are often confused with some of the wood-rotting fungi. Some of the fruticose lichens are inaccessible due to their aerial growth and thus their collections are challenging sometimes. After collection, it is often advantageous to moisten the fruticose and foliose lichen when dry and brittle to avoid any breakage (Jennings, 1934).

- Though mosses and liverworts are easy to find on logs, trunks, rocks, soil but due to their small size and similar morphology misidentifications occur. Thus, mixing of the specimens should be avoided in the field.

- Likewise, the ferns *Asplenium nidus* L. and *A. phyllitidis* D. Don are often treated as a single species and so mixing up of the similar looking yet different specimens are very liable to happen. The succulent ones like *Antrophyum obovatum* Baker, *Pyrrosia costata* (Wall. ex C. Presl) Tagawa & K. Iwats. etc. have major difficulty in drying and easily gets fungal infection.

- For the mycologists, the biggest challenge is the collection, drying and preservation of the fungi, specially the fleshy mushrooms since they bloom out during the monsoon only. A field dryer should be carried during the survey to prevent rotting of the samples and secondary infection. Special care should be given to the edible ones like *Agaricus*, *Russula*, *Termitomyces* etc.

- Mushrooms should be characterized in the field itself since all of its macro-morphological features can only be observed before it gets completely dried. In case of the parasitic or saprophytic fungi, a suitable part of the host should also be collected alongside. The wood rotting fungi like Polypores are somewhat difficult to collect from the great height of the trunk.

The extensive field work is a 'blessing in disguise' for any taxonomist. In the end, as Ursula K. Le Guin in *The Left Hand of Darkness* says, "It is good to have an end to journey toward; but it is the journey that matters, in the end."

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Shiv Ram Kashyap – Father of Indian Bryology (1882–1934)

Rai Bahadur Dr. Shiv Ram Kashyap was born on 6th November 1882 at Jhelum, in a family with a long record of meritorious military services. In 1899 he matriculated from the M.B. High School, Jallundur City and in 1900, he joined the Medical School at Agra and received his Medical Diploma in 1904. He was the topper of the list which gained him the First Medal. Then for two years he served in the Medical Service of the United Provinces. While still a student of the Medical School he appeared as a private candidate for the Intermediate science examination of the Panjab University and was declared the topper of the list. He was offered a university scholarship but he declined the offer and went on with his studies at the Medical School. In 1906, while serving in the Medical Department of the United Provinces, he again appeared as a private candidate for the B.Sc. examination of the Panjab University and again topped the list. In the same year he resigned his post in the Medical Service and was appointed Assistant Professor of Biology at Government College, Lahore. In 1909, he passed the M.Sc. examination in Botany, standing first among the M.A. and M.Sc. candidates in the University. As a result, he was awarded the much prized Arnold and Maclagan Gold Medals of the University. Professor Kashyap had a brilliant and remarkable academic career.

In 1910, he went to Europe and joined the Cambridge University. From there he took his Honours Degree in the Natural Science Tripos in 1912. On his return home, Prof. Kashyap was appointed Professor of Botany at the Government College, Lahore, in the senior grade of the Provincial Educational Service and was later promoted to the Indian Educational Service in 1920. In 1919, when the Honours School in Botany was organized by the Panjab University, he was appointed University Professor of Botany until his death. In recognition of his scholarship and services, Prof. Kashyap was made "**Rai Sahib**" in 1920 and later "**Rai Bahadur**" in 1929.

He had been an elected Fellow of the University for many years and the Dean of the Science Faculty for a long time. He was also a member of the Syndicate and in 1931 officiated as Dean of University Instruction for few months. For several years he had been a member of the Science Faculty and of the Boards of Studies of several other Universities such as Agra, Benares and Lucknow. Professor Kashyap was the first systematic Botanist to preside over the annual deliberations of the Indian Science Congress in 1932, ever since it was founded in the year 1914, which was the highest honour for an Indian Scientist. In recognition of his valuable contributions, the Panjab University in 1933, conferred on him, *Honoris Causa*, the Degree of Doctor of Science. He was the first recipient of the degree from the University of Punjab. He was also a Fellow of the Asiatic Society of Bengal. Professor Kashyap was the first teacher in Northern India who started M.Sc. classes in Botany.

Professor Kashyap was the first Secretary of the Indian Botanical Society, which was founded in 1920, and was appointed its President in 1925. Based on his vast knowledge, experience and quality research, Prof. Kashyap was also elected as Editor-in-Chief of the *Journal of the Indian Botanical Society*. He was also an Advisory Editor of *Chronica Botanica*, published from Holland. He was elected President of the Botany Section of the Indian Science Congress in 1919 when the Congress met at Bombay. In 1934, he was elected a Fellow of the Indian Academy of Sciences.

One of his very first paper appeared in 1914, in which he described the structure and development of the sexual generation of *Equisetum debile* which was unknown at that time. He has published high quality research papers on bryology, phycology, pteridology, anatomy, angiosperm taxonomy, gymnosperm etc.

Professor S.R. Kashyap – aptly regarded as the '**Father of Indian Bryology**', as he for the first time initiated systematic explorations of and critical morphotaxonomic investigations on liverworts and hornworts which culminated into the publication of "*Liverworts of Western Himalayas and the Panjab Plain*" – the first illustrated account of Indian liverworts, containing 53 genera and 161 species, including four genera and 50 species instituted by Prof. Kashyap himself, in two volumes and its supplement. Professor Kashyap's contributions not only added greatly to our knowledge of Indian liverworts, especially those from the Western Himalaya, but also marked the beginning of systematic studies on these plants at local, State and regional levels. His work was highly appreciated and earned him recognition which are source of inspiration and knowledge for upcoming generations.

His contribution to the "Theory of Evolution by Reduction", is very important and has been highly appreciated in Europe and America. He expanded this theory that followed out the various lines of evolution.

Professor Kashyap largely contributed in the Flora of the Western Himalayas and Western and Central Tibet. He was also the author of "*Lahore District Flora*" which was revised and completed by Assistant Professor, Amar Chand Joshi, published in 1936.

He was a great traveler and probably knew more than anybody else about this interesting country. He crossed the Himalayas into Tibet at nine different places throughout its length and several times at some places. Despite falling very ill on one of his forays in the Himalayas, he returned many times before his heart began to give him trouble.

The exploration of the Himalayas and the study of its vegetation were his life's passion. With him, his work came first and if any one complained for working so hard in his failing health, he would say "Why, my life is not more important than my work".

Professor Kashyap is considered a distinguished Scientist, a pioneer botanist, a Himalayan explorer and a great teacher. He has earned tremendous popularity due to his personality, magnetism and qualities. He had his last breath on 26th November, 1934 at Lahore due to sudden heart failure.

Forever, he will be remembered as one of the chief makers of modern Indian Botany especially Bryology. His pioneer research on Himalayan Liverworts will go down to all future generations of people as a great scientific achievement which will keep alive his memory forever.

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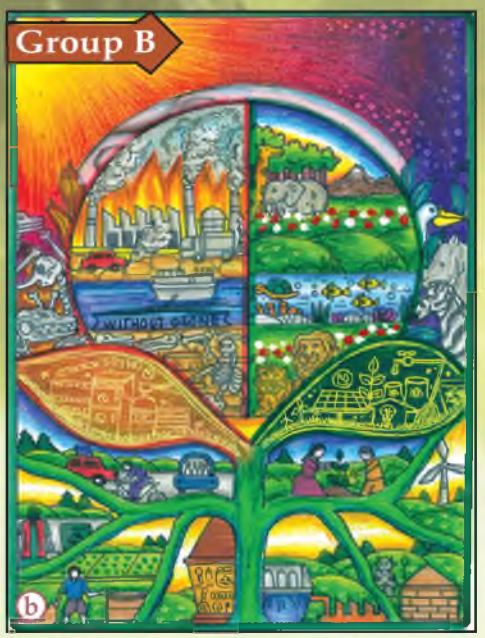

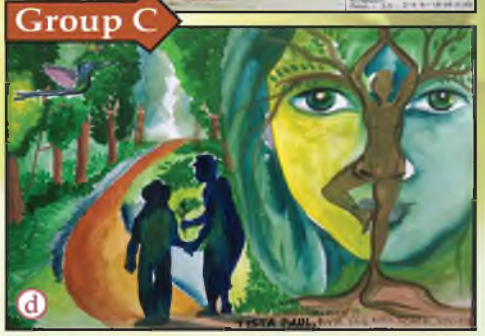

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