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AN ACCOUNT OF *Leycesteria* WALL. IN INDIA

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ABSTRACT

The present study records five species of *Leycesteria* Wall. (*L. dibangvalliensis*, *L.formosa, L. glaucophylla, L. gracilis* and *L. stipulata*) from subtropical to subalpine regions of the Himalaya stretching from Kashmir to the North East. Artificial key to the identification of concerned species has been provided along with precise phytography and information about flowering and fruiting periods, distribution of the species and the specimens examined.

KEY WORDS: *Leycesteria* Wall., Caprifoliaceae Juss., Himalayan Regions, Artificial key Phytography

Caprifoliaceae Juss., familiar as the family of beautiful "Honeysuckles" is a taxon mostly of shrubs, vines and herbs having typically opposite leaves and tubular and funnel- or bell-shaped corolla with five outwardly spreading lobes and five epipetalous stamens; ovary with more than one ovule per locule and fruits of drupe or berry type.

The family Caprifoliaceae belongs to the order Dipsacales of the subclass Asteridae under Magnoliopsida and includes about 400 species (Cronquist, 1988). Takhtajan (2009) placed it under the 112th order Dipsacales of the Superorder Cornanae belonging to the Subclass Asteridae and considered 12 genera with 275 to 300 species in the family. Watson and Dalwitz (1992 onwards) have considered 12 genera and 330 species. The Angiosperm Phylogeny Group Classification (APGIII 2009 and APG III 2016) puts Caprifoliaceae in Dipsacales under the subgroup Euasterid II of the clade Asterid of the Core Eudicot, the largest group under Eudicots which is one of the major groups of Angiosperms having tricolpate or tricolpate-derived types. The family is cosmopolitan in distribution, the main centres of diversity being North America and Eastern Asia. Interestingly the taxon is absent in tropical and southern Africa.In accordance with the circumscription of Caprifoliaceae considered by Cronquist (1988) as many as 6 genera are found in India, viz. *Abelia* Roxb., *Leycesteria* Wall., *Lonicera* L., *Sambucus* L. *Triosteum* L. and *Viburnum* L. which are mainly distributed in the subtropical to subalpine elevations of the Himalaya extending from Jammu and Kashmir to the Northeast and also in the temperate regions of the South Indian Hills. For being cold loving, no species is found in the warm alluvial plains and hotter regions of India. Wherever they occur they discharge excellent ecological services especially to diverse forms of insects, birds and herbivores and give us aesthetic pleasure with their beautiful flowers and fruits.

Leycesteria Wall., familiar as the flowering nutmeg, is native to temperate Asia in the Himalaya and southwestern China. It has 7 species of shrubs often with short-lived fistular soft stems growing to a height of 1-2.5 m. The name *Leycesteria* was coined by Nathaniel Wallich, one time Director of the Calcutta Botanic Garden, in the honour of his friend William Leycester who was a judge in the native court in Bengal and also a famous horticulturist in about 1820 (Lindley, 1839; Gledhill, 1994). The

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genus distinguishes it from other genera of the family by bearing typically opposite leaves, tubular and funnel- or bell-shaped flowers in axillary whorls or terminal spikes being subtended by bracts and bracteoles and five to eight-celled berry type of fruits.

MATERIALS AND METHODS

This work is based on thorough scrutiny of pertinent literature and specimens preserved in different Herbaria in India (Central National Herbarium (CAL), Lloyd Botanic Garden, Darjeeling (LBG), Sikkim Circle of Botanical Survey of India, Gangtok (BHSC), Burdwan University (BURD), North Bengal University, Eastern Regional Centre, Botanical Survey of India, Shillong (ERC, BSI), Arunachal Pradesh Field Station, Botanical Survey of India, Itanagar (ARUN)], Madras Herbarium (MH) of the Southern Regional Centre, Coimbatore) and abroad [Royal Botanic Gardens, Kew (K), Herbarium Haussknecht (JE), Friedrich-Schiller-Universität, Jena and Botanische Staatssammlung München (M)] as also the scanned and web images of specimens, mainly the types, availed from such sources as Herbarium of the Arnold Arboretum (A), Natural History Museum (BM), Royal Botanic Garden Herbarium (E), Muséum National d'Histoire Naturelle (P), The William and Lynda Steere Herbarium of the New York Botanical Garden , NYBG, (NY), Academy of Natural Sciences of Drexel University Museum in Philadelphia, Pennsylvania (PH) and others. Floras and other publications covering the taxon in India were consulted to confirm identification and to cite them along with protologue of respective species. Nomenclature of each species was checked with that given in the latest publications. Websites of the International Plant Names Index (IPNI) [http://www.ipni.org/], The Plant List (http://www.theplantlist.org.) and Tropicos (http://www.tropicos.org/) were consulted for updating species names. The present study also takes into account the specimens collected by the authors during field trips since 2011 in conformity with earlier work (Mukherjee, 1988; Acharya, Acharya and Mukherjee, 2010; Acharya and Mukherjee, 2015, 2017). In every case type specimens were cited confirming identification. Standard Taxonomic methods were followed to prepare comprehensive keys to identification of species to facilitate their identification. The species are arranged alphabetically giving their scientific names, citations, synonyms and basionyms wherever needed and brief descriptions along with notes on flowering and fruiting periods, distribution and specimens examined etc.

RESULTS

The genus *Leycesteria* Wall. of Caprifoliaceae comprise of short lived low shrubs with fistular stem and branches growing up to 1-2.5 m in height. Leaves simple, opposite, entire or toothed, caudate-acuminate, membranous, abaxial surface glaucous, stipules 0 or minute. Flowers in axillary whorls or terminal spikes subtended by bracts and bracteoles. Calyx tube ovoid, limb subequally 5-lobed, persistent. Corolla funnel shaped; tube short, gibbous at base, limb subequally 5-lobed, Stamens 5, epipetalous at the corolla throat. Stigma capitate; ovules many in 2-series in each ovarian cell. Fruits berries, oblong or subglobose, 5-8 celled. Seeds minute, many per fruit, testa crust-like and shiny.

Key to the Species

1a. Flowers in whorls set in spikes or in axillary clusters……..2

2a. Interpetiolar stipules absent; flower-whorls set in a drooping axillary or terminal spikes; involucral bracts purple or reddish purple ……**2. *L.formosa***

2b. Interpetiolar stipules present, stem and branches solid; flower-whorls set in a subspicate or head-like or pseudoverticillate axillary clusters; involucral bracts leafy……3

3a.Branches conspicuously fistulose; stamens pubescenteven along connective ……..... **1. *L. dibangvalliensis***

3b. Branches solid;; stamens lacking such pubescence ……**….5.*L.stipulata***

1b.Flowers in pairs on spikes:

4a. Interpetiolar stipules present; petioles less than 4mm……. **3. *L. glaucophylla***

4b. Interpetiolar stipules absent; petioles exceeding 4mm.....**4. *L. gracilis.***

1.*Leycesteria dibangvalliensis* S.K.Das & G.S.Giri. 1991. J. Bombay Nat. Hist. Soc. 88: 265 publ. 1992. Hajra *et al.,* (Ed.) in Materials for Fl. Arunachal Pradesh 1:558.t. 123.1996.

Type: Arunachal Pradesh, Dibang valley district, Tiwari Gaon, Mahao Sanctuary, c. 1500m, 3.1.1988. S.K. Das 2903 (Holotype CAL); S.K. Das 2903a-2903d (Isotypes ARUN)

Scandent shrubs, 1.5 -2.5 m tall, branches conspicuously fistulose, glandular pubescent at nodes. Leaves opposite, superposed, ovate to ovate-lanceolate, dentate, reticulations prominent, alveolate and pubescent beneath, stipules interpetiolar, foliaceous, unequal in pair, suborbicular, subentire, somewhat adnate to the petiole. Flowers sessile in axillary pseudoverticillate clusters shorter than the subtending leaves, bracts covered by stipules,bracteoles in 2-whorls, in outer whorl 4, those in inner whorl adpressed with receptacle; receptacle ferruginous-glandular pilose, slightly curved. Calyx connate with the ovary, shortly tubular, up to 2mm long, spreading distally into 5 minute unequal lobes, densely ferruginous- glandular pubescent. Corolla whitish, glandular pubescent, tubular campanulate, up to 1.5cm, proximally gibbous with 5 nectaries, long.Stamens 5, epipetalous with anthers near throat, basifixed, pubescent even along connective. Ovary 5 chambered, pubescent; style straight, barbate at base; stigma capitate or somewhat unequally lobed.

Flowering: December to January.

Fruiting: Yet to be recorded.

Distribution: Dibang Valley; 1400-1600m' in secondary forests at about 1500m altitude.

Specimen examined: The authors were unable to collect any specimen from the field. The species seems to be very rare. So the description had to be based on the Isotypes [S.K. Das 2903a-2903d] preserved at the Arunachal Pradesh Field Station, Botanical Survey of India, Itanagar (ARUN).

2. *Leycesteria formosa* Wall. in Roxburgh, Fl. Ind. 2:182.1824; C.B. Clarke in Hook.f., Fl. Brit. India3:16.1880; Osmaston, Forest Fl. Kumaon 284.1927; Parker, For. Fl. Punj. ed.3.274.1956; Banerji in Rec. Bot. Surv. Ind. 19(2): 50.1966; Gupta, Fl. Nainitalensis 160.1968; Hara in Fl. E. Him.317.1966, 124.1971; Nair, Fl.Bash. Himal. 129.1977; Matthew, Fl. Pl. Kurseong 41.1981; Polunin and Stainton, Fl. Him. 165. 1984; Naithani, Fl. Chamoli 1: 274. 1984; Chowdhery *et* Wadhwa, Fl. Himachal Pradesh 1:334. 1984; Mukherjee, Fl.Pl. Darjiling 109.1988; Grierson and Long in Springate, Fl. Bhutan 2(3):1355.2001; Pusalkar and Singh, Fl.Gangotri National Park.333.2012.

Common name: Himalayan Honeysuckle, Himalayan Nutmeg, Bhenkew in Chamoli of Uttarakhand.

Type: Napaul (Nepal), Nathaniel Wallich, s.n. (Syntype, BM000648032).

A deciduous undershrub, upto 3m in height. Stem fistular, hard and glaucous. Branches almost from base, stout, fistular. Leaves simple, opposite, ovate, 13-15 x 4-5 cm, dark green, irregularly dentate, acuminate, whitish beneath, glabrescent; petiole distinct, pinkish; exstipulate. Flowers 3 in sessile cymes arranged in opposite pairs in nodes of drooping axillary or terminal spikes; peduncle up to 3cm pubescent and sometimes glandular hairy along with bracts and sepals. bracts large, leafy, up to 2.5cm, purple or reddish purple; bracteoles variable. Calyx connate at base or up to mid way; lobes lanceolate to deltoid, Corolla funnel shaped, 5- short lobed, white, red- purplish to whitish pink, not exceeding 2cm.Stamens 5, not exceeding corolla tube, dorsifixed, epipetalous. Ovary 5 chambered, densely glandular hairy, style longer than corolla tube, glabrous. Fruit a 5-celled berry, dark red becoming blackish purple, subglobose, 5-6mm wide, crowned by persistent calyx teeth. Seeds numerous, minute, oblong, ca. 1mm, translucent.

Flowering and fruiting: June to October.

Field notes: Grows in scrublands as well as amidst grasses in open places in well drained moist shady slopes, often found to form thickets and provide nesting sites to birds.

Distribution: Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, Darjeeling stretching up to Arunachal Pradesh [1500-3000m]. Bhutan. Introduced in Tasmania in Australia's south coast, New Zealand and England..

Use: In Garhwal Himalaya toy flutes and trumpets are made from the hollow stems.

Specimens Examined:

Palmooghra**,**YHb(LBG),Jalapahar(Darjeeling),2250m, Mukherjee 344, East of Phalut, 10,000', I.H. Burkill 25319(CAL), Darjeeling, Anonymous 8539(CAL), Gromfoliar, G.King 4786(CAL), Yoksum to Rampook, 5-6000', T. Anderson 661(CAL); Senchal (2100m) forest, 2100m, Acharya and Mukherjee60 (BURD) ; . Bipin Balodi, 10299 (ARUN)Helmet Top, 2200m, R.Gogoi,21659, (ARUN)Kibithu, Anjaw,A.P., R.Gogoi,24173, (ARUN)Gumpa Hill, Lumla,Tawang district, Dr.J.Lal,L97, (ARUN) Bomdir, Near Stream, Tawang district, Dr.J.Lal,2247, (ARUN) Mukto, Tawang district, Dr.J.Lal,2429, (ARUN); Morsing, Kameng F.D. Arunachal Pradesh, G. Panigrahi 15718 (ASSAM); Bomdila Camp, on the way to Dirang Dzong, Kameng F.D., Arunachal Pradesh, G. Panigrahi 6866 (ASSAM); Kameng F.D., Arunachal Pradesh, Rolla Seshagiri Rao 8091 (ASSAM); Senge,3300m, Kameng F.D., Arunachal Pradesh, J.Joseph 40128 (ASSAM).

3. *Leycesteria glaucophylla* (Hook.f. et Thoms.) Clarke in Hook.f., Fl. Brit. India3:16.1880; Hara in Fl. E. Him.317.1966, 124.1971; Grierson and Long in Springate, Fl. Bhutan 2(3): 1355.2001.Pal, Fl. Lower Subansiri Dist., Arunachal Pradesh 1:385.2013. *Leycesteria glaucophylla* (Hook.f. et Thoms.) Clarke in Hook. f., Fl. Brit. India 3:16.1880; Hara in Fl. E. Him.317.1966, 124.1971; Grierson and Long in Springate, Fl. Bhutan 2(3): 1355.2001. *Lonicera belliana* W. W. Sm.; Trans. Proc. Bot. Soc. Edinb. 24: 173, t. 13 1911. *Lonicera glaucophylla* Hook. f. and Thomson in J. Proc. Linn. Soc., Bot. 2: 165 1858.

Leycesteria glaucophylla var. *thibetica* (H.J. Wang) J.F. Huang *Fl. Xizang.* 4: 509. 1985. *Leycesteria thibetica* H.J. Wang in *Acta Phytotax. Sin.* 16(4): 125–125, pl. 1 1978.

Type: Sikkim, India, 07.1812, Hooker, J.D. 6. (Holotype. K000076888; Isotype A 00105486)

A large closely branched shrub, 1- 2m in height. Stem and branches slender, fistular. Leaves opposite, lanceolate or ovate-lanceolate, up to 10 × 6 cm, sinuate-dentate, glaucous but abaxially pubescent, margin sparsely serrate, apex acuminate to caudate, base rounded; shortly petioled, 1-2mm; stipule variously developed, reniform to suborbicular or inconspicuous. Flowers white, in 1-2 pairs few in axillary pinkish spike; bracts 3 per flower; 2 involucral bracts leaflike, ovate to lanceolate, 5-6mm long. Calyx 5, connate at base; lobes lanceolate, 5-7 mm. Corolla greenish or pale yellow to white, funnel-form, 1-2 cm, hairy outside; lobes ovate, ca. 4 mm. Stamens slightly shorter than corolla; filaments hairy in lower half. Ovary 4- 5 mm with a short beak at apex, densely pubescent with shorter glandular and long non-glandular hairs, 5-celled, ovules more than one in each cell; style as long as corolla and hairy in lower half. Fruits yellow-green berry in axillary raceme, ovoid-ellipsoid, 1.5 × 1 cm, pubescent with glandular trichomes. Seeds small, numerous, yellowish brown, ovoid.

Flowering and fruiting: March to November.

Field notes: Found to occur in moist peripheral parts of broad-leaf forests in hill slopes, somewhat rare.

Distribution: Sikkim, Arunachal Praesh [1800-3000 m]; Nepal, Bhutan, North Myanmar.

Specimens examined: Karponang, Ribu and Rhomoo 4676(CAL); KarponangYHb (CAL); Sandamjuk, Dr. Prain's collector (CAL); Ressasum, Ribu and Rhomoo 3720(CAL); Sim long, T.Anderson 84(CAL); Ruchi La, Riba 437(CAL); Delei valley (Arunachal Pradesh),1928. Capt.F.Kingdon Ward 8307 (K000076882 and000076883) ; Karponang, 9500', W.W.Smith s.n. Kumba Forest, Nathula Road, Gangtok, K.Tothathri 9483; Nechiphoo,West Kamang district,1600m, G.D.Pal,6053, (ARUN), Tale Valley, Lower Subansiri district, G.D.Pal, 77725 (ARUN). Karponang, 8000', Ribu and Rhomoo 4676(CAL), Chota Rimitti, 7000', J. S. Gamble 7457(CAL), Tombong, T. Anderson,MD 1633(CAL), Ruchira, Ribu 737(CAL), Lower Tonghu Forest, 7000', C. G. Roger 5(CAL), Forest around River Kherem, Lohia, B. Krishna 48752(CAL);Sikkim, R.Seshagiri Rao 701(CAL), 4th Mile towards Nathula Road from Gangtok, B.Krishna 2185. (CAL), Darjeeling, S.N. Basu, 6219(CAL), Near Chhangu Lake,Sikkim, Acharya 381 (BURD); Tonglu, 3070m, Acharya and Mukherjee 544 (BURD).

4. *Leycesteria gracilis* (Kurz) Airy Shaw in *Icon. Pl.* 32: t. 3166 t. 3166 1927. in Kew Bull. 1932: 174 1932. *Lonicera gracilis* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 39: 77. 1870.

Type: Sikkim Kurz, W.S. s.n.. Isotype K000076885.

A shrub with fistular branches, up to 2.5 m in height. Leaves opposite, ovate-lanceolate, 7-12 × 2.5-6.5 cm, margin with shallowly undulate or remotely dentate, acuminate, dorsally almost glabrous being sparsely pubescent on veins, ventrally glaucous ; base rounded to subcordate; petioles 5-10 mm; interpetiolar stipules absent. Flowers in 2-6 pairs set in a pedunculate, axillary, pendent spike; bracts 3 per pair of flowers; bracts ovate-lanceolate or lanceolate, 2-3mm long, glandular ciliate. Calyx shallowly cupular in lower part; lobes linear-lanceolate to lanceolate, 1.5-2 mm, often glandular ciliolate. Corolla white, tubular-campanulate, 1-2 cm, glabrous; lobes

orbicular-ovate, 5-7 mm. Stamens 5, not exceeding corolla. Ovary 5-6 mm, with a short beak at apex, 5 or more celled; ovules more than 1 in each cell; style prolonged beyond corolla. Fruits berry, red, turning bluish purple, oblong or ellipsoid, 1-1.3 cm. Seeds minute, subglobose, ca. 1 mm wide.

Flowering and fruiting: September to March.

Field notes: Found along moist hill slopes, rare in occurrence.

Distribution: Eastern Himalayas: Sikkim, Darjeeling [1800m to 3000m], Nepal to Bhuan.

Specimens examined: Maenam Wildlife Sancturay, Anon.32064 (BSHC); Maenam Wildlife Sancturay,Yangong, Anon.31769 (BSHC); Karponang to Kyangnosla,East Sikkim, Anon., 22691(BSHC); Lamedurah, Acharya and Mukherjee 528 (BURD);Gairibas, Acharya and Mukherjee 534 (BURD);Tonglu, 3070m, Acharya and Mukherjee 542 (BURD);Tonglu, 3070m, Acharya and Mukherjee 544 (BURD).

5. *Leycesteria stipulata* (Hook.f. et Thoms.) Fritsch. in Engl., Die Natürlichen Pflanzenfamilien IV, 4:169.1891; Brandis, Indian Trees 360, 1906; Hara in Fl. E. Him.318.1966, 125.1971; Matthew, Fl. Pl. Kurseong 41.1981; Grierson and Long in Springate, Fl. Bhutan 2(3):1355.2001.*Lonicera stipulata* Hook.f. et Thoms. In Journ. Linn. Soc.2:165.1858.*Pentapyxis stipulata* **(**Hook.f. et Thoms.) Clarke in Hook. f., Fl. Brit. India 3: 17.1880; Mukherjee, Fl. Plants of Darjiling 109.1988.

Type: Sikkim, Hooker, J.D. s.n. (Holotype, K000076878)

An erect shrub. Stem and branches solid with a dense wooly pubescens. Leaves distichous, opposite, ovate-lanceolate, 10-20 X 5-7 cm, sinuate-toothed, acuminate, with prominent nerves; stipules very large, leafy, orbicular. Flowers white, axillary, in very shortly peduncled or sessile, woolly-pubescent subspicate or head-like clusters with 1–3, whorls of opposite 3-flowered cymes; involucral bracts many, leaf-like, orbicular-ovate to lanceolate, 3–5 mm, exceeding or as long as ovaries. Calyx subcampanulate, persistent; lobes 5, subequal. Corolla 5, tubular-funnel like, tube proximally gibbous, limb subequally 5-lobed. Stamens 5, epipetalous at corolla throat. Ovary 5-locular, with many ovules in each locule, style short and slender, stigma capitate. Fruit a pubescent, many seeded, 5-celled berry. Seeds ellipsoid, minute, testa rigid and shiny.

Flowering and fruiting: March to August.

Field notes: Found to occur in open scrublands as well in broad-leaf forests in hill slopes.

Distribution: Sikkim- Darjeeling Himalayas and adjoining areas [2000-2400m]; Bhutan, Myanmar.

Specimens examined: Senchal (2100m), YHb unmarked (LBG); Jalapahar, Darjeeling, 2200m, Mukherjee 349 (BURD); Gangtok, 2000m, A.Mukherjee 336 (BURD); Third Mile, Acharya and Mukherjee 50 (BURD); Ghoom,2225m, Acharya and Mukherjee 52 (BURD); Tiger Hill,2050m, Acharya and Mukherjee 53(BURD); Lamedurah, Acharya and Mukherjee 518 (BURD);Rambi Forest, 2325 m, Acharya and Mukherjee 519(BURD);Senchal, 2100m, Acharya and Mukherjee 551 (BURD).

DISCUSSION

The present study records 5 species of *Leycesteria* Wall. of Caprifoliaceae from India which are mostly restricted to the subtropical to subalpine regions of the Himalayan cradle stretching from Kashmir to the North East. The taxon is absent in other regions of India including the Western and Eastern Ghats. Interestingly *Leycesteria formosa* is

a widespread species stretching its residence from Kashmir to Himachal Praesh, Uttarakhand, Sikkim and Darjeeling (W.B.) and even extending up to Arunachal Pradesh in the North East. However *Leycesteria dibangvalliensis* seems to be highly restricted in distribution since its existence has been documented with all circumstantial evidences from Dibang valley of Arunachal Pradesh by S.K. Das and G.S.Giri (1991) for the first time. The remaining 3 species, i.e., *Leycesteria glaucophylla, Leycesteria gracilis* and *Leycesteria stipulata* prefer the Sikkim Haimalya for their accommodation. Analysis of the flowering and fruiting periods of the concerned species reveals monsoon season (mid-March to mid-November) to be utilized by most for the purpose. It is also interesting to find that both pre-and post-monsoon seasons are utilized by *Leycesteria gracilis* for flowering and fruiting. *Leycesteria dibangvalliensis* flowers in the winter months of December and January. Fruiting of the species is yet to be recorded. The reproductive biology of the species of *Leycesteria* thus, thus covers the whole calendar year indicating a temporal partitioning of flowering response among its species for better use of available resources and in reducing competition even for the utilization of pollinating agents.

In Garhwal Himalaya toy flutes and trumpets are made from the hollow stems of *Leycesteria formosa.* The habit as well as the habitat of *Leycesteria* suggests its ecological service rendered to goats and other cattle under domestication and to wild herbivores by providing them with foliages to eat. Again in form of shrubberies they provide nesting and mating facilities to tiny humming birds and maintain excellent coordination with other members of the biodiversity they share. The most noteworthy aspect that emanates from the distribution pattern of *Leycesteria* is that the taxon exists in two among the three Biodiversity Hot Spots, viz. the Himalaya and the Indo-Burma, thus deserving topmost priority for conservation. Species to have been perceiving high levels of threat include *Leycesteria dibangvalliensis, Leycesteria gracilis* and *Leycesteria glaucophylla*. A thorough ecotaxonomic surveillance in the Himalaya covering all such rare and threat perceiving taxa is deemed very essential.

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