REVOLUTION OF THE GENUS SCILLA L. IN INDIA (LILIACEAE)

D. B. DEB AND SYAMALI DASGUPTA

Botanical Survey of India, Howrah

ABSTRACT

The paper presents a taxonomic revision of the genus Scilla L. (Liliaceae) in India. 3 species are described with all synonyms, illustrations, original citations and references to Indian regional floras. A key to the species is given. Distribution, phenoology and ecology of the taxa are worked out. Types are indicated and exsiccatas studied are cited. Scilla giffithii Hochr. is reduced to a synonym of S. hohenackeri Fisch. et Mey. Ledebouria Roth is treated as a subgenus under Scilla L.

INTRODUCTION

Linnaeus described the genus Scilla in 1735 in Systema Naturae on the basis of Lilio-hyacinthus Tournefort and Hyacinthus stellaris Raji. Subsequently he treated it in Species Plantarum (1753) and Genera Plantarum (1754) and thereby validated the generic description.

He described 8 species (1753), of which S. maritima was removed by Steinhilh (1834) for erecting the genus Urginea and was named Urginea scilla Steinh. in Ann. Sc. Nat. Ser. 2, 1: 321. 1834. S. unifolia L. was placed by Kerr-Gawler under the genus Ornithogalum L. and was changed to O. unifolium (L.) Kerr-Gawl. in Bot. Mag. t. 935. 1827. Roth (1821) postulated the genus Ledebouria from India by distinguishing it from Scilla L. for distinction in perianth and number of seeds in the capsule. Baker (1873) and Bentham & Hooker (1883), however, reduced this taxon to a subgeneric status under Scilla L. Recently Jessop (1970) and Ingram (1971) working on South African material revalidated the generic status of Ledebouria Roth. They considered certain points of distinction, which were not recognized in this regard by any worker earlier. They distinguished Ledebouria thus: Leaves frequently spotted; inflorescence flexuous, softer and axillary, flower greenish; filaments free from one another; ovary conical, stipitate and with 1-2 basal ovules in each locule. They (i.c.) delimited Scilla for uniformly green leaves; erect rigid terminal racemes; bluish flowers; filaments united towards the base, and oblong, ssisile ovary with ovules usually several, rarely 2, per locule in axile placentas. In course of this study, it is observed that size, shape and markings of leaves, and colour and size of the flower may vary even in the same species. Globose ovary and perigonous, distinct filaments are found in the members of both the groups. The ovary may be ssisile as well as substipitate in Scilla. Two ovules in each locule of the ovary may be present in both the groups. Thus the differences are reduced to the characteristics of inflorescence and placentation. These characters do not appear to be of taxonomic significance at the generic level. Therefore, following Baker (1873) and Bentham & Hooker (1883) Ledebouria Roth is treated here as subgenus of Scilla L.
Jussieu (1789) placed Scilla L. under the order (now treated as family) Asphodeloideae. Reichenbach (1828) postulated the tribe Scilleae and placed it under Asphodeloideae. He included 13 genera under this tribe. Lindley (1836) followed Reichenbach (l.c.) but Endlicher (1836) did not recognise Scilleae. He postulated the tribe Hyacinthae and placed this genus under it. Kunth (1843) followed Endlicher (l.c.) in recognising the tribe but placed it under the order Asphodeloideae distinguished from Liliaceae. Baker (1871, 1873) subdivided the bulbous Liliaceae with racemose inflorescence into two groups gamophyllous Hyacinthae and polyphyllous Scilleae and placed this genus under the latter. Bentham and Hooker (1883) did not recognise gamophyllous and polyphyllous series and kept Scilla L. with allied genera under Scilleae. Engler and Prantl (1930) placed it under the subfamily Scilloideae. Hutchinson (1960) kept it under Scilleae.

The present paper is based on the specimens deposited in the Indian as well as some foreign herbaria. The area under consideration covers India and adjoining region. It is considered worthwhile to present here a key, to the genera of Scilleae to facilitate the determination of the taxa, even though Drimiopsis and Ornithogalum are not found in India.

Key to the genera of Scilleae

1. Perianth tube absent; filaments adnate to the base of the perianth lobes
2. Seeds not flat; lower bracts not spurred
3. Seeds few; filaments perigynous
4. Bulb scales membranous and loose
4'. Bulb scales scarious and compact
5. Inflorescence axillary, flexuus; placentation basal
5'. Inflorescence terminal, rigid; placentation axile
6. Seeds many; filaments hypogynous
2'. Seeds flat; lower bracts spurred
1'. Perianth tube present; filaments adherent to the perianth tube


Type species: Scilla bifolia L. from Europe.

Herbs small, bulbous, scapigerous; bulb globose or ovoid, tunicated or imbricated, bitter to taste, outer scales dry, papery, inner fleshy. Leaves synanthus or hysterahtus, petiolar or sessile, oblong, lanceolate or lorate, gradually narrowed towards the apex, entire, acute or obtuse. Scape one or more, as long as the leaves, narrow, terete, glabrous. Inflorescence raceme, loose and few flowered or dense and many flowered. Flowers campanulate; pedicle outspreading; bracts small, single or in pair, opposite, lanceolate or deltoid, or obovate, often spurred. Perianth biseriate, segments 6, connate at the base, lanceolate, uninnervet, persistent, acute. Stamens 6; filament filiform, free from one another, attached at the base of the perianth segments; anthers small, oblong, dorsifixed, introrse. Pistil syncarpous; carpels 3; ovary stipitate or stipitiate, globose to ovoid, trilobed, trilocul'ar, 1-4 ovules in each locale: style as long as the ovary or longer, filiform; stigma triquetrous, curved or capitate. Fruit capsule, small, trilocular, loculicidal; pericarp brown. Seeds few, not flat, not winged, obovoid, brown.

About 80 species, distributed in temperate Eurasia, South Africa, and a few in tropical Africa (Airy Shaw 1966). 3 species representing 2 subgenera are found in India.

Cytology: Raghavan & Venkatasubban (1939), Sheriff & Murthy (1946) and Sundar Rao (1953, 1954, 1956) investigated on the cytology of this genus and found that the chromosome number is very variable 2n = 30, 44, 45, 58, 60 in S. hyacinthina while 2n = 10 in S. hohenackeri (Sundar Rao 1954, 1956).

Key to the species

1. Bulb tunicated; raceme loose; pedidel long, stout; 3-6 ovule per locale in the ovary
   2. Synanthus; inflorescence 4-20 flowered; perianth violet, blue or mauve... hohenackeri
   2'. Hysterahtus; inflorescence approximately 40 flowered; perianth pinkish-green... viridis

1'. Bulb imbricated; raceme denseflowered; pedicle short, filiform; 1 ovule per locale in the ovary... hyacinthina

Subgenus I—Scilla.

Type species: S. bifolia L. from Europe.

Inflorescence little rigid, terminal, ovule 3-6 per locale of the ovary, seeds 3-4 in each locale of the capsule.


Herbs bulbous, scapigerous; bulbs 2-3 x 1-2 cm, ovoid, tunicated, scarios, shining white to rusty white in colour, without fibrous apices. Leaves radical, 4-6 in number, synanthus, 10-32 x 2-1 cm, linear-lorate, gradually narrowed towards the two ends, acute at the apex, never spotted. Scape 1 or 2 on each bulb, 15-45 x 2-3 cm, terete, erect, glabrous. Inflorescence simple, loose raceme, 4-20 flowered, on the upper 4-10 cm of the scape. Flowers campanulate, 0.9-1.5 cm long; bracts paired, ± 4 mm long, deltoid or lance-
Fig. 1: Selina hohenackeri Fisch. et Mey. (a) Plant, (b) flower, (c) bract, (d) fruit, (e) seed.
olate, scarios, entire, acute, blue to mauve in colour; pedicel 1-1.5 cm long, linear, outspreading somewhat drooping. *Perianth* biseriate, segments 3, in each whorl, connate at the base, lanceolate, slightly hooded, acute, entire, uninnerved, blue to mauve in colour. *Stamens* 6, free, arising from the base of the perianth segments, blue to mauve in colour; filaments all equal, 3.5-4.5 mm, filiform, broader at the base and attenuated at the apex; anther 1.5-2 x 7 mm oblong, dorsifixed; *pollen* 54-65 µ x 32-49 µ, oblong, finely reticulate. *Pistil* syncarpous; carpels 3; ovary 1.3 x 1-3 mm, globose-oblong, 3 lobed, trilocular, 3-6 ovules per locule, axile in placentation; stipe less than .5 mm; style 4-5 mm long, linear; stigma trigonous. *Fruit* capsule, small, 5.6 x 7.8 mm, ovoid, obovoid or globose, trilocular, trisepitate, deeply trilobed, loculicidally dehiscent, brownish yellow in colour, 3+4 seeds in each locule. Seeds 2.5-3 x 1 mm, obovoid, brownish black, not shining, not flat, wingless; seeds of different locules mature at different time.

*Flowering time*: March-April.

*Fruiting time*: April-May.

It flowers in March at places up to 1000 m in altitude and in April when growing above.

*Cytology*: Sundar Rao (1954, 1956) investigated the cytology of this species and found the chromosome number as 2n = 10.

*Ecology*: Plants are found on hills between 660 m and 1500 m in altitude on rocky sides or crevices, grassy or fallow fields on the hill side, sometimes in association with holly-oak.

*Distribution*: This plant has been collected from Jhelum valley in Kashmir at an altitude of 600 m and Mingora in Gujerat at an altitude of 1000 m. This plant has also been collected from Rawalpindi, Peshwar, Chitral, Landikotal at an altitude of 850 m-1500 m in Pakistan and Khyber Pass at 1200 m in Afganistan.

*Note*: Hurt in Curtis Bot. Mag. 179(1): t. 621. 1972 maintained *S. griffithii* as distinct. The authors do not agree to it as the distinguishing characters enumerated by him are not tenable. Inflorescence is 5-15 flowered in *D. L. 707*(E), other points are mostly ecological or are intergrading and not distinguishable.

*Herbarium sheets examined*: KASHMIR: Jhelum valley, 600 m, 16.3.42, Ludlow & Sheriff 8578 (BM). GUJERAT: Mingora, 1000 m, 12.4.1954, Ali 26044 (BM). AFGANISTAN: Griffith s. n. (CAL); Khyber Pass 1210 m, 13.4.1897, Johnston 100 (E), PAKISTAN: Peshwar, 1878, Dalzell s. n. (DD); Rawalpindi, 1871, Aitchison 1213 (DD); Peshwar, 1927, Rodger s. n. (DD); Mala kand, March 1908, Dean s. n. (K); Mirkhani Chitral, 1500 m, 24.4.1958, Stainton 2286 (E & BM); Landikotal, 865 m, 30.3.42, DL 707 (E); 1922, Drummond 26554 (E); Arandu, Chitral, 1170-1330 m, 1910, Topbin (K).

2. *Scilla viridis* Blat. & Hallb. in Jour. Ind. Bot. Soc. 2: 52. 1921 (*Tybe-Khandala*, September 1918, McCunn 14500 (BLAT)).

*Herbs* perennial, bulbous, scapigerous; bulb 5 x 4 cm, ovoid globose, tunicated, pale green, solid, somewhat bitter in taste, but smelling like potato; roots up to 10 cm long, strong, cylindrical, pale coloured, arising from the basal disc of 15 mm diam. Leaves hystearanthus. *Scape* 50 cm high, slender, terete, shining, yellowish purple. *Inflores- cence* raceme loose, about 40 flowers arising from the upper half of the *scape*: 1/8 of the *raceme* with open flowers. *Flowers* 15 mm in diam. stellate, pinkish, bract in pair, deciduous, ± 2 mm long, small, narrow, keeled, obtuse, reddish, lower surface hardened; pedicels 10-15 mm long, strong articulated, sub-reflexed towards the apex. *Perianth* pinkish, segments 6, subequal, outer 3 little broader, oblong, subacute, inner 3 blackish green in colour, oblong, obtuse; midrib thick. *Stamens* 6, adnate to the base of the perianth; filaments broader on the upper part; anthers small, 1.5 mm long, oblong, dorsifixed, introrse, slightly decurved after deh-
scence. **Pistil** tricarpellary; ovary ovoid, subtrigonal, trilocular; ovules 3-4 in each locale; style as long as ovary, trigonous, clavate; stigma small, triangular, knob like, centrally depressed. **Fruit** not seen.

Leaves and bulbs brought by Mr. C. McCann from Khandala, in Western Ghat in September 1918. This flowered in March 1919 in St. Xaviers' College, Bombay. This plant has not been collected since its discovery. It does not appear to have persisted under cultivation.

**Subgenus 2. Ledebouria**

Type species: **Scilla hyacinthina** (Roth) Macbride from India. Inflorescence flexuous, axillary; ovule 1 per locale of the ovary and 1 seed per locale of the fruit.


**Herbs** bulbous, scapigerous; bulb 1.5-5.5 x 5-3 cm, ovoid, imbricated, outer scales scarios, dull white, inner fleshy, cream coloured, without fibrous apices, bitter to taste, often two bulbs are found at a time. **Leaves** radical, 2-5 in number, 3-18 x 5-4 cm, petiolate or sessile, very variable in shape, from linear to lanceolate, ovate or obovate, acute or obtuse; petiole when present 1-4 cm long; leaves often maculate with dark red patches; bulbils are often formed at the tip of the leaves and roots develop from the base of the bulbils; sometimes adventitious roots develop at the tip of the leaves without formation of bulbils. **Scape** 6-22 cm long, as long as the leaves or longer, 1 or 2 per bulb, flexuous, soft, terete, slender, glabrous axillary. **Inflorescence** dense raceme of numerous flowers, on upper 3-12 cm of the scape. **Flowers** minute, 0.5 cm long, campanulate, greenish pink in colour; bracts 1 mm long, obovate, scarious, serrated, bifid above; pedicel 4-1 cm long, small, filiform, outspreading, base broader, scarious, pink coloured. **Perianth** 6, biseriate, 3 in each whorl, connate at the base, lanceolate, acute, uninnerved, green tinged with red inside at the base. **Stamens** 6, filament ±4 mm, free, arising from the base of the perianth, filiform, attenuated at the apex, deep purple in colour; anthers 75 x 0.5 mm; oblong, dorsifixed, introrse; pollen 37-41 μ x 24-28 μ, oblong, finely reticulate. **Pistil** syncarpous; carpels 3; ovary ±1 x 1 mm, globose, trilocular, trilobed, stipitate; ovules 1 in each locale basal in placentation; style ±0.5 mm long; style 3.5-4 mm long, filiform; stigma triquetrous, curved. Flowers on the lower portion of the inflorescence sometimes undergo modification to small bulbils wherein perianth is much reduced in size, while stamens and carpels are sterile and vestigial. **Fruit** capsule, brown, ±5 x 5 mm, obovoid, trilocular, unequally trilobed, with one seed in each locale, loculicidally dehiscent. **Peri-** anth and stamens are persistent in fruit. **Seeds** ±3 x 3 mm, obovoid, brown in colour; wrinkled, wingless, neither flat nor angular; seeds of different locules mature at different time.

**Flowering time:** April to November.

**Fruiting time:** June to January.

During summer hot wet wind from Ara-
Fig. 2: *Scilla hyacinthina* (Roth) Macbride: (a) Plant, (b) flower, (c) bract, (d) fruit, (e) seed.
bian sea blows from S. W. to N. E. direction causing rain in the S. W. coast of Deccan in May-June, and in Maharashtra, Andhra, and Tamil Nadu in July-August, when the plants flower in the respective places. In the same way hot wet wind from the Bay of Bengal causes rain in Orissa and Bihar in May-June, which blows towards N.N.W. direction causing rain in July-August and influences flowering of the plants in the environment. Retreating monsoon causes rainfall in winter in Tamil Nadu and Andhra where this plant flowers in November.

Ecology: This plant grows on sea coast (rising up to an altitude of 840 m) on sandy soil or on rocky ground on bare laterite or red gravelly soils amongst the grasses or at the outskirts of the forest. It sometimes grows in association with Iphigenia Kunth, Chlorophytum Ker. and Cyanotis D. Don. In moist situation leaves touch the ground and form roots and bulbils.

Local names: Various local names have been given to Scilla hyacinthina (Roth) Macbride in different states of India. It is called Suphaadi Khus in Bengal, Buikonda, Bolhkanda, Paharikonda, Nanijangliikonda, Lahanakonda in Bombay, Shirunarivengayam, and Narivengayam in S. India and Korekhonda in Madhya Pradesh.

Uses: It is used as a substitute for Urginea indica Kunth in cardiac drugs, and also for polishing new clothes and threads for weaving.

Distribution: This is widely distributed from Mirzapur, Uttar Pradesh in the north, down to Ceylon, extending to the Western and Eastern coasts, and to Kalahandi of Orissa and Hazaribagh and Manbhum of Bihar to the east.

Herbarium sheets examined: MAHARASHTRA: Bombay Presidency, Gibson s.n. (CAL); Concon, Stock s.n. (CAL); Bombay, 1.8.1912, Babu bala (BSI); Alandichakan, Khcd taluk, 9.6.1963, R. S. Rao 85287 (BSI); Poona, 28.7.62, A. S. Rao 39529 (BSI); Apsion hill, Maripur, Khandesh, 10.7.1957, Mahajan 20234 (BSI); Katraj, 16.6.56, Puri s.n. (BSI); Khandesh, 14.7.1957, Mahajan 20382 (BSI); Chaturshingi hills, Poona, 16.7.1910 (BSI); Dharwar, 20.5.1905, Bhide 16696 (BSI); Shivneri hills, Junar, 17.6.1965, Ansari 88792 (BSI); Bhikauli forest, Mahabaleswar, 2.6.60, R. S. Rao 62292 (BSI & E); Shivneri fort. South Junnar, 24.6.1964, Hemadri 94322 (BSI); Nasik, 12.7.67, Cherian 111135 (BSI); Nasik, 13.7.67, Cherian 111196 (BSI); Alandi, Deccan, June 1893 (K); South Maratha,
Woodrow s.n. (K); Chaturshingi hill, Poona, 15-6.1917, Ezckiel 30576 (BLAT); National Park, Biroli, 27-6.1953, Fernandez 1303 (BLAT); Andheri, Makalcaves, Salsette, 7-7.45, Santapau 6767 (BLAT); Malad Quarry hills, 17-6.55, Shah 4538 (BLAT); Chaturshingi hill, 28-6.54, Rukmini 153 (BLAT); Panchgani, 27-6.54, Rukmini 139 (BLAT); Bombay, 3-7.1955, Shah 4589 (BLAT); Venarlake, 5-7.1958, Merchant 589 (BLAT); Chakau, 28-6.1966, Janardhan 68572 (BSI); Base of Shivneri hill, 25-7.1963, Ansari 88681 (BSI); Deccan, 1884, Cooke 16 (CAL). TAMIL NADU: 16-8.1899, Watt 10035 (CAL); ibid, 14-6.1899, Watt 10036 (CAL); Nilgiri, 1859, Cleghorn s.n. (CAL); Annamalai, 600 m, 1866, Beddedome 7784 (BM, MH); Ootacamund, Feb. 1899, Bourne 3042 (K); Pulney Hills, September 1836, Wight (E); Courtlum, August 1835, Wight 949 (E); Ootacamund, 1857, Cleghorn s.n. (E); Nartaramalai, Wight s.n. (E); Vellore, August 1833, Griffith s.n. (CAL, MH); Shanikulam, 5-9.1899, Barber 787 & 788 (MH); Gingee R.F., 120 m, 4-8.1961, Ramamurthy 18009 (MH); Vemmaniyathur, 21-8.1930, Narayanswamy 4086 (MH); Hogainakkal Forest, 275 m, 12-7.1964, Vajravelu 20579 (MH); Krishnagiri, 22-9.1917, Jacob 14891 (MH); Sehanapuram, 333 m, 1958, Sebastine 6268 (MH); Kollimalai, 28-6.1916, Jacob 13035 (MH); Kollimalai, 19-6.1916, Jacob 12910 (MH); Nartaramalai, 125 m, 23-9.1965, Ramamurthy 25933 (MH); Cavelong, 13-7.1890, Coll (?) sheet no. 52048 (MH); Poyakarai, 133 m, 20-9.1957, Subramanyam 4278 (MH); Madakupatti forest, 110 m, 16-8.1964, Ramamurthy 20949 (MH); Esani forest, 14-8.1964, Ramamurthy 20300 (MH); Kalakadu R.F., 300 m, 8-11.1962, Joseph 15185 (MH); Tiruchendur, 30-11.61, Sebastine 13726 (MH); Mundunthorai grassy hill, 200 m, 7-11.1969, Sebastine 9453 (MH); Peninsula Indiae Orientalis, Wight 2928 (CAL); ibid., Wight 1113 (E); Wight (MH).

ANDHRA PRADESH: Yerraconda hill, 25-7.1914, Ramaswami 1212 (CAL); Nellore dist., August 1883, Gamble 12252 (CAL, MH & BM); Kurnool dist., 260 m, July 1886, Gamble 17723 (K, BM & MH); Venkukonda, 27-8.1924, 17399 (MH); Nerbudda, 650 m, 23-6.1969, Subba Rao 31990 (MH); Horsely hills, 17-7.1957, Wagh 6389 (BLAT); Kodimial, 400 m, 17-7.1964, Subba Rao 200032 (MH); Balappal, 300 m, 19-7.1962, Ellis 14265 (MH); Guvvalcheruvu-Palkonda R.F., 985 m, 23-8.1958, Subramanyam 6433 (MH); Hyderabad, 1855, Campbell 104 (BM & K); Tirumalayapalem R.F., 150 m, 30-6.1965, Subba Rao 24507 (MH). KARNATAK: Mysore, 1855, Wight s.n. (E); Mysore, Walker Arnott C54 (E); Belgaum, 11-7.1885, Talbot 2278 (CAL); N. Kanara, 1882, Talbot s.n. (BSI); Belekeri, 10-6.1883, Talbot 504 (CAL & BSI); Kadra, 5-6.1885, Talbot s.n. (BSI); N. Kanara, 6-6.1879, Young s.n. (BM); ibid., 1-7.1882 (BM); Bandipur, 930 m, 22-4.1965, Nithani 23877 (MH). KERALA: Pavagada, 725 m, 12-5.1965, Ellis 24077 (MH); Walayar forest, 70 m, 12-7.1963, Joseph 17118 (MH). BHAR: Manbhum, June 1886, Campbell (CAL); Jinghani 600 m, 12-8.1953, Kerr 2072A (BM); N. Hazaribagh, 600 m, 9-6.54, Kerr 2072B (BM); ibid., 3-6-1951, Kerr s.n. (BM). ORISSA: Mandibisi, 660 m, 27-5-1044, Mooney 2509 (K); Khairatola, 80 m, Nastra Estate, 15-6.38, Mooney 811 (K). MADHYA PRADESH: Goorul, King 78 (CAL); Raipur, 22-6.1896, Marter (CAL); Cwaldor, August 1889, C. Maries 64 (CAL & BM); Kesla-Bangalore, 356 m, 22-7-1961, Joseph, 12824 (MH); Lalitpur, 11-7.1903, Kalkaprasad 20072 (BSIS); August 1903, Kalkaprasad 20274 (BSIS); Bhupal, 17-7.1903, Kalkaprasad s.n. (BSIS); Nagpur, 6-8.1917 (BSIS); Nagpur, 11-8.1917 (BSIS). CEYLON: Tha-waites 3829 (BM).

ACKNOWLEDGMENTS

The authors are thankful to the Directors of Royal Botanic Gardens, Kew and Edin-
burgh, Keeper, British Museum of Natural History. London, Officer-in-Charge, Systematic Botany Branch, Forest Research Institute, Dehra Dun, Prof. P. V. Bolc, St. Xaviers' College, Bombay and Heads of Regional Circles, Botanical Survey of India, for loan of specimens from their respective herbaria. Thanks are also due to the Director, Botanical Survey of India, for providing facilities to work out the genus.

REFERENCES

Endlicher, S. Genera Plantarum Ordines Naturales p. 139. 1836.
Griffith, W. Itinerary Notes (Posthumous publication) 2: 238. 1846.
Hooker, J. D. Flora of British India 6: 348. 1892.
Linnaeus, G. Species Plantarum 1: 308. 1753.
Pain, D. Bengal plants 2: 1074. 1908.
—Chromosomes of Scilla hongnackeri Fisch. et Mey. Ibid. 25: 63-64. 1956.
—Scilla indica in India. Ibid. 25: 164. 1956.
Reichenbach, Th. L. Conspectus Regni Vegetabilis p. 65. 1828.
Roth, A. W. Novo species Plantarum p. 194. 1821.