

A CONSPECTUS OF THE 74 TAXA OF COTONEASTER EHRHART EX MEDIC. (ROSACEAE) IN INDIA

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A B S T R A C T

Available evidence from cytology [$X=17$ $2n=34$ (3 spp.), $2n=51$ (3 spp.) and $2n=68$ (14 spp.)] judged against the breeding behaviour of the parental species and their F_1 hybrids, all suggest that *Cotoneaster* Ehrhart ex Medic. must be treated as a largely apomictic genus, in which recognition of 'micro-species', sensu Klotz (1957-Seq. 1978), is justified. The distributional data of the 74 taxa indigenous to India brings up 25 species as endemic (asterisked) to the Indian Sector of the Himalayas and one, viz., *C. buxifolia* Wall. ex. Lindl., to the Nilgiri hill ranges. A conspectus of the 74 species, arranged alphabetically with correct nomenclature typification, relevant synonyms and their occurrence in different Sectors/Zones of India, is appended.

Cotoneaster Ehrhart ex Medic. [Rosaceae Juss., subfam. Maloideae (Small) Weber (1964); Malaceae Small, 1903] is lectotypified with *C. integerrimus* Medic. (*C. vulgaris* Lindley, *nom. illeg. superfl.*, *Mespilus cotoneaster* Linn.) It is said to be represented by about 50 species (Airy Shaw, 1973) or about 60 spp. (Santapau and Henry, 1973) in the North Temperate regions of Europe and Asia. Of these, J.D. Hooker (1878) described only 11 species from, and Santapau & Henry (*l.c.*) attributed 25 species to, India. We have, however, listed more than 74 spp./varieties from the Indian Himalayas extending from Kashmir to Manipur; only one species, *C. buxifolius* Wall. ex Lindl., strays to the temperate altitudes of the Kodaikanal — Pulney — Nilgiri Hills in South India.

A critical analysis of the 74 species ('microspecies') occurring in India, Nepal and/or Bhutan shows that 48 species are with wider distribution, extending to Europe in West and China (not Japan) in the North

and Northeast. Of the 29 endemic species, 15 spp. are endemic to India proper, only one to Bhutan, and 7 to Nepal, whereas 6 additional species are restricted to India-Nepal-Sikkim-Bhutan sector.

It is noticed that of the 74 indigenous taxa, as many as 37 were described by Klotz between 1957 and 1978. It is difficult to comment on the validity or otherwise of Klotz's species in view of the fact, not only the types of many of his taxa are not available in India, but also because there is hardly adequate number of specimens in Indian herbaria to represent many of the species.

A critical appraisal of the cytological data available so far (Sax, 1954; Zeilinga, 1964; Flinck and Hylmo, 1966; Klotz, 1968 and Kroon, 1975) would show that diploids (3 spp.) are rather rare, triploids (3 spp.) are scarce, but tetraploids (14 spp.) are preponderant (with 3 species showing both $3x$ and $4x$ and one species, both $2x$ and $4x$).

The following table shows the grade of ploidy reported by different workers in respect of 29 of the 74 Indian taxa.

TABLE

Species	Chromosome number (2n =), as reported by					Nature/grade of Polyploidy
	Sax 1954	Zeilinga 1964	Flinck & Hylmo 1966	Klotz 1968	Kroon 1975	
<i>C. acuminatus</i>	34**	68	—	—	—	4x
<i>C. adpressus</i>	51**	34	—	—	—	2x
<i>C. affinis</i>	—	—	—	—	68	4x
<i>C. bacillaris</i>	68**	—	—	—	51	3x
<i>C. bakeri</i>	—	—	—	68	—	4x
* <i>C. buxifolius</i>	—	—	—	51, 68	—	3x, 4x
<i>C. cooperi</i>	—	—	—	68	—	4x
<i>C. falconeri</i>	—	—	—	68	—	4x
<i>C. frigidus</i>	34	34	out breed- ing species	34	—	2x
<i>C. franchetii</i>	68	68	—	—	—	4x
<i>C. hissaricus</i>	—	—	—	51	—	3x
<i>C. horizontalis</i>	51**	68	—	—	—	4x
<i>C. integerrimus</i>	51**	—	—	68	34, 68	2x, 4x
<i>C. integrifolius</i> (<i>C. thymifolius</i>)	—	—	68	—	—	4x
<i>C. insignis</i>	51**	—	—	—	—	3x
* <i>C. Lindleyi</i>	51**	—	—	—	—	3x
* <i>C. ludlowii</i>	—	—	—	68	—	4x
<i>C. marginatus</i>	—	—	—	68	—	4x
<i>C. meuseli</i>	—	—	—	68	—	4x
<i>C. microphyllus</i>	34**	768	—	—	68	4x
<i>C. multiflorus</i>	68	68	—	—	51	3x, 4x
<i>C. nummularioides</i>	—	—	—	51, 68	—	3x, 4x
<i>C. nitidus</i>	—	—	—	—	68	4x
* <i>C. prostratus</i>	—	—	—	—	68	4x
<i>C. roseus</i>	51**	—	—	68	68	4x
<i>C. rotundifolius</i>	51**	68	—	68	—	4x
<i>C. rubens</i>	51**	—	—	—	—	3x
<i>C. schubertii</i>	—	—	—	51	—	3x
* <i>C. simonsii</i>	51**	68	—	—	—	4x

*endemic to India

**not confirmed by subsequent workers

The cytologists, such as Broertjes (1956), Zeilinga (1964), Flinck and Hylmo (1966), Klotz (1968), and Kroon (1975) could not confirm Sax's (1954) findings. Zeilinga (1964) maintains that *Cotoneaster*

species are normally either diploids or tetraploids; triploidy is found only in varieties/cultivars showing a reduced fertility. Kroon (1975) agreed: "the *Cotoneaster* species are preponderantly tetraploids, only a small

number being diploids". According to them, the established ploidy level in most species differs from that found by Sax, probably because Sax determined the chromosome numbers on the basis of meiotic materials, which, as a result of the occurrence of multivalents, may present difficulties in interpretation for determining the somatic numbers. Thus, comments on the grade of polyploidy in *Cotoneaster* as reported by Sax (*l.c.*), is suspect. They report further that some diploids are self-incompatible and suggest that *C. bacillaris* (4x) might have arisen from *C. frigidus* (2x) by chromosome — doubling and that, *C. frigidus* has served as a 'parent' for the origin of several species.

While this is so, reports of apomixis in *Cotoneaster* Medic. complicates taxonomic delineation between allied species. Sax (1954), who observed a number of multivalents in his studies of meiosis, observed that seedlings raised by him always resembled the maternal parent. Sax also found that a number of species developed fruits and viable seeds after having the flowers de-styled. Flinck and Hylmo (1966), from their studies on the heredity pattern and cytology, confirm apomixis within the genus and maintain that this feature makes it difficult to recognise infrageneric groupings *viz.* sections and series.

Hjelmqvist (1962), from his embryological and cytological studies on seven species, also confirmed that the genus was predominantly apomictic; only *C. roseus* Edgew. was occasionally amphimictic. Kroon (1975) also confirmed Hjelmqvist's (*l.c.*) report of apomixis in the genus and observed that only *C. conspicuus*, *C. racemiflorus*, and *C. microphyllus* produce heterogenous progenies, although none of them, except *C. microphyllus*, showed any evidence of interspecific hybridisation. He, therefore, concluded that "in at least part of these species, the uniformity may be due to apomictic development" (cf. *C.*

horizontalis) and justified the principle for recognition of 'microspecies' in *Cotoneaster* Medic.

Flinck & Hylmo (1966) reported that only two of the Indian species *viz.* *C. frigidus* Wall. ex Lindl. and *C. conspicuus* Marquand did not breed true through seed propagation, they being outbreeders. They refer to Klotz's (1963) treatment and state "In our opinion, a number of microspecies are joined under *C. microphyllus*" Is then Klotz (1957-seq.) a "splitter"? Flinck and Hylmo (1966) would justify such 'splitting' into a relatively larger number of 'microspecies' as valuable, both for the theoretical plant geography and for the horticulture. That even minute variations resulting from hybridisation and polyploidy are "fixed" by apomixis is sufficient to ward off criticisms against Klotz as a "splitter"

Before apomixis was confirmed in *Cotoneaster* Medic., Turrill (1950) also experienced "notorious difficulty in the genus *Cotoneaster* to determine satisfactorily the limits of species." Since we do not know how far hybridisation happens in the wild, how plastic individual plants are, or how much intraspecific genetic variation occurs, there results a frequent difference of opinion between 'lumpers' and 'splitters'

It is generally conceded that China is the centre of distribution of *Cotoneaster* and that a concentrically diminishing number of species extend towards Europe and north Africa (Browicz 1959, Flinck & Hylmo *l.c.*). We may, therefore, visualise "the Himalayas" with as many as 26 endemic species as a secondary centre of origin and differentiation, if not as a more southerly extension of the primary Chinese centre of origin for the genus.

In the following pages, an enumeration of 74 species/indigenous to India, is provided in alphabetical order. The species are listed with reference to original literature /and relevant recent literature; the type(s) of each taxon is cited with the

herbarium acronym(s), wherever available. It is hoped that this conspectus of the genus will be an invaluable aid to the Indian botanists in particular.

INDIAN COTONEASTER EHRHART EX MEDIC.

(ROSACEAE)

1. *Cotoneaster acuminatus* Lindl., Trans. Linn. Soc. 13 : 101, t. 9(1821); J. D. Hooker, Fl. Brit. Ind. 2 : 385 (1878); Klotz, Wiss. Zeits. Univ. Halle. Math-Nat. 6 : 948 (1957); Ohashi in Hara & Williams, Enum. Fl. Pl. Nepal, 2 : 134 (1979).

Type : Habitat in Nepalia, Wallich Num. list no 664.1 (K-W; microf. - CAL).

Mespilus acuminatus (Lindl.) Lodd., Bot. Cab. : t. 919 (1824) (as *acuminata*).

Crataegus acuminatus (Lindl.) Desf. ex Petzold et Kirchner, Arb. Musca. : 303 (1864) (as *acuminata*).

Distrib. : Temperate Himalaya (Kashmir to Arunachal Pradesh); Nepal, Bhutan, Burma and W. China (Yunnan).

2. *C. adpressus* Bois in Vilmorin et Bois, Frutic. Vilmor. : 116 (1904); Klotz, *op. cit.* 6 : 949; Ohashi, *op. cit.* : 134. *C. horizontalis* var. *adpressus* (Bois) Schneid., Ill. Handb. Laubh. 1 : 745, figs. 418 K-m, 419 e' (1906); Yu, Bull. Brit. Mus. Bot. 1 : 131 (1954).

Distrib. : India (Uttar Pradesh, Sikkim); Nepal, Burma and W. China. 2n=34 (Vide Zeilinga, 1964).

3. *C. affinis* Lindl., *op. cit.* : 101; Klotz, *op. cit.* 6 : 949; Ohashi, *op. cit.* 2 : 134 (Plate 1).

Type : Habitat — Chittagong, Buchanan — Hamilton s.n., (BM).

Mespilus affinis (Lindl.) D. Don, Prodr. Fl. Nep. : 238 (1825).

C. bacillaris var. *affinis* (Lindl.) Hook. f., *op. cit.* : 385, p.p., excl. syn. *C. roseus* Edgew.

C. frigida Lindl. var. *affinis* (Lindley) Hook. f. ex Wenzig, Linnaea 38 : 194 (1874).

Mespilus integerrima Buch. — Ham, Mss. vide D. Don, *op. cit.* : 234 *pro. syn.*, non Medicus (1793).

Distrib. : India (Kashmir, Uttar Pradesh, Himachal Pradesh); Nepal, Bhuttan, Bangladesh, China.

2n = 68 (vide Kroon, 1975).

4. *C. afghanicus* Klotz, *op. cit.* 15 : 532. *Type* : Afghanistan, Kurum valley, Dec. (1879), J.E.T. Aitchison 363 (Holo. — DD !, Photo — CAL; Iso. — CAL !, BM).

C. nummularius Fish. & May. var. *tomentosus* Aitchison, Journ. Linn. Soc. Lond. Bot. 18 : 56 (1881) (as *tomentosa*).

C. racemiflora (Desf.) Koch var. *Kotschyi* Scheneider, Ill. Handb. Laubholz. 1 : 754 (1906).

Distrib. : India (Kashmir) ; Pakistan, Afghanistan.

5. *C. aitchisonii* Schneider, *op. cit.* : 749, 420 m¹ — m²; Nair, Fl. Bashahr Himal. : 92 (1977).

Type : Afghanistan, Kuram-Tal, 2500 m, (1880), Aitchison 277 (Holo. — K (?); Iso. — CAL).

Distrib. : India (Kashmir, Himachal Pradesh); Afghanistan.

- *6. *C. assamensis* Klotz, *op. cit.* 21 (5-6) : 996.

Type : India, Arunachal Pradesh (Assam-Himalaya, Balipara Frontier), Manda La., ± 2440 m, 6 July 1938, F. Kingdon-ward 13858 (BM !).

Distrib. : India (Arunachal Pradesh)

7. *C. bacillaris* Wall. ex Lindl., Bot. Reg. 15 : sub. t. 1229 (1829); Hooker, *op. cit.* : 384; Klotz, *op. cit.* 6 : 951; Ohashi, *op. cit.* : 134.

Type : Habitat in Kumaon, Wallich Num. list no. 660 (K-W, K; Photo & Microf. — CAL !).

C. affinis var. *bacillaris* (Lindl.) Schenied., *op. cit.* : 757.

Distrib. : India (Kashmir, Uttar Pradesh, Himachal Pradesh, Tamil Nadu—(Cult.); Bhutan, Nepal, Afghanistan).

$2n = 51$ (vide Kroon, 1975; a triploid, not a tetraploid (cf. Sax, 1954).

8. *C. parvifolius* (J.D. Hook.), comb. nov.
C. bacillaris var. *parvifolia* J. Hooker
op. cit. : 385.

Syntypes : Bhutan, Griffith 992 (K, Photo – CAL).

Distrib. : East Himalaya.

9. *C. bakeri* Klotz, *op. cit.* 21 (5-6) : 970 (1972).

Type : South Eastern Tibet, Takpo-Province, Langong Chu valley, 3505 m, 15 June 1938, F. Ludlow, G. Sherriff & G. Taylor 5533 (BM !).

Distrib. : Tibet, Bhutan.

$2n = 68$ (Bhutan; vide Klotz, 1968).

*10. *C. bis-ramianus* Klotz, *op. cit.* 21 (5-6) : 994; Ohashi, *op. cit.* : 134.

Type : W. Nepal, Gandhibasa Khaptar, 29 May 1929, *Bis Ram* s.n. (Holo. – DD, not traced; Iso. – BM).

Distrib. : Nepal (known by the type collection only).

11. *C. brandissi* Klotz, *op. cit.* 15 : 537.

Type : India, Garhwal, Chakrata, 2100 m, 17 June 1946, M. B. Raizada 98015 (DD !).

Distrib. : India (Kashmir, Uttar Pradesh); Pakistan.

*12. *C. buxifolius* Wall. ex Lindl. Bot. Reg. 15 : sub. t. 1229 (1829); Baker, Saund. Refug. Bot. 1 : t. 52 (1869) p.p. excl. spec. ex Himalaya & syn.; Hooker *op. cit.* : 387, p.p.; Schneid., *op. cit.* : 753 figs. 425 K-I, 429b, (1906); Klotz, *op. cit.* 6 : 951, et 12(10) : 773. (Plate 2).

Type : "Habitat in Jugo Neelghery dicto, ubi legit dom Noton", vide Wallich Num. list no. 661 (K-W ; Microf. – CAL; CAL !).

C. affinis sensu DC., Prodr. 2 : 632 (1825) p.p.; incluso spec. Lesschenault ex Neelighery, non Lindl. (1821).

C. lanata Hort. ex. Hamburg. Gart. Blum. Ztg. 14 : 341 (1858) non Jacques (1859); Decne., Nouv. Arch. Mus. Hist. Nat. Paris 10 : 173 (1874).

C. microphylla var. (♂) *buxifolia* (Wall. ex Lindl.) Wenzig, *op. cit.* : 196. p.p., includo spec. Neelghiry

C. microphylla var. (∞) *buxifolia* (Wall. ex Lindl.) Dippel, Handb. Laubh. 3 : 420 (1893).

Distrib. : India (Tamil Nadu).

$2n = 51, 68$ (vide Klotz, 1968; Kroon, 1975).

13. *C. cashmirensis* Klotz., *op. cit.* 12 (10) : 778.

Type : Kashmir, Near Singhan Pass, "On rock and cliff faces" 3500 m, 4 July 1939, F. Ludlow 179 (BM !).

C. rotundifolius auct.; spec. ex Kashmir, non Wall. ex Lindl. (1829).

Distrib. : India (Kashmir, Himachal Pradesh) and Pakistan.

14. *C. cavei* Klotz, Bull. Bot. Surv. India 5(3&4) : 213 (1963); Ohashi, *op. cit.* : 134; Klotz, *op. cit.* 21(5-6) : 1006.

Type : "Sikkim-Himalayas, Prope, Kalapokhri, in Rupestribus", 3,200 m, 28 May 1963, G. Klotz s.n. (CAL !).

C. distichus var. *parvifolius* Yu, *op. cit.* : 129.

Distrib. : India (Sikkim, Assam); Nepal, China (Yunnan).

15. *C. congestus* baker *op. cit.* : t. 51 (1869); Klotz *op. cit.* 6 : 953; et *op. cit.* 12(10) : 780, p.p., nomen tantum, excl. syn. et. descript.; Ohashi, *op. cit.* : 134.

Type : Western Himalayas, *Dr. Royle s.n.* (K !) (cf. t. 51, Baker, *l.c.*).

Distrib. : India (Sikkim); Bhutan, Nepal, W. China.

- *16. *C. cooperi* Marquand, Hooker's Icon. Plant. 32 : t. 3146 (1933); Klotz, *op. cit.* 6 : 953.

Holotype — "Flowering specimens, cultivated in Royal Botanic Gardens, Kew, May 1924, *Cooper*, 3311 (type); fruiting specimen, Botanic Garden, Glasnevin, Oct. 1929, *Cooper* 3311" (Isotype).

Distrib. : Bhutan.

$2n = 68$ (vide Klotz, 1968).

17. *C. duthieanus* (C. K. Schenid.) Klotz, Bull. Bot. Surv. India 5 : 211 (1963); Ohashi, *op. cit.* : 134.

C. distichus var. *duthieanus* C. Schneider, *op. cit.* : 745. fig. 419 C; Yu, *op. cit.* : 128, p.p. (*) excl. *Duthie* 1061.

Type : Kumaon "Birch-forest" near Naffi in the Kutti valley, 3660-3965 m, 11 Sept. 1884, *J. F. Duthie* 2874 (Holo — K, Photo CAL; iso. — CAL !).

Distrib. : India (Uttar Pradesh); Nepal, Burma, China (Yunnan).

(*) *Note* : Yu (1954) included *Duthie* 1061 from Tehri-Garhwal with var. *duthieanus*, but Klotz (1966) segregated it as the holotype of *C. garhwalensis* Klotz.

18. *C. falconeri* Klotz, *op. cit.* 15 : 535; Riedl., Fl. Iran. 66 : 25 (1969).

Type : N. Pakistan, Chitral, Jambatai, 5 May, 1895, *S. A. Harriss* 16109 (Holo — CAL !; iso. — BM, DD).

Distrib. : India (Kashmir); Pakistan, Afghanistan.

$2n = 68$ (vide Klotz 1968, spec. ex Kashmir).

19. *C. frigidus* Wall. ex Lindl. Bot. Reg. 15 : t. 1229 (1829); Hooker, *op. cit.* : 385; Klotz, *op. cit.* 6 : 956; Ohashi, *op. cit.* : 134.

Type : Northern Nepal, Gossain Than, *Wallich* Num. List. no. 657 (K — W), (t. 1229 is based on plants raised from seeds received from Nepal, in the garden of the Hort. Soc. London).

C. nepalensis Hort. ex Hooker, *op. cit.* : 385, *pro syn.*

C. affinis sensu Koehne, Deutchche Dendrologie. : 226 (1893); non Lindl. (1821).

Distrib. : India (Uttar Pradesh, Sikkim, Arunachal Pradesh); Nepal, Bhutan, China.

$2n = 34$ (vide Sax, 1954; Zeilinga, 1964 & Klotz, 1968); an outbreeding species (vide Flinck & Hylmo, 1966).

20. *C. franchettii* Boiss., Revue hort. 74. 379, f. 159-164 (1902); Rehder, Man. Trees & Shrubs, ed. 2 : 351 (1940); Klotz, *op. cit.* 6 : 955; Yu, Fl. Reip. Populs. Sinicue 36 : 153 (1974).

Type : Described from plant cultivated by M. Maurice de Vilmorin, at les Barres, Loiret France, and grown from seed sent by the Abbe Soulie. (cf. Stapf, in Curtis's Bot. Mag. t. 857, 1914).

Distrib. : India (Darjeeling cult.); S. China, Tibet.

- *21. *C. gamblei* Klotz, *op. cit.* 15 : 530.

Type : Bhutan Shabjetang. Bumthang Chu, 3,050 m, 9 June, 1949, *F. Ludlow, G. Sherriff & J. H. Hicks* 19083 (MB !).

Paratype : Sikkim, Lechung, 2700 m, (2745 m), 25 Nov. 1911, *Ribu* and *Rhomoo* 6041 (K, Photo — CAL).

Distrib. : India (Sikkim); Bhutan.

- *22. *C. garhwalensis* Klotz, *op. cit.* 15 : 543.

Type : Garhwal, Nila Valley, Phuladaru, 3355-3660 m, 20 June, 1883, *J. F. Duthie* 1061 (Holo — K, not traced; Iso. — DD!).

Distrib. : India (Uttar Pradesh and Himachal Pradesh).

- *23. *C. gilgitensis* Klotz, *op. cit.* 15 : 539.

Type : Kashmir, Nittar valley, north of Gilgit, 3,300-3600 m; 4 aug. 1892, J.F. Duthie 12385 (Holo.— CAL, not traced; iso.— DD I).

C. vulgaris sensu Hooker, *op. cit.* : 385, p.p., non Lindley (1821).

C. integerrima sensu Parker, For. Fl. Punjab. 3rd. ed. : 288 (1956), non Medic. (1793).

Distrib. : India (Kashmir).

- *24. *C. himalaica* Carr., Rev. Hortie 160 (1878).

Distrib. : Reg. Himalaya.

25. *C. hissaricus* Pojark., Not. Syst. Inst. Bot. Acad. URSS. 16 : 124 (1954); Klotz, *op. cit.* 6 : 958; et 12(10) : 765.

Type : "Tadschikistania, clivus australis jūgi hissar in declivibus" "Septentrionalibus, fl Kondara", A. I. Pojarkova 1117 (LE).

C. racemiflora (Desf.) Booth ex Bosse var. *hissarica* (Pojark.) Kitamura, Fl. Afgh.: 173 (1960).

Distrib. : India (Kashmir, Uttar Pradesh), Afghanistan, Iran.

2n = 51 (vide Klotz, 1968, spec. ex Kashmir, Garhwal).

26. *C. horizontalis* Decne., Floredes Serres et des Jardins d 1' Europe 22 : 168 (1877); Klotz, *op. cit.* 6 : 959.

C. acuminatus var. *prostratus* Hooker ex Wenzig, *op. cit.* : 185; Decne., Nouv. Arch. Mus. His. Nat. Paris 10 : 175 (1874); Dippel, Hand. der Laubhol. 3; 414 (1893).

Type : Sikkim, 12-13000, J. D. Hooker (B).

C. symonsii Loud. ex Koehne, Deut. Dendr. : 225 (1893), *pro. syn.*

Distrib. : India (Sikkim, Himachal Pradesh), ? Nepal, West China.

2n = 68 (vide Zeilinga, 1964; not triploid as reported by Sax, 1954).

27. *C. humilis* Dunn; Misc. Inf. Kew Bull. 1924 : 384 (1924); Klotz, *op. cit.* 21 (5-6) : 975.

Type : N. W. India, Kashmir, Sonamarg, at 4000 m, 9 Aug. 1921, R. R. Steward & I. D. Stewart 6619 (Holo. — K; Iso.— DD, I Photo. CAL).

C. integerrima sensu Osmaston, For. Fl. Kumaon : 224 (1927), non Medicus (1793).

Distrib. : India (Kashmir, Himachal Pradesh, Uttar Pradesh); Pakistan.

- *28. *C. inexpectatus* Klotz, *op. cit.* 27(1): 23, Plate 3; Ohashi, *op. cit.* : 135.

Type : Nepal, Dunai, 2100 m, 26 April 1974, J. F. Dobremez 2757 (*Sphalm.* 2787) (Holo. — BM; Iso. — Univ. Grenoble, Lab. Bot.).

Distrib. : Nepal (known by the type collection only).

29. *C. insignis* Pojarkova, Fl. URSS 9 : 330 (1939); Klotz, *op. cit.* 6 : 960 & 12(10) : 764; Rehder, Biblio. Cult. Tr. Shrubs : 237 (1949), *pro. syn.* *C. nummularia* Koch, Dendrol, 1 : 171 (1869), non Fisch. & Mey. (1835).

C. bacillaris sensu, Aitchinson, Journ. Linn. Soc. 18 : 56 (1880), non Lindl. (1829).

C. lindleyi sensu Schneider, *op. cit.* : 757, (1840).

Distrib. : India (Kashmir); Afghanistan, Iran and W. Tibet.
2n = 51 (vide Sax, 1954).

30. *C. integerrimus* Medik., Gesch. Bot. 85(1793) p.p. : Klotz, *op. cit.* : 6 : 960.

Mespilus cotoneaster Linn., Sp. Pl. : 479 (1753).

Type : "Habitat in Europe frigidioris collibus apricis inque pyreneis Ararat" (BM – Cliff.).

C. vulgaris Lindl., Trans. Linn. Soc. 13 : 101 (1821), *nom. illeg.*; Hooker, *op. cit.* : 385.

Type : Same as for *C. integerrimus* Medic.

Crataegus cotoneaster Borkh., Hand buch der Forst botanic 2 : 1361 (1803).

Ostinia cotoneaster Clairville, Man. Herb. Suisse : 162 (1811).

Distrib. : India (Kashmir); Europe, Iran, W. Tibet.

2n = 34 (vide Kroon, 1975); 2n = 68 (vide Klotz, 1968; Kroon 1975; not triploid, as reported by Sax 1954).

31. *C. integrifolius* (Roxb.) Klotz, *op. cit.* 12(10) : 779; Ohashi, *op. cit.* : 134.

Crataegus integrifolia Roxb., Fl. Ind. 2 : 509 (1832).

Type : India, Uttar Pradesh, Kumaon, "...on the hills between Hurdwar and Sirinagur, *Hardwicke*" *s.n.*; Roxb. Icon. Nil.

C. thymifolia Hort. ex Lindl., Paxt. Flow. Gard. 2 : 132 (1852); Hort. ex Baker, *op. cit.* : 1 : t. 50; Hooker, *op. cit.* : 387.

C. microphylla var. *thymifolia* (Hort. ex Lindl.) Koehne, Dendrol. : 227 (1893), p.p.; Schneider, *op. cit.* : 760.

Crataegus Roxb., Asiat. Res. 6 : 362-363 (1799).

Cotoneaster microphylla Wall. ex Lindl. (1821), Wall. Num. list. no. 662 p.p. (Right hand spec.). (1829).

Cotoneaster microphyllus Wall. ex Lindl. forma *thymifolius* (Lindl.) Samjatnin, Baume and Stracicher der udSSR III : 368 (1954); Klotz, *op. cit.* 6 : 963.

Distrib. : India (Kashmir, Himachal Pradesh, Uttar Pradesh), Nepal, Bhutan, and West China.

2n = 68 (vide Flink & Hylmo, 1966).

32. *C. kaganensis* Klotz, *op. cit.* 15 : 541.

Type : Pakistan, Hazara, Kagan Valley, Bhorji; 12 July 1897, *Duthie's collector* vide *Duthie* 21276 (Holo. – DD!; Iso. – CAL).

C. acuminatus sensu Parker, *op. cit.* : 228 p.p., non Lindl. (1821).

Distrib. : India (Kashmir), Pakistan.

*33. *C. khasiensis* Klotz, Bull. Bot. Surv. India 5 : 209 (1963).

Type : Khasia, Laitlyngkot, 1650 m, 16 May 1886. *C. B. Clarke* 43911 (CAL!).

C. simonsii sensu Kanjilal *et al.*, Fl. Assam : 225 (1938), non Baker (1869).

Distrib. : India (Meghalaya).

*34. *C. lacei* Klotz, *op. cit.* 15 : 851 (1966).

Type : India, Bashahr, Ralli forest, 2400 m, 29 May 1890, *J. H. Lace* 196 (Holo – E!; Iso. – E!).

Distrib. : W. Himalaya.

*35. *C. linearifolius* (Klotz) Klotz, *op. cit.* : 27(1) : 20, Ohashi, *op. cit.* : 135

C. microphyllus f. *linearifolius* Klotz, *op. cit.* 6 : 982.

Type : "Planta in Horto Botanico Halensis Culta" 5 June 1956, *G. Klotz* *s.n.* (J E).

Distrib. : Nepal.

*36. *C. lindleyi* Steudel, Nom. Bot. : 426 (1840); Decne., Nouv. Arch. Mus. 10 : 176 (1874); R. N. Parker, *op. cit.* : 229.

Type : Same as for *C. nummularius* Lindl. ex Loud.

C. nummularius Lindl. ex Loud., Arb. & Fruit. Brit. 2 : 852, t. 34C (1838), non Fisch, & Mey. (1835), nec Koch (1868).

Type locality : Nepal.

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Chromola affinis Lindley

Ascomycin J. J. Hall 1980

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ROYAL BOTANIC GARDENS - KEW

M. FORD
CIBACHROME
COPY

Plate—2



Cotoneaster buxifolius Lindley

det./corr. Y. Kuhn
HERB. UNIV. HALENSIS

16.10.1962

Staghorn Hill April
1847

Peninsula Indica Orientalis.

No 925

Cotoneaster buxifolius Walp.

Herb. Wight.

Distributed at the Royal Gardens, Kew. 1862-7.



Cotoneaster obovatus Dunn

Determinavit F. T. Gilg IV. 1210

Plate—3



Leiotypus!
Cotoneaster obovatus Dunn

det./corr. F. T. Gilg
HERB. UNIV. HALENSIS

21.4.1924

From the Himalayas
considered to be *C. rupestris*, Begun.

W. W.
Flora of the Sub-Himalayas

No. 1192

Cotoneaster baccatus W. W.

var. affinis W.

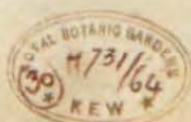
Lehmert V. J.

K. 900

1881 Coll. G. K. W.

HERBARIUM KEWENSE.

Herbarium of J. S. GAMBLE, C.I.E., F.R.S.,
Presented July, 1925.



These 2 species seem to
agree with
C. frigida, W. W.

to same extent

W. W.

Plate—4



Colocynthis unguiculata
Forsk. & Hoffm.
Chari, 7,500 ft. Soudan
Chanta S. S. S.
2-2-1920. Col. H. B. K. S. S.

C. nummularius Fisch. et Mey. var. *6 Lindleyi* (Steudel) Wenzig, *op. cit.* : 189 (1874).

Distrib. : India (Kashmir), Nepal.
2n = 51 (vide Sax, 1954).

*37. *C. ludlowii* Klotz, *op. cit.* 12(10) : 775; Ohashi, *op. cit.* : 135.

Type : Bhutan, *Ludlow* and *Sheriff* 19632 B (Herb. Inst. Bot. Halense Conservatur).

C. racemiflorus var. *songoricus* sensu Yu, *op. cit.* : 138, p.p., non (Rgl. & Herder) Schneider (1906).

Distrib. : Nepal, Bhutan.
2n = 68 (vide Klotz, 1968).

38. *C. marginatus* Lindl. ex Schlechtendal, *Linnaea* 27 : 541 (1854); Klotz, *op. cit.* 12(10) : 777; Ohashi, *op. cit.* : 135.

Lectotype : "*C. microphylla* Hort. Bot. Berold" (Herb. Inst. Bot. Halense, conservatur) (selected by Klotz, 1963, not seen).

C. buxifolius var. *marginatus* (Schlecht.) Loudon, *Enc. Trees. Shrubs* : 411 (1824) (as "*marginata*"); Klotz, *op. cit.* 6 : 952.

C. lanatus Jacques, *Journ. Soc. Imp. Centr. Horti. Paris*, t. 5 : 476 (1859) *nom. illeg.*, non Otto (1858).

C. buxifolius sensu Baker, *op. cit.* 1 : tab. 52 p.p., includo *C. marginata* Hort, pro. syn. et spec. ex Himalaya, non Wall. ex Lindl. (1829).

C. microphyllus var. *buxifolius* f. *lanata* Dippel, *Handb. Laubholz* 3 : 420 (1893) (as '*buxifolia*').

C. rotundifolius var. *lanatus* (Dippel) Schneider, *op. cit.* : 759 (as '*lanata*'); Yü, *op. cit.*, 37; Rehder, *Bibilio. Cult. Trees Shrubs* : 238 (1949).

C. buxifolius sensu Hooker, *op. cit.* : 387 p.p. includo spec. ex Himalaya (as '*buxifolia*')

Distrib. : India (Uttar Pradesh, Himachal Pradesh); Nepal (?), S.E. Tibet (cf. Yü, 1954).

2n = 68 (vide Klotz, 1968).

39. *C. meuseli* Klotz, *op. cit.* 12(10) : 777 (1963); Ohashi *op. cit.* : 135.

Type : "Himalaya occidentalis in Cedro-Querceto incanae sinco prope urbem Mussoori" 13, Sept. 1962, *Meusel & Schubert s.n.* (Herb. Inst. Bot. Halense conservatur).

Distrib. : India (Uttar Pradesh); Nepal, S.W. China.

2n = 68 (vide Klotz, 1968).

40. *C. microphyllus* Wall. ex Lindl., *Bot. Reg.* 13 : t. 1114 (1827), et in Wallich, *num. List* no. 662.1 p.p. (1829); Hooker, *op. cit.* : 387, p.p.; Klotz, *op. cit.* 6 : 963 fig. (left); Ohashi *op. cit.* : 135.

Type : "Nepal, Gossain Than, 1824, *Wal. Num. List.* no. 662 p.p. (Left hand specimen); plants raised in the Hort. Soc. Garden, London from seeds supplied by Wallich (K - W; microf. - CAL).

Distrib. : India (Kashmir, Uttar Pradesh, Himachal Pradesh); Nepal, Bhutan (Cult.) Burma, China (Tibet.).

2n = 68 (vide Zeilinga, 1964 & Kroon, 1975; not diploid as reported by Sax, 1954).

41. *C. nivalis* (Klotz), *comb. nov.*

C. microphyllus var. *nivalis* Klotz, *op. cit.* 12(10) : 780.

Type : Nepal, Arun valley, Thudam, E. of Chyamtang, 3812 m, 21 May 1956, *Stainton* 381 (BM !).

C. microphyllus sensu Yü, *op. cit.* : 34, p.p., non Wall ex Lindl. (1827).

Distrib. : Nepal, China (Tibet).

*42. *C. glacialis* (Hook. f. ex Wenzig), *comb. nov.*

C. microphyllus var. *glacialis* Hooker

ex Wenzig, *op. cit.* 195; Hooker : 387; Yü, *op. cit.* : 135.

Lectotype : Sikkim, Lachen, 4270 m, 15 July 1845, *Hook. f. s.n.* (Holo. — B; Iso. — K, Photo — CAL).

Distrib. : India (Himachal Pradesh).

Note : Yü, Klotz and Hara reduced *C. microphyllus* var. *glacialis* Wenzig as a synonym of *C. congestus* Baker. But Baker described the species from W. Himalayas as a Bush 1 feet high, whereas var. *glacialis* Hook. f. ex Wenzig is prostrate with large no. of roots arising from different levels of the stem. (vide isotype K) (Wenzig's *l.c.*, description of "..... follis tantum margine fimbriatis" is not evident on the isotypes at K).

43. *C. minutus* Klotz, *op. cit.* 12(10) : 763 (1963).

Type : "Kashmir, prope Charar — i-Shariff meridianum urbis Srinagar", 25 Oct. 1962, *Meusel s.n.* (Herb. Inst. Bot. Univ. Halense conservatur).

C. racemiflora var. *royleana* Dippel, *Handb. Laubh.* 3 : 415 (1893).

C. royleana Booth ex Schlecht., *Linnaea* 27 : 546 (1854), *pro. syn.*

Distrib. : India (Kashmir), Afghanistan.

44. *C. multiflorus* Bunge ex Ledeb., *Fl. Alt.* 2 : 220 (1830) (as '*multiflora*'); Collet, *Fl. simil. ed.* 1 : 172 (1902); *Klotz, op. cit.* 6 : 965.

Type : "In rupestribus montium Tschingis-tau et Dschigilen deserti soongoro-Kirghisici, "C. A. Meyer *s.n.* (LE, Photo — CAL).

Distrib. : India (Kashmir); Iran, Afghanistan, USSR.

2n = 68 (vide Sax, 1954 and Zeilinga 1964); 2n = 51 (vide Kroon, 1975).

- *45. *C. Nagaisis* Klotz, *Bull. Bot. Surv. India* 5 : 212 (1963).

Type : "Assam, Naga-Montes, prope Kohima", 3050 m, 1 Sept. 1937, G. K. Deka 15452 (ASSAM).

Paratypes — Naga Hills, near Chukka forest, 2196 m, Dec. 1886, *D. Prain s.n.* (Cal); Naga Hills, Kohima, Dec. 1886, *D. Prain s.n.* (CAL).

Distrib. : India (Nagaland).

46. *C. nitidus* Jacq., *Journ. Soc. Imp. Centr. Hort.* 3 : 516 (1857); Klotz, *op. cit.* 6 : 966; Klotz, *op. cit.* 6 : 966, & *Bull. Bot. Surv. India* 5 : 210 (1963); Ohashi *op. cit.* : 135.

C. rotundifolia sensu Baker, *op. cit.* : t. 54 (1869), p.p. excl. *synon.* non Wall. ex Lindl., (1829); Hooker, *op. cit.* : 386, p.p., excl. *syn.* *C. disticha* Lange (1882).

Distrib. : India (Sikkim, Assam); Nepal Bhutan, Burma and China (Yunnan). 2n = 68 (vide Kroon, 1975).

47. *C. nummularioides* Pojark., *Not. Syst. Inst. Bot. Acad. Sc. URSS* 16 : 128 (1954); Klotz, *op. cit.* : 6 : 967 & 12(10) : 765 (Plate 4).

Type : "Tadschikistania, Clivus australis jugi Hissar in fance fluvii varzob, in fissura inter pagum Bigor et Ostium fluvii Kondara", A. I. Pojarkova 1120 (LE).

C. nummularia sensu Hooker, *op. cit.* : 386, p.p. non *fisch.* et. Mey, (1835), nec. Lindl. ex Loud. (1838).

C. racemiflora var. *nummularioides* (Pojark.) Kitamura, *Fl. Afghan* : 173 (1960).

Distrib. : India (Kashmir); Afghanistan, Iran.

2n = 51, 68 (vide Klotz, 1968 ex spec. Kashmir; not tetraploid as reported by Sax, 1954).

- *48. *C. obovatus* Wall. ex Dunn, *Misc. Infor. Kew Bull.* 1921 : 119 (1921); Klotz, *op. cit.* 15 : 852; non Pojarkova (1954).

Lectotype : N. W. Himalaya,

Chenab valley, 1881, *R. Ellis* 1192 (K, Photo-CAL) (selected by Klotz, *l.c.*); (Plate 3).

Isolectotype : Chenab valley, Cherer near Sinhe, 2440 m, 3 June 1881, *R. Ellis* 1192 (CAL).

C. rosea sensu Collect, Fl. Siml., 172 (1921), non Edgew. (1846).

C. obovatus Wall. Num. list no. 659.2 (1829), nom nud.

Distrib. : India (Kashmir, Himachal Pradesh).

*49. *C. obtusus* Wall. ex Lindl., Bot. Reg. 15 Sub. t. 1229 (1829), et in Wallich Num. list. no. 659 (K – W; microf. – CAL). 1829.

Distrib. : India (U.P.); Nepal.

*50. *C. osmastonii* Klotz, *op. cit.* 15 : 850.

Type : India, Kumaon, Niti Valley, opposite Laung, 2940 m, 4 June 1915, *A. E. Osmaston* 641 (DD).

C. obovatus sensu Osmaston, Forest Fl. Kumaon : 223 (1927), quoad specim. cit., non Wall. ex Dunn (1921), nec Pajarkova (1954).

Distrib. : India (Uttar Pradesh, Himachal Pradesh).

51. *C. pannosus* Franch., Pl. Delav. : 223 (1890), non Handel, Maz. (1933), p.p.; Curtis's, Bot. Mag. 6 : t. 8544 (1915), Schneider, *op. cit.* 755, 756; Rehder, *op. cit.* 355; Klotz, *op. cit.* : 968.

Syntypes : China; "Yunnan, in declivibus calcareis montis. Hee-chanmen, alt. 2500 m; ft. 22 may. 1886 (*Delavay*, n. 3741, 3746, 3745, 3538); in collibus calcareis ad Yang-in-chan, supra Mo-so-yn; fl. 7 Jun. (*Delavay*, n. 3544); in fructicetis circa Tapin-tze (id. n. 3743)"

Distrib. : India (Darjeeling-Cult.); S. W. China.

*52. *C. paradoxus* Klotz, *op. cit.* 27(1) : 24; Ohashi, *op. cit.* : 136.

Type : Nepal, Kolagaon; Berbung Khola, 3100 m, 3 June 1952, *O. Polunin*, *W. R. Sykes* & *L. H. J. Williams* 1051 (BM).

Distrib. : Nepal (Known by the type collection only).

*53. *C. X. parkeri* Klotz, (*C. roseus* Edgew. X *C. acuminatus* Lindl.), *op. cit.* 15 : 850.

Type : Himachal Pradesh, Bashahr State, Simla dist. Khadrula 2700 m, 18 June 1928, *R. N. Parker* 3053 (DD !).

Distrib. : India (Kashmir, Himachal Pradesh).

*54. *C. poluninii* Klotz, *op. cit.* 27(1) : 21; Ohashi, *op. cit.* : 136.

Type : Nepal, Bheri River, Dunaihi, 2850 m, 2 June 1952, *O. Polunin*, *W. R. Sykes* & *L. H. J. Williams* 1037 (BM).

Distrib. : Nepal.

*55. *C. prostratus* Baker, *op. cit.* tab. 53; Klotz, *op. cit.* 12(10) : 778, non Bean (1950); Rehder, Biblio, Cult. Tr. Shrub : 238 (1949) *pro. syn.*

Type : Western Himalayas, *Royle s.n.* (t. 53 is based on the plants raised in Saunder's Garden in London from seeds sent by Royle from Western Himalayas).

C. rotundifolius sensu Hooker, *op. cit.* : 386, non Wall. ex Lindl. (1829).

C. rotundifolius var. *uva-ursi* sensu Schneid., *op. cit.* : 759, non (Lindl.) Schneid. (1906).

Distrib. : India (Uttar Pradesh, Sikkim); Nepal.

2n = 68 (vide Kroon, 1975).

56. *C. pruinosis* Klotz, *op. cit.* 15 : 533; Riedl., Fl. Iran 66 : 24 (1969).

Type : N. Pakistan, 3.2 km south of Chitral village, 1350 m, 16 April, 1958, *J. D. A. Stainton* 2212 (BM).

Distrib. : India (Kashmir); Pakistan.

57. *C. roseus* Edgew., Trans. Linn. Soc. 20 : 46 (185) (as '*rosea*'); Schneider, *op. cit.* : 745, 753, fig. 423 r, r', s, 755 fig. 424n; Nair, *op. cit.* : 94.
Type : 'Himala, in sylvis. Chur' Edgeworth s.n. (K).
Distrib. : India (Kashmir, Uttar Pradesh, Himachal Pradesh); Pakistan, Afghanistan.
 $2n = 68$ (vide Klotz, 1968 spec. ex Kashmir; Kroon 1975; not triploid, as reported by Sax 1954).
58. *C. rotundifolius* Wall. ex Lindl., Bot. Reg. 15. t. 1229 (1829); Klotz, *op. cit.* 6 : 970, fig. : 964; Hara, Fl. E. Himal. 2 : 51 (1971); Ohashi, *op. cit.* : 135.
Type : Gossain Than, Wallich Num. list no. 663 (K - W); microf. - CAL).
C. microphylla var. *uva-ursi* Lindl., *loc. cit.* 14 : t. 1187 (1828).
C. microphylla var. *rotundifolia* (Wall. ex Lindl.) Wenzig, *op. cit.* : 195.
Distrib. : India (Kashmir, Himachal Pradesh, Uttar Pradesh, Arunachal Pradesh); Bhutan, Nepal, China.
 $2n = 68$ (vide Klotz, 1968 spec. ex Kashmir; Zeilinga, 1964; not triploid as reported by Sax 1954).
59. *C. rubens* W. W. Smith, Not. Bot. Gard. Edinb. 10 : 24 (1917); Klotz, *op. cit.* 6 : 971 & 21(5-6) : 973; Hara, *op. cit.* : 51.
Type : China, Yunnan, Chungtien plateau Mountain, 27° 30'N, 3050 m, July 1914, C. Forrest 12663.
Distrib. : India (Sikkim); Bhutan, Burma, China (Tibet, Yunnan).
60. *C. sandakphuensis* Klotz, *op. cit.* 5 : 213; Ohashi, *op. cit.* : 135.
Type : "Sikkim-Himalaya, prope Sandakphu, infruticetis via, Rimbick" 9 Oct. 1941, K. Biswas 5721 (Holo - CAL; Iso. - A).
C. microphylla var. *glacialis* sensu Cowan & Cowan, Trees North Bengal : 63 (1929), non Hooker (1878).
Distrib. : India (Sikkim); Burma.
61. *C. sanguineus* Yü, *op. cit.* : 130, t. 4; Ohashi, *op. cit.* : 135.
Type : "S. E. Tibet, Karma valley, 1922, Norton 236; Chickchar, Tsari, 3,900 m", 13 June 1936, Ludlow and Sherriff 2157 (BM).
Distrib. : India (Assam), Bhutan, Nepal, China.
62. *C. schlechtendalii* Klotz, *op. cit.* 12 (10) : 776; Ohashi, *op. cit.* : 135.
Type : "S. Tibet, Sanga Choling, Charchu", 3150 m, 27 Sept. 1936, Ludlow & Sherriff 2709 (BM !).
C. rotundifolius sensu Yü, *op. cit.* : 136, p.p., non Lindl. (1829).
Distrib. : India (Uttar Pradesh); Nepal, S. Tibet.
63. *C. schubertii* Klotz, *op. cit.* 12(10) : 759.
Type : "Kashmiria, prope charar-i-sharif meridianum urbis Srinagar" 25 Oct. 1962, H. Meusel & R. Schubert s.n. (Herb. Inst. Bot. Univ. Halense conservatur).
Distrib. : India (Kashmir); Pakistan (Baluchistan).
 $2n = 51$ (vide Klotz, 1968, spec. ex Kashmir).
64. *C. sherriffi* Klotz, *op. cit.* 12(10) : 776; Ohashi, *op. cit.* 135.
Type : "Tibet austro-orientalis, Kongbo-Prov. Molo, Lilung chu", 26 June 1938, Ludlow, Sherriff & Taylor 5677 (BM).
C. rotundifolius Yü, *op. cit.* : 136 p.p., non Lindl. (1829).
Distrib. : Bhutan, Nepal, S. Tibet.

- *65. *C. sikkimensis* Hort. ex Wien., Illustr. Gartenz : 248 (1890).
Distrib. : Reg. Himal.

- *66. *C. simonsii* Hort. ex Baker, *op. cit.* 1 : t. 55; Klotz, *op. cit.* 6 : 972; et Bot. Surv. India 5 : 208 (1963); Ohashi, *op. cit.* : 135.

Type locality : Sikkim; (t. 55 in Baker *op. cit.* was drawn on plants grown from seeds collected from there; not "A native of Khasia").

C. symondsii sensu Hooker, *op. cit.* : 386 p.p., excl. spec. ex Khasia.

C. symondsii Th. Moore in Proc. Hort. Soc. London 1 : 298 (1861).

Distrib. : India (Sikkim, Uttar Pradesh); Nepal, Bhutan.

2n = 68 (vide Zeilinga, 1964; not triploid as reported by Sax (1954).

- *67. *C. staintonii* Klotz, *op. cit.* 21(5-6) : 971; Ohashi, *op. cit.* : 135.

Type : E. Nepal, Tamur valley, Kamsachen, east of Walungchung Gola, 3600 m, 27 July 1956, J.D.A. Stainton 1146 (BM !, Photo - CAL).

Distrib. : Nepal (Known by the type collection only).

- *68. *C. stracheyi* Klotz, *op. cit.* : 15: 854.

Type : India, Kumaon, Dwali, 2500 m, May 1848, R. Strachey & Winterbottom 1 (CAL !).

Distrib. : India (Uttar Pradesh, Himachal Pradesh).

69. *C. taylori* Yü, *op. cit.* : 129, Pl. 3; Klotz, Bull. Bot. Surv. India 5 : 211 (1963); Malla *et. al.*, *op. cit.* : 77.

Type : "S. E. Tibet, Takpo, Kongbo Naga La, Tsangpo valley", 3750 m, 13 May 1938, Ludlow, Sherriff & Taylor 4246 (BM !, Photo - CAL).

Distrib. : Nepal, Tibet.

70. *C. tibeticus* Klotz, *op. cit.* 17 : 334; Ohashi, *op. cit.* : 135.

Type : S. Tibet, Lhasa, 3540 m, 1 June 1942, Ludlow & Sherriff 8626, (Holo - BM !, Photo - CAL; iso. - E).

C. racemiflora var. *soongarica* Schneider, *op. cit.* : 754.

Distrib. : Nepal, Tibet.

71. *C. verruculosus* Diels, Not. Bot. Gard., Edinburgh. 5 : 272(1912); Klotz, *op. cit.* 6 : 974 & 21(5-6) : 1006 (1972); Klotz, Bull. Bot. Surv. India 5 : 212 (1963); Ohashi, *op. cit.* : 135.

Type : N. W. Yunnan, side valley on the eastern flank of the Tali-Range, 25° 40' N, 2440-3050 m, June-July 1906, G. Forrest 4427 (E !).

C. distichus var. *verruculosus* Yü, *op. cit.* : 128 p.p., excl. Kingdon Ward 8395.

Distrib. : India (Sikkim), Nepal, Burma, W. China.

- *72. *C. virgatus* Klotz, *op. cit.* 27(1) : 22; Ohashi, *op. cit.* : 136.

Type : W. Nepal, Rara, north of Jumla, 3202 m, 11 June 1966, J.D.A. Stainton 5426 (BM).

Distrib. : Nepal.

- *73. *C. wallichianus* Klotz, *op. cit.* 15 : 541.

Type : Sikkim, Tankra, 3,000 m, 5 Aug. 1892, G.A. Gammie 634 (Holo - CAL !; Iso. - BM).

C. acuminata sensu W. W. Smith, Rec. Bot. Surv. India 4 : 191 (1911) & l.c. 367 (1913) p.p., non Lindley (1821).

Distrib. : India (Sikkim).

74. *C. zayulensis* Klotz, *op. cit.* 17 : 334; Ohashi *op. cit.* : 135.

Type : S. E. Tibet, Zayul, Ata Rong to Valley, 2400 m, 29 May 1933, F. Kingdon-Ward 10439 (BM !).

Distrib. : Nepal, S. E. Tibet.

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