

THE GENUS NEILLIA (ROSACEAE) IN MAINLAND ASIA AND IN CULTIVATION

J. CULLEN

MY ATTENTION WAS DRAWN to the genus *Neillia* by an attempt to identify three specimens growing at the University of Liverpool Botanic Gardens, Ness, Neston, Cheshire. The standard works for the identification of garden shrubs all seemed unsatisfactory as far as this genus was concerned. This led me to borrow herbarium material for comparison and study, and to write to various gardens, asking for specimens of all their *Neillias* for inclusion in a taxonomic survey of the genus.

Comparison of the herbarium material with the relevant taxonomic literature (particularly Vidal's revision of the genus, in *Adansonia* II. 3: 1963) revealed that many specimens had never been named, and led me to a reappraisal of the species, as represented by both herbarium and garden material.

The genus *Neillia* is the type genus of the small tribe Neillieae of the subfamily Spiraeoideae of the Rosaceae. Its closest allies are *Stephanandra* and *Physocarpus*, both of which contain species in cultivation. The distinctions between these genera are not great, and errors appear in most of the accounts. The most satisfactory key to their identification is that provided by Vidal (*op. cit.*), on which the following one is based.

1. Carpels 5-3(-1); follicles dehiscent along both sutures. *Physocarpus*.
1. Carpels 1-2(-5); follicles dehiscent along the ventral suture only.
 2. Style terminal; follicle 2-10-seeded; testa smooth and shining. *Neillia*.
 2. Style at last lateral; follicle 1-2-seeded; testa crustaceous. *Stephanandra*.

Defined as in this key, the genus consists of shrubs (one species suffrutescent) of arching habit, with lobed, serrate leaves, and racemes or panicles of white or pink flowers. A flowering bush has a strong superficial resemblance to a *Ribes*, and, in gardens, *Neillias* tend to be grown in mixed shrubberies and semiwild areas. Vidal, treating the whole area of the genus, recognizes 13 species; I have seen material only from the mainland of Asia (the genus occurs also in Java and Sumatra), and in this area I recognize ten species, which correspond to twelve of those maintained by Vidal.

Most of the characters used in the taxonomic treatment of the genus are straightforward, and have been described by Vidal. In addition, however, I have found the mode of branching to be very useful in dividing the genus into two parts, and as the branching is unusual, and to my knowledge has not been described before, I give some explanatory notes here.

MODE OF BRANCHING

The following observations were made on mature bushes of *Neillia thibetica* and *N. sinensis* var. *ribesioides* growing at Ness, supplemented by studies of herbarium material.

Mature bushes of these two species consist of a large number of old, woody, brown-barked stems, leafless at the base, arising from ground level. These old stems, which may reach 15 feet (45 dm.) or more, are usually markedly zigzag, especially in the upper part, and their apices are apparently dead, as each ends in a short, dry extension without obvious buds. Alternate leaf scars are present on these stems, and in their axils are multiple, superposed buds, of which generally three or four are visible, the uppermost being some distance (often about 1 cm.) above the actual leaf scar.

The plants are deciduous, and in winter completely leafless. As spring advances buds borne near the apices of the old shoots begin to develop; in all cases the uppermost bud of each axil develops first. These growths develop into the short shoots bearing the inflorescences, and quite early in the spring the young flower buds may be seen terminating the short, leafy shoots. By about the end of May these shoots reach their maximum extension and the flowers open. Each flowering shoot is markedly perulate at the base, with hard, persistent bud-scales; bears from three to seven leaves, and is terminated by the raceme. The leaves on these shoots of limited growth have only *one* bud in each axil.

As the flowers mature, and the fruits develop, one of the lower buds from the axil which produced the flowering shoot begins to develop, as do buds in the lower parts of the woody stems. These buds develop into vegetative shoots of unlimited growth, which extend rapidly, and again, have multiple, superposed buds in their leaf axils. After the release of the seeds, the whole of the flowering shoot is often shed, leaving the vegetative shoot which developed from the same axil, and those from below, to persist through the winter.

In *Neillia sinensis* var. *ribesioides* the leaves on the flowering shoots are smaller and more deeply lobed than those on the vegetative shoots, whereas in *N. thibetica* there is little difference between leaves from the two types of shoot.

Thus, in both these species there is a shoot dimorphism, with the earlier flowering shoots, which are of limited growth, being formed from the uppermost buds of each group and terminating in an inflorescence, with each leaf having one bud in its axil. The later vegetative shoots, are formed from the lower buds of a group, are of unlimited growth, with each leaf having multiple, superposed buds in its axil.

As far as can be judged from herbarium material (which is usually collected in the flowering stage) a similar situation is found in all the other species of the genus with the exception of *Neillia thyrsoiflora*, *N. serratisepala*, and probably *N. fallax*. In these species the dimorphism between vegetative and flowering shoots is not so marked, and the leaves

on the long flowering shoots bear multiple buds in their axils. The flowering shoots are not perulate at the base, and in general, are more leafy. The exact behavior of these species is in doubt, as I have not seen living plants of any of them, but they clearly form a distinct group, easily separable from the other species.

Multiple superposed buds occur in the one species of *Stephanandra* I have seen (*S. tanakae* Franch.) but are absent in at least two of the species of *Physocarpus* (*P. opulifolius* (L.) Maxim. and *P. amurensis* Maxim.).

A NOTE ON TERMINOLOGY

The flowers of *Neillia* are of the type generally known as perigynous, i.e., with sepals, petals, and stamens borne on the top of a tubular structure. The nature of this structure has been much debated, and various names have been given to it. For instance, Rehder (Man. Cult. Trees & Shrubs, 1927) refers to it as "calyx tube," whereas Vidal (*op. cit.*) calls it "hypanthium." Both of these terms have morphological implications which are not certainly valid in the case of *Neillia*, and I have therefore used the neutral term "floral tube."

GROUPING OF THE SPECIES

In a genus of this size there seems relatively little point in recognizing subgenera or sections. The ten species treated here, do however, fall into four more or less clearly defined groups:

1) *Neillia thyrsiflora* group. This consists of certainly two and possibly three species. *N. thyrsiflora* and *N. serratisepala* are closely related, and clearly belong together. The Javanese and Sumatran *N. fallax* Blume, which I have not seen, probably also belongs here, as it has been frequently confused with *N. thyrsiflora*, which also occurs on both Java and Sumatra. The group is characterized by its branching (see above), its strigose floral tube, and its white flowers.

2) *Neillia affinis* group. Again consisting of two species, the polymorphic *N. affinis* and the closely allied and vicariant *N. rubiflora*. The usually pink flowers have a globose-campanulate floral tube as broad as, or broader than long. The carpels contain three or more ovules.

3) *Neillia lobata* group. This is a rather variable group containing three species, *N. lobata*, *N. uekii*, and *N. gracilis*. The one common character is the occurrence of only two ovules per carpel. The flowers are pink or whitish, and the floral tube is short and cylindric-campanulate.

4) *Neillia sinensis* group. Another group of three species, including the polymorphic *N. sinensis*, *N. thibetica*, and *N. sparsiflora*. It is characterized by a long cylindrical floral tube, carpels with three or more ovules, and usually pink flowers. This group is taxonomically the most complex in the genus (except for *N. sparsiflora*, which is a perfectly distinct species) and the present account of it differs considerably from that of Vidal.

As originally described, *Neillia sinensis* and *N. thibetica* differed in a number of characters as shown below:

	<i>N. sinensis</i>	<i>N. thibetica</i>
Floral tube	long, glabrous outside	shorter, pubescent outside
Pedicels	long	short
Inflorescence	lax, few-flowered	dense, usually many-flowered

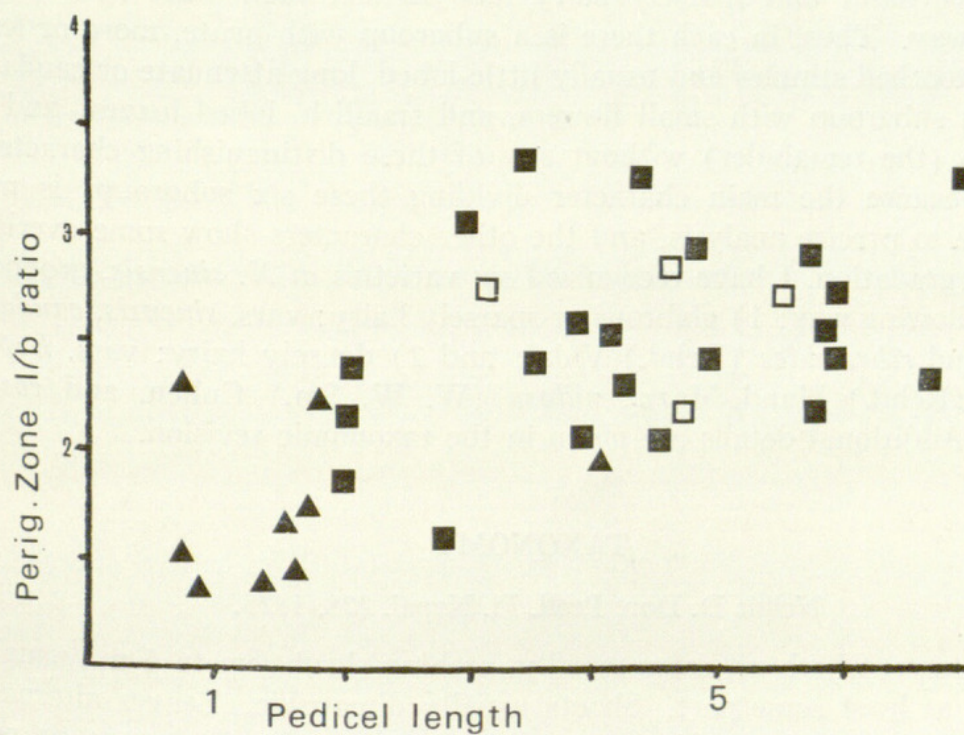
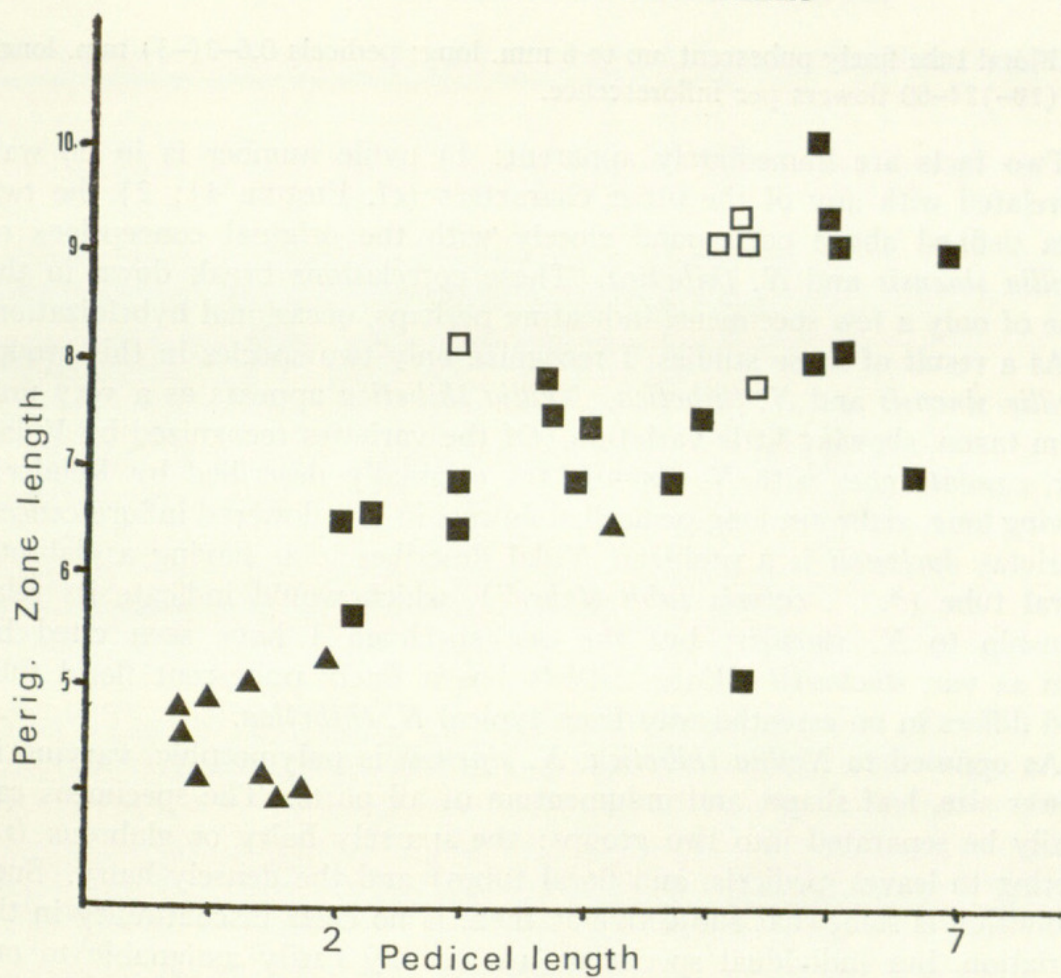
As more and more specimens were collected, these distinctions became blurred, and the identification of individual specimens became more difficult. In attempting to deal with this situation more taxa were described, either at the specific or varietal level. These included *N. longiracemosa* Hemsl. (1892), *N. glandulocalyx* Lévl. (1914–15), *N. ribesioides* Rehder (1913), *N. sinensis* var. *caudata* Rehder (1913), *N. villosa* W. W. Sm. (1917), and *N. hypomalaca* Rehder (1932) (*N. sinensis* var. *hypomalaca* (Rehd.) Hand.-Mazz., 1933).

No attempt was made to evaluate these taxa until Vidal's paper of 1963 (Handel-Mazzetti's treatment in *Symbolae Sinicae* being largely compilation). Vidal recognizes the following taxa: *N. glandulocalyx* Lévl., *N. sinensis* Oliv. (with vars. *sinensis*, *ribesioides* (Rehd.) Vidal, and *hypomalaca* (Rehd.) Hand.-Mazz.), *N. villosa* W. W. Sm., and *N. thibetica* Bur. & Franch. (*N. longiracemosa* Hemsl.) with vars. *thibetica*, *duclouxii* Vidal, and *caudata* (Rehd.) Vidal. In discriminating between the four species recognized, Vidal lays great stress on the number of ovules per carpel: 4 or 5 in *Neillia glandulocalyx* and *N. sinensis*, 5 to 8 in *N. thibetica*, and 5 or 6 in *N. villosa*. This interpretation considerably alters the original distinctions, both *N. sinensis* and *thibetica* here including forms with hairy or glabrous floral tubes. Other characters used by Vidal in discriminating between the taxa include indumentum, leaf-shape, stipule tooting, pedicel length and indumentum, and petiole length.

I found many specimens difficult to identify by this classification and therefore undertook an analysis of all the complete specimens available to me, a total of about 40 (a complete specimen being one with both leaves and well-developed flowers; changes after fertilization render fruiting specimens unsuitable). Each specimen was scored for the following characters: indumentum, length, and length/breadth ratio of the floral tube; indumentum and length of pedicel; density of indumentum on the lower surface of the leaf; number of flowers per inflorescence; number of ovules per carpel. FIGURES 1 to 4 show some of the variation in pictorialized scatter-diagram form.

This analysis shows that in this whole group of specimens there is no pair of completely correlated characters by which one may divide the group. There is, however, a close approach to this with a number of characters, enabling a good separation into two units to be made:

- a) Floral tube glabrous or with a few patent trichomes, (5–)6 mm. or more long; pedicels (2–)3–7 mm. long; 10–17(–23) flowers per inflorescence.



FIGURES 1 (above) and 2 (below). Variation in the *Neillia sinensis*/*N. thibetica* group. \blacktriangle floral tube pubescent; \square floral tube with few patent trichomes; \blacksquare floral tube glabrous. (All measurements in mm.) On graphs for "Perig. Zone" read "Floral tube".

- b) Floral tube finely pubescent, up to 6 mm. long; pedicels 0.6–2(–3) mm. long; (19–)24–60 flowers per inflorescence.

Two facts are immediately apparent: 1) ovule number is in no way correlated with any of the other characters (cf. FIGURE 4); 2) the two taxa defined above correspond closely with the original conceptions of *Neillia sinensis* and *N. thibetica*. These correlations break down in the case of only a few specimens, indicating perhaps, occasional hybridization.

As a result of these studies, I recognize only two species in this group, *Neillia sinensis* and *N. thibetica*. *Neillia thibetica* appears as a very uniform taxon, showing little variation. Of the varieties recognized by Vidal, var. *caudata* goes with *N. sinensis* (as originally described by Rehd.), having long, glabrous, long-pedicelled flowers in few-flowered inflorescences. Varietas *duclouxii* is a problem. Vidal describes it as having a glabrous floral tube (“... *calycis tubo glabro*”), which would indicate its relationship to *N. sinensis*; but the one specimen I have seen cited by him as var. *duclouxii* (Wang 23084) has a finely pubescent floral tube and differs in no essential way from typical *N. thibetica*.

As opposed to *Neillia thibetica*, *N. sinensis* is polymorphic, varying in flower size, leaf shape, and indumentum of all parts. The specimens can easily be separated into two groups: the sparsely hairy or glabrous (referring to leaves, pedicels, and floral tubes) and the densely hairy. Such a division is somewhat subjective as there is no clear discontinuity in the variation, but individual specimens are usually easily assignable to one or the other group. What is remarkable is that variations in other characters in the hairy and sparsely hairy lots parallel each other in a most striking way. Thus, in each there is a subgroup with ovate, more or less cordate, toothed stipules and usually little-lobed, long-attenuate or caudate leaves; a subgroup with small flowers, and smallish, lobed leaves; and a subgroup (the remainder) without any of these distinguishing characteristics. Because the main character dividing these six subgroups is not amenable to precise analysis, and the other characters show some overlap and intergradation, I have recognized six varieties in *N. sinensis*, grouped in the following way: 1) glabrous or sparsely hairy: vars. *sinensis*, *caudata* Rehd., and *ribesoides* (Rehd.) Vidal; and 2) densely hairy: vars. *hypomalaca* (Rehd.) Hand.-Mazz., *villosa* (W. W. Sm.) Cullen, and *rosea* Cullen. Additional details are given in the taxonomic revision.

TAXONOMY

Neillia D. Don, Prod. Fl. Nepal. 228. 1825.

Suffrutescent herb or, more usually, arching shrubs up to 6 m., usually hairy in at least some part. Shoots usually dimorphic. Leaves alternate, entire or lobed, irregularly serrate, stipulate, stipules deciduous or persistent, entire or toothed. Axillary buds multiple and superposed, at least on vegetative shoots. Inflorescences racemose or paniculate. Flowers bracteate, pedicellate, with a cylindric to campanulate floral tube (hypan-

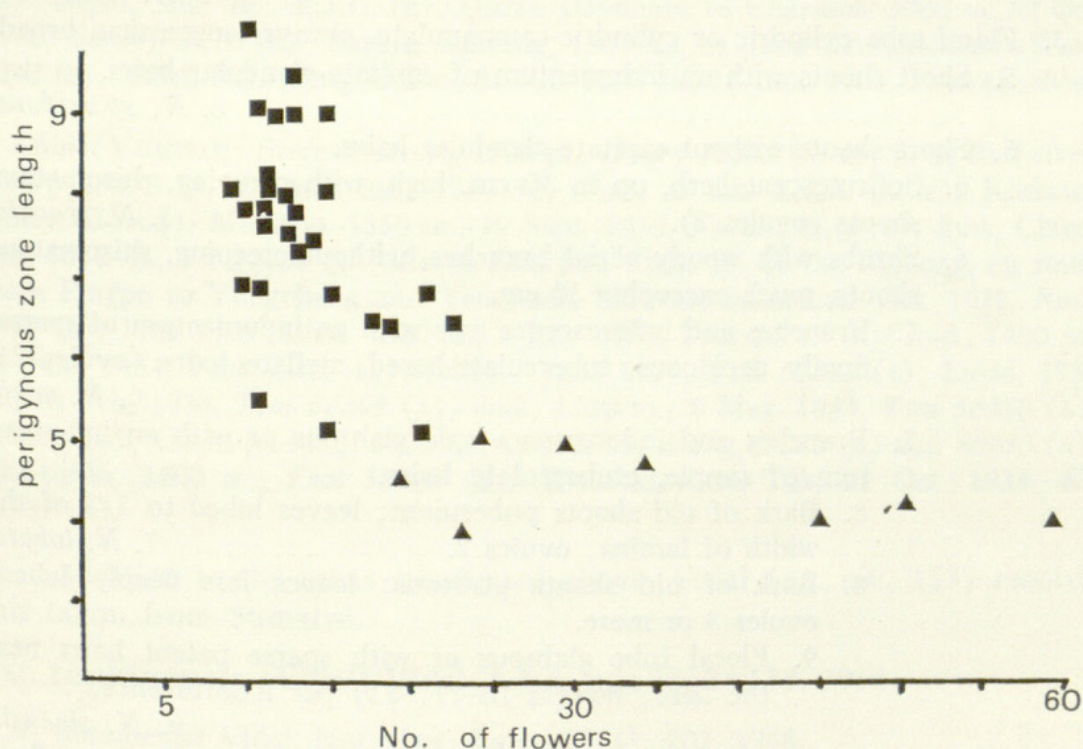
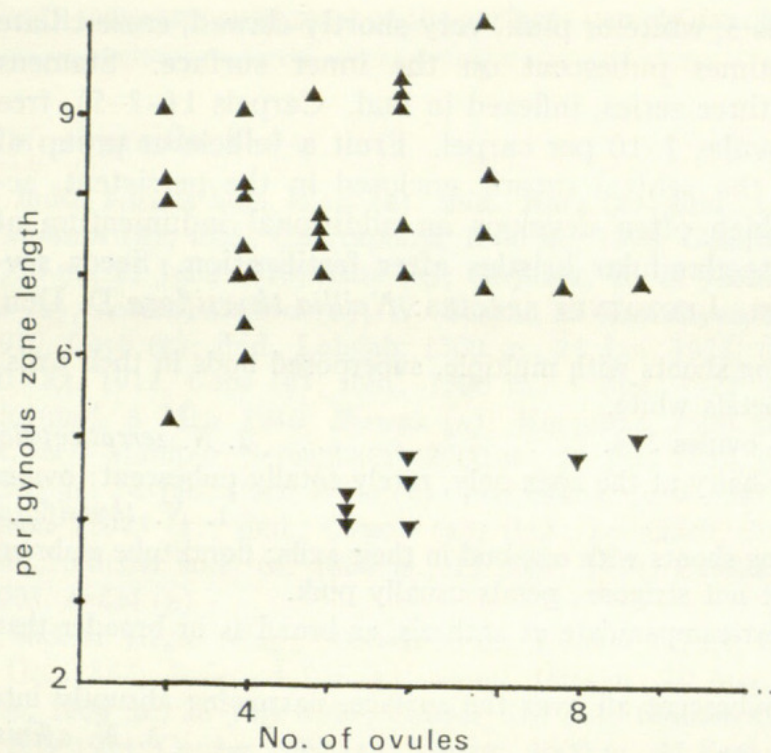


FIGURE 3 (above). Variation in the *Neillia sinensis*/*N. thibetica* group. ▼ floral tube pubescent; ▲ floral tube glabrous.

FIGURE 4 (below). Variation in the *N. sinensis*/*N. thibetica* group. ▲ floral tube pubescent; ■ floral tube glabrous. (All measurements in mm.) On graphs for "perigynous zone" read "floral tube".

thium or calyx tube of authors), glabrous, sparsely patent-pilose, pubescent or strigose outside, pilose within below the insertion of the stamens. Nectar secreted near the base of the floral tube. Sepals 5, pubescent on

the inner surface. Petals 5, white or pink, very shortly clawed, erose-ciliate on the margins, sometimes pubescent on the inner surface. Stamens (10-)15-30, in two or three series, inflexed in bud. Carpels 1(-2-5), free when more than one, ovules 2-10 per carpel. Fruit a follicle or group of follicles opening along the ventral suture, enclosed in the persistent, accrescent floral tube, which often develops an additional indumentum of long, spreading, capitate-glandular bristles after fertilization. Seeds several, shining, pale brown. LECTOTYPE SPECIES: *Neillia thyrsiflora* D. Don.

1. Leaves on the flowering shoots with multiple, superposed buds in their axils; floral tube strigose; petals white.
2. Ovary velutinous; ovules 3-4. 2. *N. serratisepala*.
2. Ovary glabrous or hairy at the apex only, rarely totally pubescent; ovules 8-10. 1. *N. thyrsiflora*.
1. Leaves on the flowering shoots with one bud in their axils; floral tube glabrous or variously hairy but not strigose; petals usually pink.
3. Floral tube globular-campanulate at anthesis, as broad as or broader than long.
4. Carpels 1-5, pubescent all over the surface, narrowing abruptly into the style. 3. *N. affinis*.
4. Carpels 1, pilose only at apex, tapering gradually into the style. 4. *N. rubiflora*.
3. Floral tube cylindric or cylindric-campanulate, always longer than broad.
5. Short shoots with an indumentum of capitate-glandular hairs. 8. *N. sparsiflora*.
5. Short shoots without capitate-glandular hairs.
6. Suffrutescent herb, up to 30 cm. high, with creeping, rhizomatous shoots (ovules 2). 5. *N. gracilis*.
6. Shrubs with woody aerial branches, without creeping, rhizomatous shoots, much exceeding 30 cm.
7. Branches and inflorescence axis with an indumentum of sparse, finally deciduous, tuberculate-based, stellate hairs (ovules 2). 6. *N. uekii*.
7. Branches and inflorescence axis glabrous or with an indumentum of simple, etuberculate hairs.
8. Bark of old shoots puberulent; leaves lobed to 2/3 of the width of lamina; ovules 2. 7. *N. lobata*.
8. Bark of old shoots glabrous; leaves less deeply lobed; ovules 3 or more.
9. Floral tube glabrous or with sparse patent hairs near the base; flowers 10-17(-23) per inflorescence. 9. *N. sinensis*.
9. Floral tube finely pubescent all over the surface; flowers (19-)24-60 per inflorescence. 10. *N. thibetica*.

1. *Neillia thyrsiflora* D. Don, Prodr. Fl. Nepal. 228. 1825; Vidal, Adansonia II. 3: 152. *pl. 1, figures 3-6*. 1963. FIGURE 5: 17, 18.

N. virgata Wall., *nomen nudum*.

Ovary glabrous or sparsely pilose at the apex and along the sutures; panicles usually much branched. var. *thyrsiflora*.

Ovary pubescent over most of the surface; panicle usually little branched.
 var. *tunkinensis*.

Var. *thyrsiflora*

India. Khasia hills, *Watt* (E); *ibid.*, *Kurz* (E); *ibid.*, 1500–2000 m., *Hooker & Thomson* (E); *ibid.*, Cherrapunji, 1600 m., 1878, *Gallatly* 214 (A); *ibid.*, Mulki, 1750 m., 12 June 1923, *Ruse* (A); Gitjhora, W. of Jaldahar, 12 Feb. 1900, *Cave* 56 (E); Assam, *Simons* (E); W. Bengal, E. Himalayas, Ghoom, 2500 m., 4 July 1919, *Cave* (E); *ibid.*, Labdah, 1500 m., 24 Jan. 1923, *Cave* (E); *ibid.*, 1000 m., 10 Oct. 1912, *Cave* (E); *ibid.*, 1500 m., 4 Aug. 1922, *Cave* (E); E. Himalaya, Singmari, 8 May 1940, *Biswas* (A); Kataphar, 2300 m., 28 Dec. 1937, *Anon.* (A, NA); Manipur, Serepharai, 2600 m., 16 Jan. 1882, *Watt* (E); *ibid.*, Chamoo, 1500 m., 14 Jan. 1882, *Watt* (E); Darjeeling, *Lace* 2347 (E); *ibid.*, 1905, *Drummond* 21043 (E); *ibid.*, *Cowan* (E); *ibid.*, Lahagach, 5 Aug. 1923, *Cowan* (E); *ibid.*, Sinchal lake, ca. 2800 m., 15 Nov. 1944, *Relzada* 19034 (A); Kurseong, 1903, *Brühl* (E).

Sikkim. Regio temp., 2000–2600 m., *Hooker* (A, E); Gassing to Ratong river, 2 Oct. 1882, *Anderson* 505 (E); Sureil, 1800 m., 29 Aug. 1912, *Cave* (A); Mungpoo, 1300 m., 28 July 1909, *Cooper* 556 (A). Bhutan. Chukha Tunpu, 1500 m., 4 July 1914, *Cooper* 1229 (E); Tongsa, 2600 m., 11 Sept. 1914, *Cooper* 2069 (E); Tilageng, Punabha, 2100 m., 18 Aug. 1914, *Cooper* 2814 (E); sine loc., *Griffith* (E). Nepal. Sine loc., *E.J.C.* (E); Gurke Bandhara to Charikot, 2000 m., 10 Oct. 1960, *Banerji* 1210 (A). Burma. Laktang, 1500 m., 21 June 1919, *Kingdon-Ward* 3241 (E). Tibet. Raiotdong to Santok, 800–2000 m., 27 June 1903, *Younghusband* (A).

China. YUNNAN: Szemao forest, 1500 m., *Henry* 12275 (A, E); S. of Red river, *Henry* 13653 (A, E); sine loc., 1939–40, *Wang & Liu* 81820 (A, E); Kiukiang valley (Taron), Monting, 1350 m., 10 Sept. 1939, *Yü* 20199 (A, E); *ibid.*, Chien-gen, 1650 m., *Yü* 19409 (E); above Kan San Chai, W. of the Mekong, en route from Pingpo to Yungchang and Tengyueh, Salween watershed, Oct. 1922, *Rock* 7056 (A); Ping Pien Hsien, 1300 m., 7 July 1934, *Tsai* 60717 (A); *ibid.*, 1400 m., 15 June 1934, *Tsai* 60207 (A); *ibid.*, 7 June 1934, *Tsai* 62383 (A); Lu-se, 1750 m., 10 Feb. 1934, *Tsai* 56895 (A); *ibid.*, 1750 m., 1 Mar. 1934, *Tsai* 56350 (A); Dzung-duei, Cham-pu-lung, 2000 m., Oct. 1935, *Wang* 67076 (A) and 66940 (A); Che-tse-lo, 3200 m., *Tsai* 58432 (A). KWANGSI: On Tak, 21 Oct. 1935, *Ko* 55787 (A).

In addition to the areas mentioned above, *Vidal* (*op. cit.*, 153) records this taxon from Sumatra.

Var. *tunkinensis* (*Vidal*) *Vidal*, *Adansonia* II. 3: 153. 1963.

N. tunkinensis *Vidal*, *Not. Syst. Paris.* 13(4): 202. 1948.

N. tunkinensis var. *bibracteolata* *Vidal*, *loc. cit.*

Burma. N. Triangle (Hkinkum), 1300 m., 10 July 1953, *Kingdon-Ward* 21135 (A). China. YUNNAN: sine loc., *Wang & Liu* 83503 (A, E); sine loc., *Forrest* 29897 (E); Mengtze, 1800 m., *Henry* 9419 (A, E); *ibid.*, S. mts., 1500 m., *Henry* 9419A (E); Mienning, Poshan, 2700 m., 9 Oct. 1938, *Yü* 17974 (A, E); Salwin-Kiukiang divide, Newahlung, 2200 m., 8 July 1938, *Yü* 19228 (A, E).

Vidal records this taxon from Assam, North Vietnam, Java, and Su-

matra. It appears to be intermediate between *Neillia thyrsiflora* var. *thyrsiflora* and *N. serratisepala*, the only distinct character separating them being the number of ovules (8–10 in both varieties of *N. thyrsiflora*, 3–4 in *N. serratisepala*). I have followed Vidal in treating them as separate species, but there are grounds for considering *N. serratisepala* as merely another variety of *N. thyrsiflora*.

2. *Neillia serratisepala* Li, Jour. Arnold Arb. 25: 300. 1944; Vidal, *Adansonia* II. 3: 151. 1963.

China. YUNNAN: Shang Pa, 2000 m., 31 Oct. 1934, *Tsai* 59158 (A, holotype).

This species is known only from the type collection; for further observations see under *Neillia thyrsiflora*.

3. *Neillia affinis* Hemsl. Jour. Linn. Soc. 29: 304. 1892; Vidal, *Adansonia* II. 3: 155. 1963.

A polymorphic species, divisible into four varieties:

1. Carpels 3–5, free but contiguous, forming a globose ovary. . . . Var. *polygyna*.
1. Carpels 1–2.
 2. Sepals as long as or longer than the floral tube, 4.2–6 mm., much exceeding petals. Var. *longisepala*.
 2. Sepals shorter than the floral tube, up to 4 mm., not or scarcely exceeding petals.
 3. Raceme elongate, the flowers 10 or more, spaced along the axis. Var. *affinis*.
 3. Raceme contracted, the 5–10 flowers fascicled at the end of the axis. Var. *pauciflora*.

Var. *affinis* Vidal, *Adansonia* II. 3: 155, 156. *pl.* 1, *fig.* 11. 1963.

FIGURE 5: 15.

China. YUNNAN: Chungkang snow range, 2500 m., 31 July 1938, *Yü* 17115 (A, E); Kengma, Chuichayko, 2500 m., 10 Aug. 1938, *Yü* 17297 (A, E); Fuchuan Range, W. of Mekong-Salwin divide and W. of Wei Hsi, 3800 m., 4–5', June 1932, *Rock* 22729 (A, E); *ibid.*, July–Sept. 1932, *Rock* 23275 (A, E); inter fluvios Landsang-djiang (Mekong) et Lu-djiang (Salween) ca. 28°, in valle a jugo Si-la, ad vicum Tsekuo descendente, 2300–3050 m., 15 June 1916, *Handel-Mazzetti* 8884 (A, E); Tengyueh, *Howell* 200 (E); sine loc., *Forrest* 30023 (E); Yi Liang Hsien, 1400 m., 27 May 1932, *Tsai* 52055 (A); Jue-she-hsien, 2500 m., 31 May 1932, *Yü* 941 (A); Yong-shan-hsien, 2100 m., 31 May 1932, *Tsai* 50949 (A). SZECHUAN: Neighbourhood of Tachienlu, 3000–4500 m., *Pratt* 347 (K, syntype); Wa-shan, June and Sept. 1908, *Wilson* 916a (A, E–transition to var. *polygyna*); Opien Hsien, 14 July 1930, *Fang* 4694 (A, E); sine loc., Feb. 1890, *Henry* 8968 (A, E, isosyntypes); Wu-shan, 2600 m., July 1908, *Wilson* 3559 (A); Hsiao-hsiang-ling, 2000 m., 21 May 1922, *Smith* 1865 (A); sine loc., 2600 m., July 1904, *Wilson* 3560 (A); Nanchuan Hsien, 1928, *Fang* 935 (A). SIKANG: Chi-natung, Tsa-wa-tung, 3000 m., Aug. 1935, *Wang* 65196 (A). N. Burma. Moku-ji pass, 3300 m., 28 July 1920, *R. F[arrer]* 1757 (E).

Var. *polygyna* Cardot ex Vidal, *Adansonia* II. 3: 156. *pl.* 1, *fig.* 12. 1963.

China. YUNNAN: Wei-hsi-hsien, Yeh-chih, 3200 m., mountain slope, Aug. 1935, *Wang 68154* (A); on the Kari pass, lat. 28°N, 4000 m., June 1917, *Forrest 14002* (A, E, WSY).

Also recorded from eastern Tibet by Vidal.

Var. pauciflora (Rehd.) Vidal, *Adansonia* II. 3: 156. *pl. 1, fig. 3.* 1963.

N. pauciflora Rehd. *Pl. Wils.* 1: 437. 1913.

China. YUNNAN: Mengtze, N. mt., 2300 m., *Henry 10231A* (A, holotype); hills to the E. of Tengyueh, 25°N, 2000 m., May 1912, *Forrest 7854* (A, E); Shweli-Salween divide, 25° 6' N, 98° 50' E, 2600 m., *Forrest 29567* (E). SZECHUAN: Mt. Omei, 2300 m., 27 July 1939, *Sun & Chang 1234* (A); *ibid.*, Yen-wang-po, 2400 m., 18 Aug. 1940, *Tu 272* (A).

Var. longisepala Cullen, var. nov.

A var. *affinis* sepalis majoribus, 4.2–6 mm. longis, conspicuis differt.

China. YUNNAN: Shweli-Salween divide, 25° 20' N, 3000 m., shrub of 4–5', fls. creamy yellow, in scrub and thickets in side valleys, Aug. 1918, *Forrest 17605* (E, holotype; A, WSY, isotypes). SZECHUAN: Ta-hsiang-ling, 2700 m., 28 May 1922, *Smith 2043* (A); Mt. Omi, June 1904, *Wilson 4886* (A, NA). SIKANG: Tsarong, on Doker-la, Mekong-Salwin divide, 28° 20' N, *Forrest 14342* (A, E, WSY); Doker-la, 3600–4000 m., July 1913, *Kingdon-Ward* (E). BURMA: Hpimaw village, road to Feng-shiu-ling, 2000–2300 m., forests, 22 May 1914, *Kingdon-Ward 1584* (E).

As is shown by the number of varieties, *Neillia affinis* is a rather polymorphic species. The variations, however, do not seem to be separable geographically. Var. *longisepala* is very distinct in its long conspicuous sepals; it may also differ from the other varieties in having stipules which are more toothed. The latter character is one which can only be determined subjectively, and it is usually of no value in determining specimens in fruit, where the stipules have usually been lost. The inflorescence in *N. affinis* is often a panicle, sometimes richly branched; this has caused some confusion with *N. thyrsiflora*, a perfectly distinct species.

4. *Neillia rubiflora* D. Don, *Prodr. Fl. Nepal.* 228. 1825; Vidal, *Adansonia* II. 3: 155. *pl. 1, fig. 9, 10.* 1963. FIGURE 5: 16.

India. E. Himalaya, Sandakpha, 4000 m., 21 July 1913, *Rohmoo Lepcha 766* (E); Darjeeling district, 2300 m., May 1908, *Smith* (A). **E. Pakistan.** Bengal, Chittagong division, nr. Soylu, 3000 m., *Cowan 79* (E). **Sikkim.** Reg. temp., 2600–3000 m., *Hooker* (A, E); *ibid.*, *Schneider* (A); Zemu and Lonakh valleys, Zemu Chu, 3000 m., 6 Sept. 1947, *Cave 97/47* (E); Sureil, 7 Sept. 1921, *Wilson* (A). **Bhutan.** Tobrang (Trashig Yangse Chu), 2300 m., 6 July 1948, *Ludlow, Sherriff & Hicks 20495* (E); Lao (Trashig Yangse Chu), 3000 m., 5 July 1949, *Ludlow, Sherriff & Hicks 20475* (E); Shabjethang, Bumthang Chu, 3000–3200 m., 1 July 1949, *Ludlow, Sherriff & Hicks 19288* (E); Gyasa Dzong, Mo Chu, 3000 m., 12 June 1949, *Ludlow, Sherriff & Hicks 16520* (E). **Nepal.** Sine loc., *E.J.C.* (E).

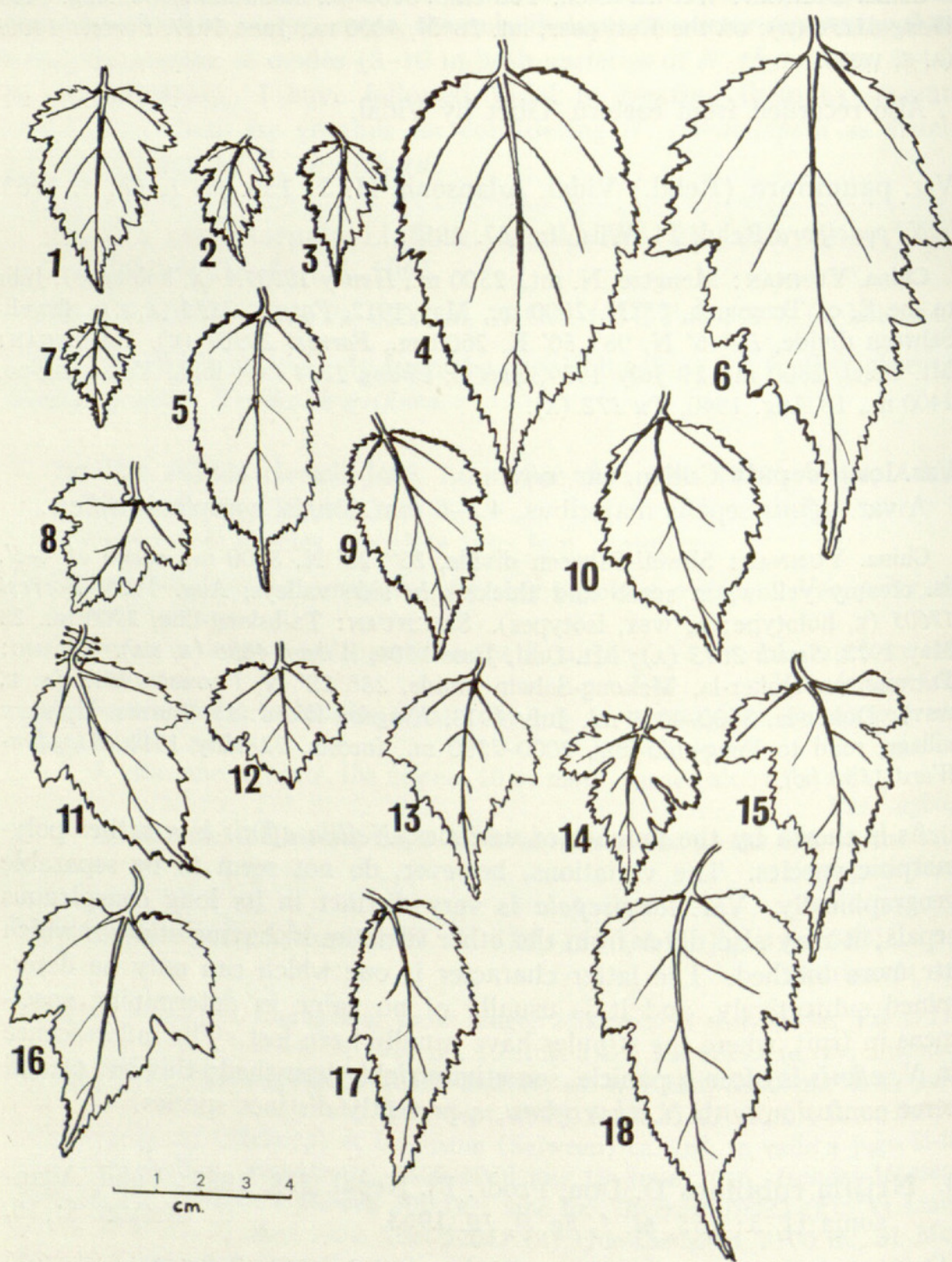


FIGURE 5. Leaves of *Neillia* species. 1. *N. sinensis* var. *sinensis* (Wilson 701); 2. *N. sinensis* var. *sinensis* (Maire s.n.); 3. *N. sinensis* var. *hypomalaca* (Forrest 30475); 4. *N. sinensis* var. *caudata* (Fang 1057); 5. *N. sinensis* var. *caudata* (Cavalerie 2461); 6. *N. sinensis* var. *villosa* (Maire 2330); 7. *N. sinensis* var. *rosea* (Maire 1120); 8. *N. sinensis* var. *ribesioides* (Wilson 2382); 9. *N. thibetica* (Wilson 916); 10. *N. thibetica* (Chu 3611); 11. *N. sparsiflora* (Ten 461); 12. *N. gracilis* (Maire s.n.); 13. *N. uekii* (Russell 90); 14. *N. lobata* (Schneider 3558); 15. *N. affinis* var. *affinis* (Rock 22729); 16. *N. rubiflora* (Ludlow et al. 19288); 17. *N. thyrsiflora* (Yü 20199); 18. *N. thyrsiflora* (Henry 12275).

Neillia rubiflora is closely related to *N. affinis*. It is also rather similar to *N. thyrsiflora*, which grows in the same area and with which it has been confused. It differs from *N. thyrsiflora* in the lack of multiple buds on the flowering shoots, in its less-branched (usually racemose) inflorescence, its adpressed-sericeous floral tube, and its entire stipules.

5. *Neillia gracilis* Franch. Pl. Delav. 1: 202. 1889; Vidal, Adansonia II. 3: 157. pl. 2, fig. 2. 1963. FIGURE 5: 12.

China. YUNNAN: Yangtze watershed, prefectural district of Likiang, eastern slopes of Likiang snow range, 4000 m., June 1922, *Rock* 4422 (A, E); eastern flank of the Lichiang Range, lat. 27° 25' N, 3000–3300 m., June 1910, *Forrest* 6033 (E); eastern flank of the Lichiang Range, lat. 27° 12' N, 3000 m., May 1906, *Forrest* 2244 (A, E); at base of range to NW. of Ho Shui, 3300–4000 m., June 1906, *Forrest* 1871 (E); paturages des mont derrière Tong Tchouan, 2600 m., *Maire* 1100 (E); *ibid.*, 1914, *Maire* 559 (E); 27° 30' N, 100° 45' E, 2800 m., 25 May 1921, *Kingdon-Ward* 3986 (E); Likiang snow range, 28 June 1939, *Ching* 30281 (A); Likiang-hsien, 2800 m., July 1935, *Wang* 70883 (A); Chungtien valley, 3500 m., 9 July 1939, *Feng* 1936 (A); in cacuminis montis Tche-tchang prope Tong-tchan, 3 June 1882, *Delavay* 249 (A, isolectotype); mountains S. of Lichiang nr. Hochin and Chinho, 25–28 May 1922, *Rock* 4079 (A); Lichiang range, 31 July 1914, *Schneider* 2071 (A); sine loc., 1937, *Yü* 15282 (A). SZE-CHUAN: In declivibus graminosis regionis temperatae jugi Daörlbi medii inter Yenyuen et Yungning, supra vic. Hungga, 3500 m., 13 June 1914, *Handel-Mazzetti* 2960 (E); inter Hunka et Woholo, 3000 m., 13 June 1914, *Schneider* 1506 (A, E).

This species, *Neillia gracilis*, is the most distinct species of the genus, being suffrutescent and rhizomatous. In inflorescence and flower characters it resembles *N. affinis* var. *pauciflora* but differs in having only two ovules per carpel, a character it shares with *N. lobata* and *N. uekii*. *Forrest* 1871 is a very robust variant, with the inflorescence forming a small panicle. In other respects this collection matches the rest of the material; it may perhaps represent a distinct variety.

6. *N. uekii* Nakai, Bot. Mag. Tokyo 26: 3. 1912; Vidal, Adansonia II. 3: 158. 1963. FIGURE 5: 13.

N. millsii Dunn, Kew Bull. 1912: 108. 1912.

Korea. Prov. N. Heian, around Matan (Unsan), 28 June 1917, *Wilson* 8714 (A); N. Heian, Kakai, 5 Aug. 1918, *Wilson* 10587 (A); Prov. Pyengan, Yengben, 30 June 1937, *Mrs. R. K. Smith* (A); Prov. Pyengan, in dumosis Pyekdan, 12 June 1914, *Nakai* 1774 (A); Kangkai, 6 Oct. 1909, *Mills* 107 (K, holotype; A, isotype of *N. millsii*); in petrosis Pyongyang, June 1901, *Faurie* 85 (A); in petrosis vallium Coreae mediae, July 1906, *Faurie* 316 (A, E).

Neillia uekii is the only species of the genus known from Korea, where it is endemic. It is similar to *N. lobata* and *N. gracilis* in having only two ovules per carpel, but differs from all the species of the genus in having a sparse indumentum of tuberculate-based, stellate hairs on the branches in the region of the inflorescence. These hairs are ultimately deciduous,

but the tuberculate bases remain attached to the fruiting axis and are easily recognized. According to Vidal (*loc. cit.*), the name *N. uekii* was published in January 1912, whereas *N. millsii* was published in March of the same year.

7. *Neillia lobata* (Rehd.) Vidal, *Adansonia* II. 3: 157. *pl.* 2, *fig.* 5. 1963. FIGURE 5: 14.

N. longeracemosa Hemsl. var. *lobata* Rehd., *Jour. Arnold Arb.* 1: 257. 1920.

China. SZECHUAN: Inter Oti et Yungsin-hsien prope Quentin, ca. 2900 m., 4 June 1914, *Schneider* 3558 (A, holotype; E, isotype); inter Tu-yung-pu et Yen-yuan-hsien, ca. 3000 m., 12 May 1914, *Schneider* 4151 (A); in regionis temperatis inter oppidum Yenyuen et flumen Yalong, 27° 31', fruticetis circa vicum Tsin-tienpu, ca. 2750 m., 12 May 1914, *Handel-Mazzetti* 2218 (E).

Neillia lobata is allied to *N. uekii*, but differs in possessing more deeply lobed leaves, finely tomentose bark on the old wood, and in lacking the characteristic tuberculate-based stellate hairs of *N. uekii*. The Handel-Mazzetti specimen cited above is a very poor one, and some doubt must remain as to whether it actually is *N. lobata*.

8. *Neillia sparsiflora* Rehd., *Jour. Arnold Arb.* 1: 237. 1924; Vidal, *Adansonia* II. 3: 157. *pl.* 2, *fig.* 1. 1963. FIGURE 5: 11.

China. YUNNAN: Circa Pe-yen-tsin, Kou-ty, 1917, *Ten* 462 (A, holotype; E, isotype); *ibid.*, 1918, *Ten* 531 (A, E).

A very distinct species, *Neillia sparsiflora* is characterized by the presence of long capitate-glandular bristles on the short shoots and petioles. It is closely related to *N. sinensis*, and is known from only three specimens: the two cited above, and a further one cited by Vidal (Yunnan, Djo Kou La près Pin Tchouan, vii 1907, *Ducloux* 5348, p).

9. *Neillia sinensis* Oliv. in Hook. *Ic. Pl.* 16: *t.* 1540. 1886.

As mentioned above (p. 142), this species and *Neillia thibetica* form an intergrading complex of forms difficult to separate into distinct taxa. However, six varieties are recognizable in *N. sinensis*:

1. Floral tube glabrous; leaves glabrous or pilose only on the veins beneath; short shoots glabrous or sparsely pilose.
2. Stipules ovate-cordate, dentate; leaves large, usually little lobed, often caudate (pedicels 2–3 mm., glabrous; floral tube 1.6–2.5 times longer than broad). var. *caudata*.
2. Stipules oblong, oblong-ovate, or lanceolate, not cordate, entire or with 1 or 2 small teeth; leaves relatively smaller, often lobed, usually not caudate.
3. Floral tube less than 6.5 mm. long (pedicels 2–5 mm., glabrous; floral tube 2–3 times longer than broad; flowers 15–19 in each inflorescence). var. *ribesioides*.
3. Floral tube more than 6.5 mm. long (pedicels 3.5–7 mm., glabrous;

floral tube (2-)2.5-4 times longer than broad; flowers 10-17 in each inflorescence). var. *sinensis*.

1. Floral tube usually with sparse patent hairs near the base; leaves pubescent to pilose on the surface beneath, usually densely so; short shoots pubescent to pilose.
4. Floral tube 5.5-6 mm.; pedicels up to 2 mm. var. *rosea*.
4. Floral tube 6.5 mm. or more; pedicels exceeding 2 mm.
5. Stipules ovate-cordate; pedicels less than 3 mm. var. *villosa*.
5. Stipules oblong, not cordate; pedicels exceeding 3 mm. var. *hypomalaca*.

Var. *sinensis* Vidal, *Adansonia* II. 3: 160. *pl.* 2, *figs.* 7, 8. 1963.

FIGURE 5: 1, 2.

China. SHENSI: Langchow, Kuan Shan, 2000 m., 3 July 1922, *Hers* 2343 (A); Tai-pe-shan, 1910, *Purdum* 1 (A, E); *ibid.*, *Purdum* 467 (A); Tu-kia-po, 4 June 1897, *Giraldi* (A). KWANGSI: Hang-on-yuen, woods, 10 June 1936, *Chung* 81758 (A). HUPEH: W. Hupeh, May & Sept. 1907, *Wilson* 86 (A, E); Hsing-shan-hsien, 1300-2000 m., June & Sept. 1907, *Wilson* 189 (A, E); sine loc. *Henry* 5554A (A); sine loc. *Henry* 5554B (E); N. Tan-schian, Mar. 1912, *Silvestri* 4589 (A); Paokang, 10-20', *Wilson* 701 (A, E). SZECHUAN: Sine loc. *Henry* 5695 (A). YUNNAN: Wei-hsi plain, *McLaren* D27 (A, E); Wei-hsi-hsien, Yeh-chih, 2400 m., July 1935, *Wang* 67945 (A). HUNAN: Yünschan prope urbem Wukang, 600-1300 m., 6 June 1918, *Handel-Mazzetti* 765 (A); *ibid.*, *Handel-Mazzetti* 12010 (E). KANSU: About Satanee and near Di-er-kan, *Farrer & Purdom* 54 (E); ad fl. Tchi-luco, 18 June 1885, *Potanin* (A).

Neillia sinensis var. *sinensis* is easily recognized by its long, narrow, glabrous floral tube, its few-flowered inflorescences and its long, glabrous or sparsely hairy pedicels. An extreme form is represented by *Wilson* 189, in which all parts are glabrous.

Var. *caudata* Rehd., *Pl. Wils.* 1: 436. 1913.

FIGURE 5: 4, 5.

N. glandulocalyx Lévl., *Fl. Kouy Tcheou* 348. 1914-15; Vidal, *Adansonia* II. 3: 160. *pl.* 2, *fig.* 6. 1963.

N. thibetica var. *caudata* (Rehd.) Vidal, *Adansonia* 3: 164. *pl.* 3, *figs.* 5, 6. 1963.

China. YUNNAN: Mengtze, E. mt., 2000 m., *Henry* 9669 (A, holotype); Yong-shan-hsien, 2100 m., 4 June 1932, *Tsai* 50992 (A); Chen-hsiung-hsien, 1850 m., 3 July 1932, *Tsai* 52706 (A); sine loc., *Tsai* 51196 *bis* (A). SZECHUAN: Nanchuan-hsien, 2100-2500 m., 27 May 1928, *Fang* 1057 (A, E). KWEICHOW: Route de Pin Fa à Tou Yun, 25 July 1905, *Cavalerie & Fortunat* 2461 (E, holotype and isotype of *N. glandulocalyx*; A, isotype); Top-kying, Ten-shan, Sunyi, 400 m., 4 June 1930, *Tsiang* 5283 (A); Tuyun, Ma-tsoon-ling, 500 m., 11 July 1930, *Tsiang* 5744 (A); She-won-san, Haufeng, 4 July 1936, *Teng* 90524 (A). KWANGSI: Yang wu, Ling-chuan district, 21-30 July 1937, *Tsiang* 27882 (A); Kon-Tung, Min-shan, N. Luchen, 1000 m., 18 June 1928, *Ching* 6107 (A); Loh-hoh-tsien, Lin-yuin-hsien, Lao-shan slope, 1450 m., 20 May 1933, *Steward & Cheo* 450 (A); Sze-hoh-tou, Lin-yuin-hsien, 12 Apr. 1933, *Steward & Cheo* 172 (A); Ling-wan district, *Lau* 28719 (A).

As explained above I prefer to treat var. *caudata* under *Neillia sinensis* (as it was originally described by Rehder), rather than under *N. thibetica*, where Vidal places it. It is a variable taxon, particularly in the lobing of the leaves, which may vary from quite deeply lobed, as in the type, to completely unlobed, as in some leaves of *Fang 1057*. Even on the same shoot, considerable variation in the degree of lobing may be found. The number of flowers per raceme is also variable.

The type of *Neillia glandulocalyx* (*Cavalerie & Fortunat 2461*) is a very poor fruiting specimen; however, in the Edinburgh herbarium there is a sheet labelled: "Flora of Yunnan, Yunnan-sen district [all this printed] *Cavalerie 2461*." This is a much better specimen, and appears to be a mislabelled duplicate of *Cavalerie & Fortunat 2461* (Mr. A. Lauener informs me that other, similar mislabellings are found in the Lévillé herbarium). On the basis of this specimen, which has both flowers and fruits, I am convinced that *Neillia glandulocalyx* and *N. sinensis* var. *caudata* belong to the same taxon; the distinctions between them noted by Vidal (number of ovules, leaf shape) are variable and are not, in my opinion, reliable for the separation of distinct species.

Var. *ribesioides* (Rehd.) Vidal, *Adansonia* II. 3: 161. 1963.

FIGURE 5: 8.

N. ribesioides Rehd. *Pl. Wils.* 1: 435. 1913.

China. YUNNAN: Chao-tung-hsien, 2000 m., 19 May 1932, *Tsai 50929* (A). SZECHUAN: Pan-lan-shan, 2300–3000 m., June and Sept. 1908, *Wilson 2382* (A, holotype; see below); Tchen-keou-tin, *Farges 494* (E); Cheng-kou-hsien, 3 May 1932, *Fang 10315* (A).

The type sheet of this taxon poses a problem; I have seen three sheets labelled *Wilson 2382*, two at the Arnold Arboretum and one at Edinburgh. The holotype sheet (A) has two shoots on it. One of these, which has flowers with glabrous floral tubes, is marked "typical form," thus agreeing with a note with Rehder's original description: "Our specimen contains 2 branches, one with a glabrous calyx tube, which I consider the typical form . . ." The other shoot is, in general, rather hairier, the flowers have finely pubescent floral tubes, and there are more flowers in the inflorescence. All the specimens on the other two isotype sheets (A and E) match this second, hairier shoot on the holotype sheet. I regard this hairier shoot as being *Neillia thibetica*, and it is interesting to note that the preceding number, *Wilson 2381*, is clearly *N. thibetica*; this matches the hairy shoots on *Wilson 2382* very well. Is it possible that these specimens have become mixed at some stage, and that most of the plants labelled 2382 are really part of 2381? The other specimens cited above match the typical *Wilson 2382* very well and are characterized by their short, glabrous floral tubes, glabrous pedicels, and small, rather deeply cut leaves, somewhat similar to those of the common British hawthorn (*Crataegus monogyna* Jacq.).

Var. *villosa* (W. W. Sm.) Cullen, comb. et stat. nov. FIGURE 5: 6.

N. villosa W. W. Sm. Notes Bot. Gard. Edinburgh 10: 53. 1917; Vidal, Adansonia II. 3: 161. *pl.* 2, *figs.* 9–11. 1963.

China. YUNNAN: Vicinity of Yunnan-sen, *Maire* 2330 (E, holotype and several isotypes).

This taxon is essentially a densely hairy analogue of *Neillia sinensis* var. *caudata*; it has similar stipules and leaves and identical flowers. The indumentum of the leaves and short shoots is very dense, as it is also in the variety which follows.

Var. *rosea* Cullen, var. nov.

FIGURE 5: 7.

A *Neillia sinensis* var. *sinensis* foliis subtus dense crispule pilosis, tubis floralibus brevissimis (5.6 mm.) differt.

China. YUNNAN: Vicinity of Yunnan-sen, *Maire* 1120 (E, holotype and several isotypes); Kin-tchouy-chan, Lou-pou, coteaux, May–June 1922, *Maire* (E).

As *Neillia sinensis* var. *villosa* is the hairy analogue of var. *caudata* and var. *hypomalaca* that of var. *sinensis*, so var. *rosea* is that of var. *ribesoides*. It is characterized by its small, lobed leaves, very densely crisply pilose beneath, and its short, glabrous floral tubes.

Var. *hypomalaca* (Rehd.) Hand.-Mazz. Symb. Sin. 7: 449. 1933; Vidal, Adansonia II. 3: 161. 1963. FIGURE 5: 3.

N. hypomalaca Rehd., Jour. Arnold Arb. 13: 337. 1932.

China. YUNNAN: Litiping range, Mekong-Yangtze divide, east of Wei-hsi, June 1923, *Rock* 9171 (A, holotype; E, isotype); Tong-tchouan, collines, 2990 m., *Maire* 429 (A, paratype); Du-long, halliers des mont, 2990 m., *Maire* 529 (A, paratype); sine loc., 2900 m., *Maire* 41 (A, paratype); Kangpu, Wei hsien, 1932 m., ravine, July 1935, *Wang* 64159 (A); NW. Likiang, Lu-tien, 3 June 1939, *Ching* 20483 (A); Pan Kiao Ho près Se'tsung, 17 May 1904, *J. B. Lo* (*Ducloux* 633–E); Liu-ti-ping, 27° 12' N, 3300 m., June 1917, *Forrest* 13883 (A, E, WSY); Wei-hsi area, *Forrest* 30475 (E); Mo-tsou, 600 m., June 1906, *Maire* 387 (E); Tsekou, May 1912, *Mombeig* 11 (E); San-o-chou, 2600 m., June 1913, *Maire* 1108 (E); Kin-tchou-chan, 2900 m., May 1913, *Maire* (E); Ma-long, 2800 m., May 1913, *Maire* 310 (E).

This variety is the hairy analogue of var. *sinensis*.

10. *Neillia thibetica* Bur. & Franch., Jour. Bot. Morot 5: 45. 1891; Vidal, Adansonia II. 3: 163. *pl.* 3, *figs.* 1, 2. 1963, excl. vars.

FIGURE 5: 9, 10.

N. longiracemosa Hemsl. Jour. Linn. Soc. 29: 304. 1892.

China. SZECHUAN: neighborhood of Tachienlu, 3000–4500 m., *Pratt* 730 (K, syntype of *N. longiracemosa*); *ibid.*, July and Sept. 1908, *Wilson* 974 (A, E); *ibid.*, 1924, *Cunningham* 529 (E); *ibid.*, 2600 m., Oct. 1910, *Wilson* 4220a (A); Pao-hsung-hsien, 2400 m., 20 June 1936, *Chu* 2827 (E); *ibid.*, 16 Aug. 1936,

Chu 3611 (E); Mupin, June and Sept. 1908, *Wilson* 916 (A, E); *ibid.*, 1600–2600 m., Oct. 1910, *Wilson* 4220 (A); Ta-hsiang-ling, Ching-chi-hsien, June 1907, *Wilson* 2381 (A, E); *ibid.*, Ta Kwan, 2400 m., 7 Aug. 1939, *Chiao* 1633 (A); Mapien-hsien, 29 May 1931, *Wang* 23084 (A); sine loc., 1300–3000 m., *Wilson* 3558 (A); Opien Hsien, 1500 m., 14 May 1932, *Yü* 740 (A); Ta Hsian Ling, 2000–2500 m., 28 May 1922, *Smith* 2078 (A).

As explained above, I have taken a different view of *Neillia thibetica* than Vidal. Of the specimens cited above, the most divergent is *Chu* 2827, which approaches *N. sinensis* in its long, narrow floral tube and rather long pedicels. However, in other features it is characteristic of *N. thibetica*, and it does not seem useful to treat it as a distinct variety.

The following specimens, because of their condition or the unsuitable stage at which they were collected, cannot be accurately identified. Possible names are suggested for some of them in parentheses at the end of the citations.

India. Khasia, *Maw* (A, probably *N. rubiflora*); Manipur, Ching Sow, 2600 m., Apr. 1882, *Watt* 6532 (E); E. Bengal, *Hb. Griffith* 2115 (A, probably *N. thyrsiflora* var. *thyrsiflora*).

China. YUNNAN: Ping Pien Hsien, 1400 m., 17 Apr. 1934, *Tsai* 60254 (A, perhaps *N. thyrsiflora*); *ibid.*, 27 June 1934, *Tsai* 60483 (A); Wei-hsi-hsien, 2600 m., 16 Sept. 1934, *Tsai* 57936 (A); between the Yangtze and Mekong, 2850 m., 29 Aug. 1915, *Handel-Mazzetti* 7867 (E, *N. sinensis* var.); Atuntze, Doker-la, 3100 m., 4 Nov. 1937, *Yü* 7855 (E); hills to the E. of Tengyueh, 2000 m., May 1912, *Forrest* 7584 (E, *N. affinis* var.). SZECHUAN: Dailangshan, E. of Ningyueh, 2350 m., 24 Apr. 1914, *Handel-Mazzetti* 1644 (E); sine loc., *Henry* 5585 (E); Tien-chuan-hsien, 2300 m., 18 May 1936, *Chu* (E). SHENSI: Mt. Tou-pei-san, 20 July 1897, *Giraldi* (A, *N. sinensis* var.); Lungchan, Li-kiapo, 1800 m., 4 July 1922, *Hers* 2370 (A). HUNAN: Yang-shan, Changning Hsien, 740 m., 13 July 1935, *Fan & Li* 242 (A, *N. sinensis* var.).

NEILLIA IN CULTIVATION

Through the kindness of the owners and/or curators of many gardens, I have had the opportunity to survey the *Neillia* material in cultivation in Britain. Specimens of all the material sent to me are now in the herbarium at Liverpool University Botanic Gardens (LIVU-BG). A few specimens of cultivated plants were also included among the herbarium material studied. All this together shows that the following taxa are, or have been, in cultivation: *N. thyrsiflora*, *N. affinis* var. *affinis* and var. *pauciflora*, *N. uekii*, *N. sinensis* var. *sinensis* and var. *ribesioides*, and, *N. thibetica*.

A search through the relevant gardening literature shows no other taxa of *Neillia* reputed to be in cultivation, though of course, the name *longiracemosa* (= *thibetica*) is used frequently.

The following simplified key will serve for the identification of the cultivated taxa:

1. Leaves on flowering shoots with multiple, superposed buds; floral tube strigose; inflorescence usually a much branched panicle. *N. thyrsiflora*.
1. Leaves on flowering shoots with single buds; floral tube pubescent or glabrous, not strigose; inflorescence usually a raceme.
 2. Floral tube campanulate, as broad as or broader than long.
 3. Raceme elongate, the flowers 10 or more, spaced along the axis. *N. affinis* var. *affinis*.
 3. Raceme contracted, the 5–10 flowers fascicled at the ends of the branches. *N. affinis* var. *pauciflora*.
 2. Floral tube cylindric or cylindric-campanulate, longer than broad.
 4. Axis of inflorescence with tuberculate-based, stellate hairs; ovules 2. *N. uekii*.
 4. Axis of inflorescence glabrous or pubescent with simple hairs; ovules 3–9.
 5. Floral tube glabrous or with sparse patent hairs near the base; flowers 9–17(–21) in each raceme.
 6. Floral tube less than 6.5 mm. long. *N. sinensis* var. *ribesioides*.
 6. Floral tube 6.5–10 mm. long. *N. sinensis* var. *sinensis*.
 5. Floral tube finely adpressed pubescent; flowers (19–)23–60 in each raceme. *N. thibetica*.

Neillia thyrsiflora D. Don

I have seen no recent material of this species, which according to Rehder was introduced in 1850. I have seen the following specimens:

Great Britain. R. H. S. Gardens, Wisley, as *Farrer 54*, from 7 acres, N. corner of long bed at W. side, 28 Aug. 1936, *Anon.* (wsy); *ibid.*, N. border near Hornbeam towards W. end, 2 July and 27 Aug. 1937, *Anon.* (wsy). Germany. Botanischer Garten der Forstakademie, Muenden, Hanover, orig. Haage and Schmidt, Erfurt (sub *Spiraea*), 1873, *H. Zabel 86* (BH).

The Wisley plants have presumably both died, as neither was included in the living material sent to me from there. I have not seen any wild material under *Farrer 54* (see first specimen cited), but *Farrer and Purdom 54* is *N. sinensis*.

Neillia affinis Hemsl. var. *affinis*

Introduced in 1908, according to Rehder, but not widely distributed in gardens. I have seen living material from Kew, Cambridge, and Wisley; the Cambridge specimen was obtained from Kew (*fide* J. S. L. Gilmour *in litt.*) and was grown as *N. thibetica*; the Wisley specimen was grown as *N. ribesioides*.

Great Britain. R. H. S. Gardens, Wisley, 30 May 1950, *F. G. Meyer 3330* (BH); *ibid.*, May 1934, *Anon.* (BH).

Neillia affinis Hemsl. var. *pauciflora* (Rehd.) Vidal

Another taxon apparently not grown today, but represented in the Wisley herbarium by the following:

Great Britain. R. H. S. Gardens, Wisley, from the W. end of 7 acres; 25 June 1941, *Anon.* (wsy).

This plant, which was grown as *N. longiracemosa*, and later identified as *N. thibetica* is of unknown origin; it may well have been grown from seed collected by Forrest.

Neillia uekii Nakai

Grown extensively at the Arnold Arboretum, introduced in 1906. I have seen living material from the Royal Botanic Garden, Edinburgh, and the following specimens:

United States. Arnold Arboretum, Jamaica Plain, Mass., 1 June 1926, *S. F. Blake* (NA-48213); *ibid.*, 12 July 1918, *Schneider* (NA-48212); *ibid.*, 21 June 1918, *Schneider* (NA-48211); *ibid.*, 4 June 1936, *P. Russell* 90 (NA-11465); *ibid.*, 2 Sept. 1921, *G. M. Merrill* (BH). Japan. Kyoto city, 20 iv 1954, *Muroi* 39 (A); *ibid.*, 2 Aug. 1954, *Muroi* 764 (A).

Neillia sinensis Oliv. var. *sinensis*

Introduced in 1901, this is the largest-flowered of all the species, though the smaller number of flowers makes it a less showy bush than good forms of *N. thibetica*. I have seen living material from the Royal Botanic Gardens, Kew, and the Royal Botanic Garden, Edinburgh, and the following specimens:

Great Britain. R. G. B. Edinburgh, from seed of *Wilson* 189, Edinburgh C642 (E); *ibid.*, from seed of *Wilson* 4220, Edinburgh C87 (E). United States. Arnold Arboretum, Jamaica Plain, Mass., 5 June 1926, *S. F. Blake* (NA-48208); *ibid.*, 9 June 1920, *Anon.* 6797-1 (BH); *ibid.*, 20080-A, 22 June 1936, *E. Nilbending* (BH); *ibid.*, A. A. 20080, 3 June 1936, *P. Russell* 48 (NA-11433); *ibid.*, 3 Aug. 1921, *G. M. Merrill* (BH); garden of B. Y. Morrison, Piney Branch Road, Takoma Park, Md., 13 May 1944, *B. Y. Morrison* (NA-161974, with photograph, Neg. 87983; BH); The Hickories, Cazenovia, N.Y., 20 July 1939, 5-6', *S. R. Hafely* (NA-188174; BH); Bennington, Vermont, 4 June 1937, *E. T. & H. N. Moldenke* 9696 (BH).

N. sinensis Oliv. var. *ribesioides* (Rehd.) Vidal

The only cultivated specimen of this taxon that I have seen is growing at Liverpool University Botanic Gardens, Ness. Its origin is unknown, but it is a large, spreading bush, obviously of considerable age. All specimens sent to me from elsewhere as *N. ribesioides* have proved to belong to some other taxon.

N. thibetica Bur. & Franch.

This is the species most frequently cultivated in Britain, and is probably the most attractive, especially in those forms with long, many-flowered racemes. It is frequently grown under the synonym *N. longiracemosa*. There is a good illustration of the plant as *t.* 3 of the new series of the *Botanical Magazine*.

I have seen living material from the following gardens: R. B. G. Kew, R. B. G. Edinburgh, Chelsea Physic Garden, University of Exeter, Keilour Castle, University of Liverpool, University of London, R. H. S. Wisley, Messrs. Hilliers', Winchester; and the following specimen:

Netherlands. The Hague, Zuiderpark, 22 June 1956, *B. K. Boom* 32240 (BH).

Several species of *Physocarpus* (which at one time was included in *Neillia*) may still be grown in some gardens as *Neillia*; the distinctions between the two genera are given in the introduction.

INDEX TO NUMBERED SPECIMENS CITED

Species are numbered 1-10, as in the revision; varieties are indicated by a, b, c, etc., in the order in which they are given in the revision.

- | | |
|--|--|
| <i>Anderson</i> 505: 1a. | <i>Henry</i> 5554A: 9a; 5554B: 9a; 5585: indet.; 5695: 9a; 8968: 3a; 9419 and 9419A: 1b; 9669: 9b; 10231A: 3c; 12275: 1a; 13653: 1a. |
| <i>Banerji</i> 1210: 1a. | <i>Hers</i> 2343: 9a; 2370: indet.; 2965: indet. |
| <i>Cavalerie</i> 2461: 9b. | <i>Howell</i> 200: 3a. |
| <i>Cavalerie & Fortunat</i> 2461: 9b. | <i>Kingdon-Ward</i> 1584: 3d; 3241: 1a; 3986: 5; 21135: 1b. |
| <i>Cave</i> 56: 1a; 97/47: 4. | <i>Ko</i> 55787: 1a. |
| <i>Chiao</i> 1633: 10. | <i>Lace</i> 2347: 1a. |
| <i>Ching</i> 6107: 9b; 20483: 9f; 30281: 5; 81758: 9a. | <i>Lau</i> 28719: 9b. |
| <i>Chow</i> 215: 9a. | <i>Ludlow, Sherriff & Hicks</i> 16520: 4; 19288: 4; 20495: 4. |
| <i>Chu</i> 2827: 10; 3611: 10. | <i>Maire</i> 41: 9f; 310: 9f; 387: 9f; 429: 9f; 529: 9f; 559: 5; 1100: 5; 1108: 9f; 1120: 9e; 2330: 9d. |
| <i>Chun</i> 3795: 9a. | <i>McLaren</i> 27D: 9a. |
| <i>Cooper</i> 556: 1a; 1229: 1a; 2069: 1a; 2814: 1a. | <i>Mills</i> 107: 6. |
| <i>Cowan</i> 79: 4. | <i>Mombeig</i> 11: 9f; 78: 9f. |
| <i>Cunningham</i> 529: 10. | <i>Nakai</i> 1774: 6. |
| <i>Delavay</i> 249: 5. | <i>Pratt</i> 347: 3a; 730: 10. |
| <i>Drummond</i> 21043: 1a. | <i>Purdom</i> 1: 9a; 467: 9a. |
| <i>Ducloux</i> 633: 9f. | <i>Relzada</i> 19034: 1a. |
| <i>Fan & Li</i> 242: indet. | <i>Rock</i> 4079: 5; 4422: 5; 7056: 1a; 9171: 9f; 22729: 3a; 23275: 3a. |
| <i>Fang</i> 935: 3a; 1057: 9b; 4694: 3a; 10315: 9c. | <i>Rohmoo Lepcha</i> 766: 4. |
| <i>Farges</i> 494: 9c. | <i>Schneider</i> 1506: 5; 2071: 5; 3558: 7; 4151: 7. |
| <i>Farrer</i> 1757: 3a. | <i>Silvestri</i> 4589: 9a. |
| <i>Farrer & Purdom</i> 54: 9a. | <i>Smith</i> 1865: 3a; 2043: 3d; 2078: 10. |
| <i>Faurie</i> 85: 6; 316: 6. | <i>Steward & Cheo</i> 172: 9b; 450: 9b. |
| <i>Feng</i> 1936: 5. | <i>Sun & Chang</i> 1234: 3c. |
| <i>Forrest</i> 554: 9f; 1871: 5; 2244: 5; 6033: 5; 7584: indet.; 7854: 3c; 13883: 9f; 14002: 3b; 14342: 3d; 17605: 3d; 29567: 3c; 29897: 1b; 30023: 3a; 30475: 9f. | <i>Ten</i> 462: 8; 531: 8. |
| <i>Gallatly</i> 214: 1a. | <i>Teng</i> 90524: 9b. |
| <i>Griffith</i> 2115: indet. | <i>Tsai</i> 50929: 9c; 50949: 3a; 50992: 3a. |
| <i>Handel-Mazzetti</i> 765: 9a; 1644: indet.; 2218: 7; 2960: 5; 7867: indet.; 8884: 3a; 12010: 9a. | |

- 9b; 51041: 10; 51196: 9b; 52055: Wang & Liu 81820: 1a; 83503: 1b.
 3a; 52706: 9b; 56350: 1a; 56895: Watt 6532: indet.
 1a; 57936: indet.; 58432: 1a; Wilson 86: 9a; 189: 9a; 701: 9a;
 59158: 2; 60207: 1a; 60254: in- 916: 10; 916a: 3; 974: 10; 2380:
 det.; 60438: indet.; 60717: 1a; 3a; 2381: 10; 2382: 9c and 10;
 62383: 1a. 3558: 10; 3559: 3a; 3560: 3a;
 Tsang 27882: 9b. 4220: 10; 4220a: 10; 4886: 3d;
 Tsiang 5744: 9b. 8714: 6; 10587: 6.
 Tu 272: 3c. Yü 740: 10; 941: 3a; 7855: indet.;
 Wang 22992: 3a; 23084: 10; 64159: 15282: 5; 17115: 3a; 17297: 3a;
 9f; 65196: 3a; 66940: 1a; 67076: 17974: 1b; 19228: 1b; 19409: 1a;
 1a; 67945: 9a; 68154: 3b; 70883: 20199: 1a.
 5.

ACKNOWLEDGMENTS

I would like to thank the curators of the following herbaria for the loan of material: Royal Botanic Garden, Edinburgh (E); Royal Botanic Gardens, Kew (K); Royal Horticultural Society, Wisley (WSY); Arnold Arboretum (A); U.S. National Arboretum, Washington (NA); L. H. Bailey Hortorium, Cornell University, Ithaca (BH).

I would also like to thank the owners or curators of many gardens (too numerous to mention individually) for their help in finding cultivated material; and finally, Dr. J. E. Vidal (Paris) for sending me a copy of his paper on *Neillia*; Mr. A. Lauener (Edinburgh) for help with Chinese place names and localities; and Mrs. K. Purcell (Ness) for preparing floral dissections.

LIVERPOOL UNIVERSITY BOTANIC GARDENS
 NESS, NESTON, CHESHIRE, L64 4AY
 ENGLAND



Cullen, J. 1971. "The Genus *Neillia* (Rosaceae) in Mainland Asia and in Cultivation." *Journal of the Arnold Arboretum* 52(1), 137–158.

<https://doi.org/10.5962/p.185776>.

View This Item Online: <https://www.biodiversitylibrary.org/item/41808>

DOI: <https://doi.org/10.5962/p.185776>

Permalink: <https://www.biodiversitylibrary.org/partpdf/185776>

Holding Institution

Missouri Botanical Garden, Peter H. Raven Library

Sponsored by

Missouri Botanical Garden

Copyright & Reuse

Copyright Status: In copyright. Digitized with the permission of the rights holder.

Rights Holder: Arnold Arboretum of Harvard University

License: <http://creativecommons.org/licenses/by-nc-sa/3.0/>

Rights: <https://biodiversitylibrary.org/permissions>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.