

CAVENDISHIA LINDL. – TREASURE FROM THE LANDS OF THE
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ABSTRACT

This paper provides an introduction to some of the plants of the genus *Cavendishia* Lindl. [Ericaceae] grown under glass at the Royal Botanic Garden Edinburgh and their collection from the wild with notes on cultivation. An overview of specimens currently held in the herbarium at Edinburgh (E) is also included.

INTRODUCTION TO THE GENUS *CAVENDISHIA* AND ITS HISTORY

The genus *Cavendishia* Lindl. nom. cons. was named by the English botanist and horticulturist John Lindley (1799–1865) in 1835 (Lindley, 1835–1836). It was named for Lord William George Spencer Cavendish, the 6th Duke of Devonshire (1790–1858), a politician and keen horticulturist (Quattrocchi, 2000). There was, however, some confusion regarding this due to the holotype being a mixed collection of a *Cavendishia* and a *Psammisia*. Luteyn explained this in his 1976 doctoral paper (Luteyn, 1976) and went on to use the correct lectotypification in his 1983 monograph (Luteyn, 1983).

There are currently between 150 and 170 accepted species of *Cavendishia* (Luteyn, pers. comm.). They are evergreen, generally upright shrubs which can be climbing or scrambling and can be both terrestrial and epiphytic in habit. Although for most of the year they are often unassuming green shrubs which scramble through other plants, when in flower they are unmissable – bright and spectacular, thanks to their large floral bracts (Fig. 1).

Cavendishia is one of the largest genera of ericaceous neotropical endemics (Luteyn, 2002); it occurs primarily in the wet, cool upland cloud forest (900–2,500m) but can range from 300m or lower in tropical forest up to almost 5,000m in high-elevation páramo (Luteyn, 1983).

The distribution of *Cavendishia* is neotropical, which refers to the American tropics, more specifically from Veracruz, Mexico in the north, to northern Bolivia in the south and eastwards through the Guianas of north-east South America to the state of Pará in north-east Brazil (Fig. 2). This roughly equates to a distributional area from latitude 20° N to 18° S and a longitudinal range from 100° to 50° W, with the highest number of species found in Colombia (Luteyn, 1983; Luteyn & Wilbur, 2005). Whilst this is a relatively large distribution, with a few species such as *C. bracteata* (Fig. 3) occurring

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Fig. 1 *Cavendishia grandifolia* 19992189B. Photo: Tony Conlon.

throughout the region, many of the species are narrow endemics, often restricted to individual mountains.

Cavendishia species are generally pollinated by hummingbirds of the family Trochilidae and the fruits are usually distributed by birds. Some of the fruits are eaten locally in tropical America; they are also used as ornamentals. Leaves and fruits of some species (*C. bracteata*, *C. quereme*) are used as an astringent and anti-rheumatic and can also be used to treat toothache (Luteyn, 1983).

This article provides information on the collections held at the Royal Botanic Garden Edinburgh (RBGE).

LITERATURE

The main players, or at least those that have named the most species, in the ‘modern’ story of *Cavendishia* are Luteyn, Smith, Hoerold and Hemsley.

William Botting Hemsley (1843–1924) (Hemsl.) was a British horticulturist and botanist at Royal Botanic Gardens, Kew (Lightman, 2004; Jackson, 1925) who had formed several new combinations in *Cavendishia* in 1881 when there were considered to be about 30 species known in tropical America (Hemsley 1881; Smith 1932).

Rudolf Hoerold (1882–1945), the one-time Director-General of Sanssouci near Berlin, was a German monographer of the tribe Thibaudieae, of whom Smith said (along with Hemsley) that his was the only comprehensive, if somewhat limited, work available to him. This was due to the fact that Hoerold was only working on specimens from one herbarium



Fig. 2 Map showing the distribution of *Cavendishia*. Map drawn by Tony Conlon.

when conducting his studies in the early 1900s (Smith, 1932; Smith, 1996). He mentions some 53 species of *Cavendishia* with 22 of these being new in 1909 (Hoerold, 1909).

Albert Charles Smith (1906–1999) (A.C. Sm.) was an American botanist working out of New York Botanical Garden (NYBG). His 1932 publication *The American*



Fig. 3 *Cavendishia bracteata* 19762352C. Photo: Tony Conlon.

Species of Thibaudieae was accepted as his PhD thesis and in it he followed the delimitation outlined by Hoerold and attempted to bring the latter's work up to date. This was Smith's first revision of any consequence (Smith, 1932; Smith, 1996; Wagner & Lorence, 2000–2001). The number of species known by this time was around 75 (73 described with 3 or 4 unplaced).

James Leonard Luteyn (1948–), also of NYBG, has published extensively and is currently considered to be the leading expert on the genus *Cavendishia*. Following Smith's 1932 work, Luteyn's revision of the Mexican and Central American species, published as his PhD thesis, considered there to be approximately 150 known species (Luteyn, 1976; Wilbur & Luteyn, 1978). By 1980 he thought that the number of species was now approaching 160 and that 200 species would be likely in the foreseeable future (Luteyn, 1980). He then went on to publish a revision of *Cavendishia* for *Flora Neotropica* (Luteyn, 1983) with detailed morphological descriptions of 100 species along with information on history, uses, ecology, habitat, distributions and taxonomic relationships. By 1996, in the *Flora of Ecuador* (Luteyn, 1996), there were approxi-

mately 155 species. By 2002, in *Flora Costaricensis*, Luteyn stated that there were about 130 species of *Cavendishia* (Luteyn, 2002; Luteyn & Wilbur, 2005).

Currently, Luteyn believes that there are probably between 150 and 170 species (Luteyn, pers. comm.). Furthermore, in 1996 Morales named one of the new species in honour of Luteyn, *Cavendishia luteynii* J.F. Morales, in recognition of his work with Ericaceae and *Cavendishia* in particular (Luteyn & Morales, 1996).

HERBARIUM SPECIMENS AT RBGE

In the herbarium at RBGE there are almost 230 dried specimens spanning much of the distributional range of *Cavendishia* and representing around 73 species and 85 different taxa. Of these, some 209 are wild collected with an additional 18 specimens of cultivated origin. They have been collected from Bolivia (6 specimens); Colombia (84 specimens); Costa Rica (20 specimens and 4 cultivated); Ecuador (43 specimens and 11 cultivated); Guatemala (6 specimens); Mexico (3 specimens); Panama (11 specimens); Peru (13 specimens) and Venezuela (11 specimens and 2 cultivated). A small number of specimens require some further research to determine their origin. Some 67 of these specimens have currently been digitised and appear on the RBGE herbarium database which is available online (RBGE, 2017). The majority of these specimens date from between the 1970s and the 1990s, but some go back to the mid-1800s. The oldest appears to be a specimen of *C. strobilifera* (now a synonym of *C. bracteata*) from 1835. This has a collection number of “Matthews 1444” and was determined by Luteyn in 1976. It is possibly from Peru, as A. Mat[t]hews, a British gardener and plant collector for the Horticultural Society of London, was known to have collected from there at that time (Global Plants, 2000–2017). More than half of these specimens have been determined by Luteyn, that is to say that the names and information on them have been confirmed as accurate, whilst all of the cultivated specimens come from plants which have been grown in the glasshouses at RBGE.

LIVING COLLECTIONS OF *CAVENDISHIA ENGLERIANA* VAR. *ECUADORENSIS*

Most of the living collections of Ericaceae at RBGE come from the Asian continent, with most of the Ericaceae cultivated in glasshouses coming in particular from Southeast Asia. However, there are also collections of Ericaceae from the Americas with some originating in Central and tropical South America also grown under glass. Of these neotropical collections *Cavendishia* is a genus with a relatively small number of species. Some of these were collected on the uniquely memorable Los Tayos expedition in 1976 (for a more ‘interesting’ account of this expedition and to discover more about the title of this article see Däniken, 1968). One of the genera collected on this expedition in the wet tropical jungles of Ecuador was a then unknown *Cavendishia* sp., collected by Dr George Argent (ARG 408) as a cutting from a plant growing as an epiphyte on a tree at around 1,300m at the Los Tayos Camp in the province of Morona-Santiago,

Ecuador. The cutting was accessed to RBGE in August 1976 and this accession is still alive today. Although time can often seem to move slowly in botanic gardens, it appears that this plant has been hiding in plain sight in the depths of the research collections for the last 40 years. This can happen to individual accessions for any number of reasons, such as scientists not working on a particular group or not having the expertise in a particular family or group; a lack of funding for particular work; insufficient specific herbarium material; the plant not being spotted at the time of flowering; sporadic flowering; or changes to staff looking after the collections. When all of this is taken into consideration it doesn't seem particularly unreasonable to wait 40 years for a plant to be correctly named considering that its precise identity was not known when it was collected.

This particular plant was initially recognised as a *Cavendishia* and further verified as *Cavendishia* sp. in 1988 by Dr Argent. It was suspected for a number of years that this was indeed a new species but no one had the time to put in the work required to discover if this was the case. It was later tentatively reverified as *C. aff. bracteata* by Sabina Knees in 2004 using Luteyn's *Flora of Ecuador* entry (Luteyn, 1996). Again the aff. (affinity) alluded to the thought that it may be something new. It wasn't until early 2016 that it was looked at again in more detail and the plant was determined to be *C. engleriana* Hoerold var. *ecuadorensis* Luteyn by George Argent, now a Research Associate at RBGE.

This new variety was not formally published or named until 1983 by Luteyn, a further reason for the confusion over the naming. The species is a terrestrial or epiphytic shrub to 3m and comes from Colombia and Ecuador (90–2,900m). This particular variety is only known from Ecuador at an altitude of approximately 610 to 1,230m. Whilst this plant was collected as a cutting back in 1976 (Argent 408), it is currently growing at RBGE in one of the tropical research collections (G65) with a night minimum temperature of 16–18°C, but can also occasionally be found on display in the Lowland Tropics display house when in flower to be enjoyed by the public, showing its cluster of small white corollas with purple tips offset by its large showy bright reddish-pink bracts. Floral bracts are often thought of as protection for the flower buds before they open; in this case they are acting as 'additional petals' in order to attract the pollinators (hummingbirds) as birds are often attracted to red colours. This is the plant that inspired this article (Fig. 4). How many other species of plants growing in botanic gardens are waiting to be discovered?

In the glasshouses at RBGE there are other living accessions of *Cavendishia* from Ecuador, Costa Rica and Venezuela (Figs 5–9).

CAVENDISHIA AND THEIR CULTIVATION AT RBGE

At RBGE the *Cavendishia* collection is grown under a range of slightly different environmental regimes in order to accommodate the range in habitats in which the species occur in the wild. Most of the *Cavendishia* plants are grown in the Temperate Ericaceae research house (G49) which has a night-time minimum setting of 8–10°C



Fig. 4 *Cavendishia engleriana* var. *ecuadorensis* 19762368A showing the pink/red bracts and white, purple-tipped flowers. Photo: Tony Conlon.



Fig. 5 *Cavendishia isernii* 19992190A. Photo: Tony Conlon.



Fig. 6 *Cavendishia lebroniae* 19992188A. Photo: Tony Conlon.



Fig. 7 *Cavendishia pubescens* 19761932B. Photo: Tony Conlon.



Fig. 8 *Cavendishia tarapotana* 19762343B. Photo: Tony Conlon.



Fig. 9 *Cavendishia isernii* growing in a mist frame. Photo: Tony Conlon.

with a venting temperature of 16°C. The species grown in this glasshouse include *C. bracteata*, *C. grandifolia*, *C. pubescens*, *C. tarapotana* and previously *C. complectens*.

C. bracteata, *C. isernii* and *C. lebroniae* are grown in the Tropical Montane Ericaceae research house (P30) with a night minimum setting of 10°C and venting at 18°C. *C. engleriana* var. *ecuadorensis* is kept in the Tropical Research Collection House (G65) with a night-time minimum setting of 16–18°C. *Cavendishia* plants are also on display permanently: *C. grandifolia* and *C. pubescens* in the Temperate Lands House (G16), which has a night-time minimum of 8°C and a venting temperature of 20°C, and *C. allenii* in the historical Temperate Palm House (G46) with a minimum temperature of 11°C (see below for further information on the plants). The other *Cavendishia* that we grow at RBGE are as follows:

C. allenii A.C. Sm. An epiphytic shrub to 1m tall and endemic of central Panama between 200m and 1,000m. The cutting material came from NYBG in 1999 via a student of Dr Bogner of Munich Botanic Garden. This is currently growing in the Temperate Palm House (G46) with a night minimum temperature of 11°C. However, the identity of this plant is currently in question and further investigation is needed to confirm it.

C. bracteata (Ruiz & Pav. Ex J. St.-Hil.) Hoerold. A morphologically variable and widespread species found growing in a wide range of habitats, occurring throughout much of the distribution of the genus, with edible fruits. This is a complex species consisting of many older synonymised names (for a more in-depth discussion regarding this species see Luteyn, 1983). All of the four accessions at RBGE entered the Collection in 1976; three of them were collected by Argent at 1,700–2,700m in Ecuador, and the other was collected by Geoffrey Herklots from the active Poás Volcano in Costa Rica. The plants are grown in the Temperate Ericaceae research house (night min. 8–10°C) and the Tropical Montane Ericaceae research house (night min. 10°C) (Fig. 3).

C. grandifolia Hoerold. A terrestrial shrub to 3m, known only from the wet forests of Ecuador between 1,800m and 2,430m. It has very large, thick-margined leaves, large red/pink floral bracts and pale yellowish-green corolla which can be a striking combination. The material came as cuttings from NYBG and was originally collected by Luteyn at around 2,000m between Quito and Santo Domingo in Pichincha Province, Ecuador. The plants are grown in the Temperate Ericaceae research house and on display in the Temperate Lands House (Fig. 1).

C. isernii Sleumer. A terrestrial or epiphytic shrub with stems to 5m, from eastern Ecuador and Peru. There are two varieties, *C. isernii* var. *isernii*, which occurs at higher elevations (1,375–2,225m in Ecuador and 1,585–2,205m in Peru), and *C. isernii* var. *pseudospicata*, occurring at lower elevations (900–1,100m). The material arrived as cuttings in 1999 from NYBG via Atlanta Botanical Garden (ABG) and had originally been collected in north-east Ecuador. More investigation is needed to establish exactly which varieties are in the collections at RBGE. The plants currently grow in a mist frame (Fig. 9) in the Tropical Montane Ericaceae research house (Fig. 5).

C. lebroniae Luteyn. A terrestrial arching shrub to 3m which is known only from the type locality in Ecuador and is recognisable by its large leaves, paniculate inflores-

cences and numerous small mauve to wine red to purple flowers. The material came to Edinburgh as cuttings in 1999 from NYBG via Luteyn who collected the original material in Cañar Province, Ecuador at around 1,000m in 1981. This is grown in the Tropical Montane Ericaceae research house (Fig. 6).

C. pubescens. This species can be an epiphytic or terrestrial shrub or small tree generally 1m to 5m but it has been recorded up to 8m tall. It is also fairly wide ranging and variable, especially at the southern end of its range of Colombia, Venezuela, Peru, Bolivia and Panama between 700 and 3,000m. It is grown in our Temperate Ericaceae research house and is also on public display in our Temperate Lands House. The plants were originally collected by Herklots in Venezuela in 1973 (Fig. 7). Unsurprisingly it is most closely related to the widespread and variable *C. bracteata* (see above).

C. tarapotana (Meisn.) Benth. & Hook. f. This is a terrestrial or epiphytic shrub with stems to 5m at 400–1,960m which occurs widely from Colombia to Peru. It has two varieties – *C. tarapotana* var. *tarapotana*, occurring widely from Colombia to Peru mainly along the eastern foothills of the Andes throughout the altitudinal range of the species, and *C. tarapotana* var. *gilgiana* (Hoerold) Luteyn, which occurs infrequently from Colombia south to Pichincha Province, Ecuador in the western foothills of the Andes at 1,100–1,900m. The plant came from Argent's Ecuador expedition in 1976 and was found between 1,000 and 1,300m in Mera near the Rio Pastaza, Pastaza province. It currently grows in the Temperate Ericaceae research house (Fig. 8).

C. complectens Hemsl. This epiphytic or terrestrial shrub to 2m tall has also been in the collection previously. It has two subspecies: *C. complectens* subsp. *complectens* and *C. complectens* subsp. *striata*. Subspecies *striata* also has two varieties: *C. complectens* subsp. *striata* var. *striata* and *C. complectens* subsp. *striata* var. *cylindrica*. It has a distribution from Nicaragua southwards to Peru at 70–2,100m, with the type specimen being from Costa Rica. The original material came to RBGE as cuttings in 1975 from the Botany Department of University College Los Angeles via Robert Wilson, San Vito, Costa Rica. This was grown with the bulk of the other *Cavendishia* in the Temperate Ericaceae research house but it had unfortunately died by 2010.

Records show that at least one *Cavendishia* (*C. acuminata* Benth. ex Hemsl., currently *C. bracteata*) had been cultivated under glass at Edinburgh at least as far back as 1910 (RBGE, 1911). They are cultivated in a mix which has been refined over the last few years specifically for the tropical ericaceous montane species from Southeast Asia. However, with some modifications it works just as well for the species from the Neotropics. As a lot of these species are epiphytic it is an open mix consisting of potting bark (3–15mm) and horticultural charcoal (5–15mm) combined at a rate of 70 litres of bark to 4 litres of charcoal. This can be adapted to grow the terrestrial species by adding more of a smaller-grade propagation bark (2–7mm). However, those that are permanently planted in the display glasshouse beds can tolerate quite a range of soils and mixes. In nature whilst the lowlands and coastal regions generally experience warm tropical temperatures, higher up in the mountains it can get a lot cooler, which explains why they continue to thrive in the glasshouses which have a night-time minimum of

8–10°C. Although most are grown in temperate conditions some inevitably grow better in tropical conditions, particularly those collected from lower altitudes, and often thrive with the warmer temperatures used in some of our tropical houses where we try to keep a night minimum of 16–18°C. In the cooler houses the venting can be manipulated by setting the vents to open at a higher temperature to obtain more agreeable growing conditions.

Watering is needed daily in the warmer months, reducing to once a week in winter. Propagation is straightforward using semi-ripe cuttings. Seed is best sown fresh using any standard seed compost. Both can be placed in a closed case or other similar microclimate such as a pot covered with glass or a plastic bag. Bottom heat is beneficial for all propagation and pots should be misted or watered daily as required to maintain a warm humid environment for rooting, germination and seedling growth. Once plants are established feeding is carried out every three weeks during the growing season using a balanced liquid feed NPK 1:1:1 at half strength. The *Cavendishia* are relatively slower growing at RBGE when compared with some of the other montane neotropical Ericaceae such as *Macleania*, *Psammisia* and *Satyria* and they can be quite tolerant of a number of watering regimes, but reports from previous collecting expeditions, particularly of the Ecuadorian material, suggest that they naturally often grow in areas of high daily rainfall. *Cavendishia* are not as horticulturally well known as they could be and can often produce beautiful flowers with relatively little effort.

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