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From the Editor

Dr. Glen Jamieson
Parksville, BC
Canada

Rhododendrons International (RI) is an online journal distributed free to all the world's known rhododendron associations for their internal distribution. It can also be accessed without charge on the American Rhododendron Society website at https://www.rhododendron.org/ri-index.htm. This seventh issue of RI includes six articles, some modified slightly from those printed initially, that I have extracted from various rhododendron publications that I feel are worthy of wider world-wide distribution. Articles in this volume are from "Rhododendron Species 2020" the journal of the Rhododendron Species Botanical Garden in Federal Way, WA; "Rhododendrons, Camellias & Magnolias" 2020 and 2021, Royal Horticultural Society Group; and the "Journal American Rhododendron Society 76." I regularly search botanical publications for worthwhile rhododendron articles I deem to be of international significance for wider distribution through RI issues. I also welcome submissions from authors of such material that I might not be aware of, so please feel free to bring such material to my attention at rhodojournal@gmail.com, and please put "Rhododendrons International" in the subject line.

Finally, I would like to express my big appreciation to Sonja Nelson, the volunteer layout editor, for all her hard work in producing each issue of Rhododendrons International. Without her involvement and support, this journal would not exist!

The S0-Called Dane-Rhododendrons: What Are They ?

Svend Askjær
Spoettrup, Denmark

(Photos by the author unless otherwise noted)

(Reprinted from Rhododendrons, Camellias and Magnolias 2020, RHS)

The Danish Chapter of the American Rhododendron Society was established in 1973, thanks to initiatives from Jens Christian Birck (laboratory technician), Palle Kristensen (graduate engineer), and Klaus Hansen (nurseryman), who were all rhododendron enthusiasts from the Copenhagen area. At the end of the following year the Danish chapter had 36 members. Before that time, there had only been a very modest and unnoticed hybridizing activity with rhododendrons in Denmark but after the creation of the Danish Chapter, many possibilities turned up for Danish enthusiasts: exchange of seeds and pollen and contact with similarly disposed people in other parts of the world with exchange of cuttings, scions, information, and establishment of good friendships.

Very soon, many of the enthusiastic members began to work seriously with hybridizing, often inspired by the pioneer Jens Christian Birck (henceforward JCB), who in 2009 was awarded the ARS Gold Medal for his many contributions. Among these hybridizers was also the keen Danish nurseryman Svend Hansen (henceforward SH) from the Kaernehuset Nursery and Gardens in Danstrupvej, Fredensborg. The main priority in these efforts was the creation of plants with ornamental and interesting foliage all the year round, a compact growth habit, and sufficient hardiness for the Danish climate. Of secondary importance was the quality of the flowers. Lots of plants were raised in the following years, and among these several turned out to be splendid garden plants, of which some gradually reached the nursery market, especially in Germany. These included selections and clones made by Jens Christian Birck and Svend Hansen, who attached the surname "Dane" to their plants.

Unfortunately, with one exception, none of the "Danes" were officially registered and described. As a result, confusion and uncertainty regarding these plants has been rather widespread. Owing to this situation, the then International Rhododendron Registrar, Dr. Alan Leslie from the Royal Horticultural Society, asked me in 2015 if I could gather some information about these "Danes". It subsequently emerged that this was a difficult and time-consuming job. Few notes were available, and often I have had to rely upon the memories of the people involved. As many relevant details relate to 20–30 years ago, these memories have in some cases been uncertain, incomplete, and inconsistent. For that reason, I regrettably cannot guarantee that all information in

this article is 100% correct. Nevertheless, I am very indebted to JCB, SH, and Holger Hachmann (HH) for helping me to collect as much information as possible for this article. The Dane-cultivars can be divided into two groups: selected species and selected hybrids, and these will be discussed separately.

A. **SELECTED SPECIES**

1. ***R. degronianum* subsp. *yakushimanum* var. *yakushimanum* 'Best Dane'** *

Selected seedling from *R. degronianum* subsp. *yakushimanum* var. *yakushimanum,* CW. Selected and named by JCB and SH, and marketed by HH in about 2009–2010.

R. degronianum subsp. *yakushimanum* var. *yakushimanum* 'Best Dane'*

This clone of *R. degronianum* subsp. *yakushimanum* var. *yakushimanum* is low and very compact, looking like the well-known 'Koichiro Wada' form, but its leaves and flowers are a little bit larger. The leaves are oblong, 8–11 × 2–4 cm (3.1-4.3 x 0.8-1.6 in), with creamy white to beige, thick, woolly indumentum.

The rose colours in the otherwise white flowers are retained a little bit longer than in other forms. The flowering is from the middle of May to the beginning of June. It does not open any of the flower buds in autumn, and it blooms well despite a shady position. In ten years, it will reach about 60 × 100 cm (24 x 40 in). It is hardy to about –25° C (-13° F).

2. ***R. campanulatum* subsp. *aeruginosum* 'Blue Dane'***

A selection from *R. campanulatum* subsp. *aeruginosum*, selected and named by SH about 1990 and marketed by HH about 2009–2010.

R. campanulatum subsp. *aeruginosum* 'Blue Dane' *.
Photo: Svend Askjær and Jens Birck.

The new growth of this plant in spring is a marvellous sight with its obovate to oval, 7–11 cm (2.8-4.3 in) long, 4–5 cm (1.6-2 in) broad leaves with their strikingly bluish colour on the upper surface and the yellowish white, later light brownish indumentum on the lower surface. The funnel-campanulate,

purple flowers in the beginning of May are sitting in a loose dome shaped truss. The flowering is mostly rather modest, but the magnificent foliage really compensates for that. In ten years, it grows to about 75 × 75 cm (30 x 30 in), and it is hardy to about –22° C (-8° F).

Compared to *R. campanulatum* subsp. *aeruginosum* from the Rhododendron Species Foundation and *R.* 'Blauschimmer' from the Hachmann Nursery, the young leaves are bigger and the blue colour is more intense.

3. R. phaeochrysum 'Glossy Dane'*

A R. phaeochrysum seedling, selected by JCB from an English nursery in about 1994 and later named by him.

R. phaeochrysum 'Glossy Dane'*. Photo: Svend Askjær and Jens Birck.

The leaves are elliptic, 6–10 × 3–4 cm (2.4-4 x 1.2-1.6 in) with a somewhat shiny upper surface, and the lower surface is covered with slightly agglutinated, one layered indumentum, which initially is white to creamy yellow, later reddish-brown. In May, campanulate white flowers with some red-purple spots on the upper lobe present themselves in dome-shaped trusses with 10–12 flowers in each. In ten years, it is supposed to reach about 70 × 70 cm (28 x 28 in), and it should be hardy to about –22° C (-8° F). This plant has one interesting and distinctive quality: the new growth in spring has a very nice and pleasant smell, especially in sunny and warm weather – somewhat like heliotrope or dried woodruff. The smell is clearly different from what you can observe with some forms of *R. taliense*, and I have never observed this quality with any other rhododendrons. Another interesting thing is that this 'Glossy Dane' seems completely identical to another *R. phaeochrysum* in my garden, namely a grafted plant from Corsock, southwest Scotland, obtained in 1986. This is now about 2.5 m (8.25 ft) high and 2 m (6.5 ft) broad, with exactly the same nice smell in spring.

4. R. pachysanthum 'Little White Dane'* (no photo)

Selected by SH in about 1990–95 and named by him many years later.

Referring to information from SH and HH, this is a very slow growing, compact and low form of *R. pachysanthum* with pure white flowers. I have not seen it, and a search in the literature for it has been without success, so I cannot offer any further description. It is very uncertain whether it is still in the nursery trade.

5. *R. roxieanum* 'Needle Dane'*

Selected seedling from *R. roxieanum* var. *oreonastes* (controlled pollination) in about 1981–82. Selected and named by JCB and SH and marketed by HH in about 2009–2010.

'Needle Dane'*.

This spectacular plant is not particularly different from some of the lower and compact forms of *R. roxieanum*, which I have had in my garden for many years. The linear, needle-like, 7–10 cm (2.7-3.9 in) long, 1–1.5 cm (0.4-0.6 in) broad leaves are dark green on the upper surface. The lower surface is covered with a two-layered, brownish indumentum. The margins are somewhat recurved. The new shoots in spring have even more needle like leaves in an upright position with revolute margins. Flowering takes place in May with lax trusses, each of which has about 8–10 white, funnel-campanulate, 3–4 cm (1.2-1.6 in) flowers, with some light purple dots. In ten years the plant will grow to a size of about 40 × 60 cm (16-24 in), and it is hardy to about –22°C (-8° F).

6. *R. aluataceum* var. *alutaceum* 'Sticky Dane'*

A clone of *R. alutaceum* var. *alutaceum* (previously *R. roxieanum* var. *globigerum* or *R. globigerum*) obtained from the Rhododendron Species Foundation in about 1980–85. Named by JCB and SH and marketed by HH in about 2009–2010.

R. aluataceum var. *alutaceum* 'Sticky Dane'.*

Although it is shy flowering while small and young, this is a very beautiful and ornamental garden plant all the year round with its closely packed foliage. The oblanceolate leaves, 8–11 cm (3.1-4.3 in) × 2–3.5 cm (0.8-1.4 in) , have a rather short petiole, recurved edges, a dark green, slightly shining upper surface, and a lower surface with a thick, bistrate indumentum, which during the season changes from creamy white to reddish-brown – a beautiful sight when the leaves are illuminated by the evening sun. The plant is hardy to about –22°C (-8° F), and it grows to about 50 × 50 cm (20 x 20 in) in ten years.

7. *R. sphaeroblastum* 'Super Dane'*

R. sphaeroblastum 'Super Dane'*.

A clone of *R. sphaeroblastum*, collected in the wild by SH in 1993. Selected and named by SH in about 2010 and marketed by HH about 2015.

Leaves elliptic, 7–11 × 3–5 cm (2.8-4.3 x 1.2-2 in). Upper surface dark green. The indumentum on the underside is initially bistrate on young leaves. The outer layer is white to greyish and woolly, detersile. The inner, persistent layer is light grey initially, later dark brown, slightly woolly. The flowers in May are white with scattered, small red-purple dots on the upper lobe of the funnel-campanulate corolla. The truss is lax with 8–10 flowers. The hardiness and growth is supposed to be like that of other plants from this species, but I have no personal experience.

8. *R. pachysanthum* 'Super White Dane'* (no photo)

A selected seedling from *R. pachysanthum* X *R. pachysanthum* about 1994. Selected and named by SH.

I have not yet seen this selection, but referring to information from SH, the flowers are pure white. The most outstanding quality should be the intensely silvery white new shoots. As its growth is very slow, propagation is difficult, and it has probably not yet reached the nursery trade.

9. *R. taliense* 'Woolly Dane'*

R. taliense 'Woolly Dane'*. Photo: Jens Birck.

A selected clone of *R. taliense* from the Sino British Expedition to China 1981, SBEC 350. Over the years, there have been discussions about the taxonomic position of the plants from this collection, but at the present time there is some consensus about their placement with *R. taliense*. Selected and named by JCB and SH and marketed by HH about 2009–2010.

Leaves elliptic, 6–8 × 2–4 cm (2.4-3.2 x 0.8-1.6 in) and very dark green. The rufous indumentum is very thick and woolly, two–layered, with a similar indumentum on young shoots. Young plants flower rarely, but when it eventually

occurs in May, the dome-shaped trusses reveal 8–10 campanulate flowers, which are white and pink with an impressive crimson blotch on the upper lobe of the corolla. In ten years, it should reach a size about 60 × 80 cm (24-32 in), and it is hardy to about –22°C (-8° F).

B. **HYBRIDS**

1. ‘Baby Dane’*

‘Panda’ × *R. kiusianum*, a cross made by JCB and named by him before 2001.

I do not have the plant in my garden, but a picture from JCB shows a very low, compact, and pure white evergreen azalea. In addition, he has told me, that it is hardy and easy to grow. It is probably the first Dane rhododendron which reached the nursery trade, and it is shown and mentioned in a publication by Kenneth Cox. (2005).

‘Baby Dane’.* Photo: Jens Birck.

2. ‘Birck’s Dane’

R. insigne X *R. proteoides.* A cross made by JCB 1992. Grown (from scion) by the author since 1996. Officially named and registered by the author in 2014 and marketed by HH 2016.

The best asset of this plant is the very shiny, beautiful foliage and its very good, compact growth habit. These properties make it a very ornamental garden plant. The lanceolate, very stiff, coriaceous leaves, 5–8 × 2 cm (2-3.2 x 0.8 in), are dark green and very shiny on the upper side. The thin indumentum on the lower surface is initially nearly white, and later changes to greyish-green. In May, the lax trusses show 6–10 open funnel shaped, white and rose flowers with prominent crimson spots on the upper lobe. A grafted plant, now 20 years old, measures 1.3 m (4.25 ft) in height and 1.5 m (five feet) in width. It has managed –25° C (-13° F) without serious damage. I named it for Jens Birck, my good friend, to show my gratitude for his many contributions.

‘Birck’s Dane’.

3. ‘Chocolate Dane’*

‘Chocolate Dane‘*.

This plant is *R. degronianum* subsp. *yakushimanum* var. *yakushimanum* X R. *bureavii*. The cross was made by SH 1979–1980, and it was raised and later named by him. Marketed by HH in about 2010–2011.

Once again, a plant that matches up to the objectives of some of the first Danish hybridizers – beautiful foliage and good growth habit. It has a harmonious, compact growth and in ten years has grown to about 60–70 cm (24-28 in) high and wide. Its oblong leaves, 6–8 × 3–4 cm (2.4-3.2 x 1.2-1.6 in), have a dark green upper surface, where a thin greyish-brown indumentum persists to some degree for some months. The under surface has a persistent thick, woolly, light brown, and later darker brown indumentum. The hardiness is good, to about –24° C (-11.2° F). There is a sister plant, ‘Brown Dane’, with darker leaves.

4. ‘Debbie Dane’*

‘Debbie Dane’*.

R. degronianum subsp. *yakushimanum* var. *yakushimanum* X *R. haematodes*. Cross made by Henning Petersen, Jyllinge, Denmark. Named by JCB and SH and marketed by HH in about 2009–2010.

Henning Petersen was one of the very first members of the Danish Chapter of ARS. He made this cross in about 1977–1978, using pollen from *R. haematodes* collected in Hobbie’s Rhododendron Park in Germany. When at a great age, he could no longer take care of his dog called Debbie, she was given to SH, who later named this plant after her. Henning Petersen died about 15–20 years ago. It is a low and compact growing plant, reaching about 60 cm (24 in) high and 80 cm (32 in) wide in ten years, with elliptic-oblanceolate, convex leaves, 8–11 × 3–4 cm (3.2-4.3 x 1.2-1.6 in). The top side of the new leaves have a thin, silvery indumentum, which gradually disappears. The persistent, thick and woolly indumentum on the underside is at first light, later darker yellowish-brown. The bloom starts in the middle of May from trusses with 6–10 campanulate flowers, which initially are bright red. Later they fade slowly towards rose-pink.

5. 'Great Dane'*

R. degronianum subsp. *yakushimanum* var. *yakushimanum* X *R. rex*, JCB, 1973. Named by JCB and marketed by HH from about 1995. Not officially registered – however mentioned in "The International Rhododendron Register, second edition, 2004."

'Great Dane'*. Photo: Jens Birck.

R. rex is not sufficiently hardy in most parts of Denmark, including in my garden. However, this hybrid with *R. rex* is really a prize for Danish rhododendron lovers thanks to its beauty, tough constitution, and hardiness. It tolerates an exposed growing place, and in my garden, it has managed –25° C (-13° F) several times, although many flower buds have been destroyed with temperatures lower than –21° C (-5.8° F). In ten years, it has reached a height of about 1.2 m (four ft) and a width about 1.5 m (five ft). The new growth in spring is very conspicuous with its erect positioned shoots with their silvery-grey indumentum on leaves and shoots. Subsequently the foliage is beautiful with its big and thick elliptic leaves, 15–20 × 5–7 cm (6-7.9 x 2-2.8 in), which are dark green on the upper side, once a thin greyish-white indumentum has been shed after 2–4 months. The underside keeps a thick, woolly, and ochreous indumentum, which in time becomes more greyish-brown. The dome-shaped trusses in May are big, about 12 × 13 cm (4.7-5.2 in), each carrying up to 10–15 white, 6–7 lobed, funnel-shaped flowers with a prominent, carmine blotch and some spots on the upper lobe.

6. 'Rusty Dane'*

R. bureavii X *R. pachysanthum.* A cross made by the late Henning Petersen, Jyllinge, Denmark, in about 1978. Raised and later named by SH and marketed by HH in about 2012–13.

'Rusty Dane'*.

The high qualities of this plant are primarily its beautiful new growth, its foliage and its good growth habit. The flowers are less important.

The new growth starts with silvery, grey-green colours. Later these change towards light then darker, rusty yellowish-brown. Leaves are elliptic, 5–7

× 2–4 cm (2-2.8 x 0.8-1.6 in), with an acute apex and a rounded base. A thin, greyish-yellow to yellowish-brown indumentum persists for some months upon the upper surface. The under surface has a yellowish-brown indumentum, which darkens in time. The funnel-campanulate flowers in the second half of May are white with some small purple dots on the upper lobe. In ten years, the plant reaches a size about 70 × 90 cm (28 x 35 in), and it is hardy to about –22° C (-7.6° F).

7. 'Silver Dane'*

R. degronianum subsp. *yakushimanum* var. *yakushimanum* X *R. pachysanthum*. A cross made by SH in about 1980–85, later selected and named by him, and marketed by HH in 2018.

'Silver Dane'*.

Thanks to the foliage you can spot this hybrid from far away. The emerging new shoots in spring are intensely silvery white. The elliptic to oblong leaves, 6–10 × 3–4 cm (2.4-3.9 x 1.2-1.6 in), have a thin, spectacular silvery grey to nearly white indumentum on the upper surface, persisting for some months. The underside has a persistent, thick, woolly, yellowish-brown to beige coloured indumentum. The flower buds open in the middle of May with 6–9 flowers in flat trusses, initially dark rose-pink, later fading gradually to nearly white. On the upper lobe of the campanulate flowers are some light greenish-brown spots. In ten years, it will reach a height and width about 60 × 90 cm (24 x 35 in). The hardiness is good, to about –22°C (-7.6° F).

8. 'Special Dane'*

R. pachysanthum X *R. bureavii*. A cross made by Henning Petersen, Jyllinge, Denmark in about 1978–80. Grown and named by SH and marketed by HH in 2018.

'Special Dane'*.

The new growth in May and June is really outstanding. The new, ovate leaves, 5–8 × 2–4 cm (2-3.2 x 0.8-1.6 in) with an acute apex and a slightly cordate base, have a light to darker greenish-brown surface, and on the underside, you find a yellowish, later brown indumentum. The white, funnel-campanulate flowers in May are not particularly impressive. Height and width in ten years will probably be about 90 × 100 cm (35 x 39 in) and its hardiness is good.

9. 'Spider Dane'*

R. degronianum subsp. *yakushimanum* var. *yakushimanum* X *R. longesquamatum*. A cross made by JCB in 1976. Raised, selected and named (1985) by JCB (Birck 2011a).

Leaves oblong, 4 × 14 cm (1.6 x 5.5 in) , with a very thin, unistrate greyish-brownish indumentum. The upper surface is dark green without indumentum. Flowering is from the middle to the end of May. The trusses are nearly dome-shaped with 6–8 funnel-campanulate, white and pink flowers with a prominent purple blotch.

'Spider Dane'*.

In 2015 Dr Alan Leslie told me that to his knowledge, it is the first time that *R. longesquamatum* has been used in an hybrid. I have grown this plant in my garden since 1986. In the first ten years, it grew to about 1 × 1 m (39 x 39 in). It has been exposed to –25° C (-13° F) several times without any serious damage.

10. 'Super Silver Dane'*

Supposed to be *R. degronianum* subsp. *yakushimanum* var. *yakushimanum* X *R. pachysanthum*, open pollination. Found and selected by SH in about 1995, and also named by him.

I have never seen this plant, but referring to information from SH, its indumentum on the upper surface should be more persistent and still more silvery-white. It grows much slower than 'Silver Dane', and it is uncertain whether it is propagated commercially at the moment.

'Super Silver Dane'*.

11. 'Tessa Dane'*

R. campylogynum X *R. brachyanthum* subsp. *hypolepidotum*. A cross made by JCB in 1990 and named by him.

I do not have this in my garden, but referring to information from JCB, it is a compact growing plant, about 35 cm (14 in) high and 70 cm (28 in) broad in ten years. It has dark green obovate leaves and campanulate, apricot-coloured flowers in

May. It is named after his dog and to my knowledge, it is no longer in the nursery trade. A short description (in Danish) with photos has been published by JCB (Birck 2011b)

'Tessa Dane'*. Photo: Jens Birck.

12. 'What a Dane'*

A hybrid created and named by JCB 1983, it is (*R. ambiguum* X *R. concatenans)* X *R. cinnabarinum* 'Nepal'.

'What a Dane'*. Photo: Jens Birck.

This is a splendid plant. JCB gave me one in 1987, and it has behaved well since that time. It is reasonably hardy here in one of the coldest parts of Denmark. During severe winters, temperatures lower than –20° C (-4° F) have sometimes caused some damage and destroyed some flower buds, but the plant recovers well. Now it is about two m (6.5 ft) high. Referring to information from JCB this cultivar also grows well in Nova Scotia, Canada. It is an upright growing rhododendron with obovate, dark green leaves, 3–5 × 2–3 cm (1.2-2 x 0.8-1.2 in). Apex obtuse, base slightly obtuse. The upper surface has a few, scattered entire scales. The lower surface is matt green with a bluish tint and numerous, closely placed but not overlapping entire scales. Flowering takes place in the first half of May with lax trusses, each of which carry 3–5 tubular funnel-shaped flowers. These are yellow and red, with red dominating the outside and yellow apricot dominating the inside.

It is listed in Glendoick's catalogue 2010–2014 with this text: "Red and yellow bells, very striking. A new Danish hardy and spectacular *R. cinnabarinum* hybrid. Seems to have some resistance to mildew".

13. 'White Dane'*

R. degronianum subsp. *yakushimanum* var. *yakushimanum* X *R. galactinum.* A cross made by SH in 1978 and later selected and named by him. Marketed by HH about 2009–2010.

'White Dane'*.

For more than 30 years, I have enjoyed this plant with its beauty, its tough constitution and its very good hardiness. Severe winters with temperatures below –25° C (-13° F) have not caused any damage. Now it measures about 2.5 × 3.5 m (8.25 x 11.5 ft). It is very free flowering with many big, ball-shaped trusses in the last half of May. Each truss has 10–15 flowers, starting as rose-pink buds, which later open to campanulate, pure white flowers, 5–6 cm (2-2.4 in), with a few indistinct dots on the upper lobe. The elliptic leaves, 12–15 × 3–5 cm (4.7-5.0 x 1.2-2 in), are mid green on the upper surface, and the lower has a rather thick, woolly, light brown indumentum, which darkens in time.

14. 'Yellow Dane'

R. hanceanum Nanum Group, Rowallane form X *R. rupicola* var. *muliense*. A cross made by Palle Kristensen, Copenhagen 1976, and later named by him.

'Yellow Dane'.*

According to an article (in Danish) by Palle Kristensen (2011) this is a compact growing hybrid, reaching 30 cm (12 in) in height and 60 cm (24 in) in width in ten years. Leaves about 20 × 10 mm (0.8-0.4 in). It blooms in the first half of May with openly funnel-shaped, saturated-yellow flowers, 1–3 flowers per truss. It is said to be hardy for Danish conditions. However, my own experience is scanty. For unknown reasons, I lost my plant after two years. The plant is also described by Kenneth Cox (2005), and has been marketed by Glendoick Gardens, Scotland, and "Rhododendronhaven", Tørring, Denmark (www.rhodo.dk), but I am not sure that it is still in the trade.

Conclusion

A main feature of the elepidote "Danes" is their high value as ornamental foliage plants all the year round, with a zenith during the period of emerging new growth.

They also have beautiful flowers, but for many gardeners these cannot compete with the beauty of the foliage and the decorative growth habit. Some of these cultivars are also suitable in smaller gardens. This, and their good hardiness, promote their popularity in Denmark and Germany, especially with gardeners who rate foliage quality higher than flower quality. The rhododendron people in Sweden have also taken them to their hearts. Initially "The Danes" were mainly propagated and introduced to the trade by Holger Hachmann, Hachmann's Nursery in Germany, but now some of them are also produced and available in Denmark, for example from "Rhododendronhaven". * = not registered.

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Why I Like Lapponicas

Ole Jonny Larsen
Aalesund, Norway

Photo credits?

(Reprinted from the 2020 RSF yearbook.)

Shichuan, May 30, 2016. I am leading a Scandinavian group tour through central parts of Sichuan province, China. We have just passed the Pan Pan Pass (4700 m; 15,420 ft), the weather is fantastic, and we are descending to the long Moxi valley where we are supposed to camp the following night. When we get lower down, we enter a special landscape where *Lapponica* species are totally dominating. No other rhododendrons at all, only grasses and some perennials in between. Further down the *Lapponica* shrubs form a carpet and there is no way to avoid stepping on beautiful plants, all at the peak of flowering. Finally, after crossing a small river, we reach our site for camping and start putting up our tents and organising for the night. The sun is lower, and it is now lighting up the north-

Knut Grepstad with a carpet of lapponicas, Moxi Valley, Sichuan.

south-oriented mountainside where we came down an hour earlier.

And there it is! The most fantastic sight I have ever experienced on my travels in China. Literally millions of flowering Lapponica are covering the whole east side of the valley. They grow from the bottom to the top, and the scenery reaches kilometres both ways. Then and there, my heart was lost to the lapponicas, and I realise I will never ever see something like that again. In this article, I will go through several aspects of *Lapponica* and their culture in gardens. I will also step into the difficult room of identification, maybe the most troublesome of all when we speak about rhododendrons.

Lapponicas in the wild in Sichuan. They are functionally China's heathers!

How can lapponicas best be grown

Lapponicas are dwarf rhododendrons. Mostly they are low growing in nature and have the same function as heathers have in the mountains in my home country of Norway although some species can be taller. In garden situations with fertiliser added and no competition from other shrubs, the lapponicas can grow taller than in the wild, maybe up to two metres (6.5 ft), but that is not seen often. On the other hand, there are also creeping forms, just rising a few centimetres (inches) above the ground.

After having visited lots of rhododendron gardens over the years, and especially when it comes to private gardens, I have noticed that often the owners do not seem to care much for lapponicas and other dwarf rhododendrons. Most large gardens have huge and wonderful collections of only elepidote rhododendrons. When I ask for the dwarfs, I am often told that the owners are not particularly interested in them. I have been wondering about this for some time, and I think there are two main reasons for why the dwarfs often are excluded.

First, it may have to do with the climate. Many gardens I have visited have warmer summers than what I am used to here in Norway, and lapponicas do not like that. They are all mountain dwellers; some even grow above 5000 m (16,400 ft). They simply won't thrive in hotter gardens where other rhododendrons, especially elepidotes, have fewer problems. The climate situation in their garden thus excludes many rhododendron collectors from growing the species from this

A so-called Czech crevice bed with small lapponica plants mixed with other dwarf shrubs. (author's garden).

R. tapetiforme Drommonium Group planted at the north side of a sunken rock to provide cool roots.

lepidote subsection.

The other obstacle for growing a lapponica collection is the layout of the garden. You will have to design a special section of the garden to grow dwarf rhododendron species. They cannot just be "put in between" large growing elepidotes. Lapponicas grow naturally in full sun, and this must be copied in gardens. If you want a complete dwarf collection with plants from lepidote subsections like *Lapponica, Lepidota, Rhododendron, Saluenensia, Trichoclada* and others, plus section Pogonantha, you must reserve a part of your garden for that and make a design suited for these plants. Normally you will then end up with some sort of a rock garden, or at least an open field with no overhanging trees and lot of shade. I would go for the first. That gives a much more interesting design, and you have more possibilities to give each species extra care to be comfortable in your garden. That said, I have also seen wonderful displays of lapponicas growing together on a flat bed, making what Peter Cox calls an "undulating carpet." In nature they do not mind growing closely together, and this can be successfully copied in a garden. Some botanical gardens, like for instance the Royal Botanical Garden of Edinburgh, have made great efforts to include dwarf rhododendrons in their collections by making very fine rock gardens, even designed like small artificial "mountains."

As mentioned above, *Lapponica* species in gardens are in general limited to cooler regions. The Eastern USA and the south parts of the American west coast like California are not suitable places for lapponicas. Neither are most of Australia and New Zealand. In Europe, the northern parts are most suited, and areas further south will struggle with keeping them alive during the warm summers, and the Mediterranean area is out of the question for them. There are indications that the southern border for *Lapponica* culture is creeping northwards due to a warmer climate. The southern parts of England seem to be an area where

this is starting to happen now.

I live on the Atlantic coast of Norway, on the Scandinavian peninsula. Where I live, we have mild winters with little snow and frost, and cool and wet summers, very unlike the conditions where lapponicas grow naturally, where they normally have snow cover every winter, and the growing season is limited to the few months when the snow in gone. Still, my area has proved very good for *Lapponica* culture. We often have early spring periods followed by new winter-like conditions with snow and frosty nights. One would think that lapponicas under these conditions would be confused and start flowering too early (like the Russian species *R. dauricum, R. sichotense* and *R. ledebourii* do with us), but they do not. They wait patiently until the real spring comes and flower together with other rhododendrons in April-May.

How to use lapponicas in the garden

As mentioned, lapponicas prefer lots of light. I have seen lapponicas at many places in the wild, and they all grow in full sun. No shade from other plants, and never situated on north facing mountain sides. One fine thing with these plants are that they look nice and are useful from a young age. Even a compact tiny plant can look good in the right position, for example between rocks and artificial cliffs in a rock garden. Even in a trough they are useful. They start flowering at a youngage, often only three to five years after sowing, depending on the species and growing conditions. Even the so-called Czech crevice beds, normally used for growing alpine perennials and tiny shrubs, will be useful for displaying very tiny high-alpine lapponicas, as they fit well in among other alpine plants.

Dwarf rhododendrons should not be planted in open black soil, at least not when they are young and spaced out with distance between them. They will get sprayed with mud in heavy rain, giving them a dirty look, so in such situations,

The rare *R. zheguense* in the author's garden.

Lapponicas and other dwarf shrubs in the author's rock garden in western Norway

some kind of cover on top of the soil is advised. Bark can be used, but course bark with big pieces will not look good. On the other hand, so- called decoration bark with fine grains decompose quite quickly and the beds will have to be recovered more often. I myself have ended up using grit, sold locally as "crushed stone, 6-12 mm (0.25-0.5 in)." I put this directly on the soil, no plastic or other cover between grit and soil. In my opinion, this looks fine, it gives a kind of alpine look, especially mixed with bigger rocks. It makes the bed look tidy, the grit cover slows down the evaporation from the soil on hot days, and it makes weeding easier. When the plants get bigger and grow together like a carpet, the cover is not that important any longer as most of the soil will be covered by plants.

Lapponicas can grow in combination with other small shrubs, small conifers, heathers and various perennials, but not tall and vigorous ones which have a very different *gestalt* and soon will be dominating the bed. In autumn when such perennials go dormant and wither, they will fall over the small lapponicas, choking the plants and give an untidy looking bed. Small trees with single trunks like some of the Japanese maples can be a good combination, but not too many.

Like other dwarf rhododendrons, lapponicas can be pruned to give a compact look or to rejuvenate older plants. There will always be lots of sleeping buds down the stems which will break easily if the pruning is done in spring. Some winters take care of this process alone when frost kills the top of the plant. Some gardeners are very keen to cut away dead-looking branches, but it is always wise to be patient! Surprisingly often frost damaged lapponicas end up as your finest plants during the following summer, more compact than they have ever been. Plants which have not been pinched when they were young, can get a leggy habit with only a few stems from the ground. I have tried to cut all except one stem away, and mostly have had very good result with lots of new shoots from the base. Next spring, I remove the last tall stem, and during the growing season I get a fine compact plant branching perfectly form the ground.

Lapponicas do not really like fertilizer. Normally they can do well without. Leaving fallen leaves from the plant itself to decompose over the roots, is enough for most of them. If for some reason you want to add fertilizer, be careful! Use a much smaller dose than you normally give bigger rhododendrons, and I find fertilizer diluted in water better than dry pellets which can burn the roots.

Lapponicas are normally healthy plants if they are in good condition. Few diseases or insects make trouble for them, and spraying is rarely needed. There are normally no problems with moving lapponica plants as long as they are watered properly before and after.

Lapponicas are quite easy to propagate from cuttings. A good tip is to try to make cuttings from two-year-old wood. If you succeed, you get a small plant with three to four branches right away.

They can also be sown from seeds, but you rarely see lapponica seeds offered

on the main seed lists, except for wild collected seeds, which is getting rarer due to the Nagoya concept. Hand pollination to make seeds from your own plants is possible, but the flowers parts are small, so it is a little tricky. Open pollinated seeds normally give lots of hybrids, and the correct plants are almost impossible to identify before they flower.

How to tell Lapponica apart from each other

There is classic joke about identifying *Lapponica* species: *"It is the easiest thing in the world. You have the white one, the two yellow ones, the big leaved one and all the blues."* For garden purpose, it is actually a good way to look at it! For the genuine collector or the real nerd, it is of course nonsense. They want detailed facts, but then things are becoming difficult!

Let us start with the number of species. H.H. Davidian (*Rhododendron species – Lepidotes*, 1982) lists 51. Cox & Cox (*The Encyclopedia of Rhododendron Species*, 1997) only describe 24. Flora of China (Vol. 14, 2005) has included 38 species. In *Notes from the Royal Botanic Garden*, vol. 39 (1980), written by David Chamberlain, 27 species are presented.

It is important to remember that lots of the species mentioned in *Flora of China* has never been introduced to Western culture. More about that later. Keep also in mind that Davidian never saw Lapponicas in nature. His material was herbarium sheets and plants in cultivation on the British Iles. Many of the species he describes, have been identified as natural hybrids or have been defined as varieties within a species in later years.

In the seventies it became accepted among botanists that the genus *Rhododendron* needed a revision, and especially the large subsection *Lapponica.* More than 50 named species were then reduced to 26. Behind this work we find a couple normally called Phillipson & Phillipson. They were husband and wife, and their full names were William Raymond and Melva Philipson. Many former species were now reduced to varieties, forma or Groups, or they were just lumped

R. tapetiforme aff. growing in the wild, Beima Shan, Yunnan.

R. tapetiforme varieties found in the wild on the Beima Shan, Yunnan.

without getting any name to put on the label after the species name.

That leaves us with around 25 +/- species to learn to identify. It does not seem impossible, we must just find some good identifying features, and then we have solved the problem. Well, unfortunately it is not that easy. Here are a few quotes picked from Cox & Cox's description of some *Lapponica* species (the highlighting of some words is done by me; species names in brackets):

-lobes triangular **or** irregularly rounded (*bulu*)
-calyx **very variable in size** (*capitatum*)
-lobes **usually** oblong (*capitatum*)
-stamens **variable** in number, but usually 10 (*impeditum*)
-margins **often** hairy (*intricatum*)
-stamens **5-10** (*lapponicum*)
-calyx 1-3 mm, **variable in shape** (*nitidulum*)
-f**ew to many darker** (scales) (*nivale*)
-**prostrate, low, compact or erect** (*nivale*)
-scales contiguous (-) **or not** contiguous (*polycladum*)
-style **usually** heavily pubescent (*russatum*)
-inflorescence **1-6** flowers (*setosum*)
-style **usually** longer than stamens (*tapetiforme*)
-**sometimes** also with scattered darker scales (*youngningense*)

I know I have read the descriptions in a negative way, trying to emphasise just contradictive or unclear details. Still, try to imagine a beginner who really wants to learn to tell the species apart, with a magnifying glass and a book like this in his hands. Would he/she manage? (NB! The descriptions in the Cox's book are actually very good! It is just that nature makes things difficult.)

Let us imagine the same person in a Chinese mountain, trekking for days to see

Lapponica species with white flowers in Sichuan.

R. rupicola var. *chryseum*, deviant form with red petal edges. Beima Shan, Yunnan.

Lapponica species with white and lavender flowers in Sichuan.

R. rupicola var. *chryseum*, deviant form with red petal edges. Beima Shan, Yunnan.

Lapponica species. He has done his homework and has taken notes about which features to look for during the identifying process. But he is not fully aware of how variable *Lapponica* species are in nature. Some species are spread over enormous areas in several countries, and at varying altitudes. Evolution has altered them to be able to adapt to just the place they grow (see above about *R. nivale*: prostrate, low, compact or erect.) Then there is another problem for our enthusiast—natural hybrids! There is always a discussion about natural hybrids, but most authors seem to agree that lapponicas do hybridize in the wild. Now our observer is in real trouble. There are no descriptions for all the possible hybrids he finds out there. But at the end of the day, I still hope that whoever has learnt an important lesson: To tell all the *Lapponica* species (and hybrids, and variations) apart is a hell of a job—if possible!

I have tracked some Chinese mountains searching for rhododendrons. It is a fantastic experience, but also frustrating. In 2013 I joined a Group led by the experienced Dane Bent Ernebjerg to Beima Shan in Yunnan province, China. We found thousands of lapponica plants, covering mountain areas like heathers in my country. Some, like *R. rupicola* var. *chryseum*, were easily identified. But others caused us trouble. One plant which we found in large numbers, we ended up calling *R. tapetiforme* aff. Everything seemed to fit the description of that species—except a minor detail. There was no other alternative as far as we could tell, and still we were not certain, so we had to add an "aff". As a comfort, I have heard that better taxonomists than myself have had similar problems identifying wild lapponicas. Steve Hootman got terribly frustrated once when he was tracking in China with some of the most knowledgeable rhododendron people of our time. After long discussions over some lapponica plants he had shouted: "If WE can't identify these plants, who the hell can!?"

Frank Kingdon Ward, the famous plant collector once wrote (in frustration, I guess) that there are no species in the *Lapponica* subsection! Kenneth Cox says (personal email communication) that he has come to agree with Kingdon Ward

after having studied lapponicas in nature for years. Kenneth would also reduce the number of rhododendron species in general by 60% if he was to decide!

One who has worked a lot with identifying lapponicas is Hans Eiberg, ARS Gold medallist from Denmark. He has gone through all the main keys for the Lapponica species, included lots of named varieties and forms, and he also included all the species described in Flora of China, still not introduced to culture in the west, and has from all this made his own *Lapponica* key. It is an extremely detailed key down to all very small identifying features, and it can only be used with a microscope, millimetre measure tool, very good eyes, tons of patience and lots of time. And it is only written in Danish! Eiberg may be the world's leading expert (not by profession) on identifying subsection *Lapponica* plants. The problem is, I have a feeling very few can follow his instructions without getting even more frustrated. It is simply too difficult! What his efforts underline is that you simply "must" go into scales, hairs, minute calyxes and all the other details if you have ambition to fully understand the world of lapponicas.

I do not, and I do not intend to either. Still, I will try to open the box a little. It is possible to come closer to an understanding of the subject and be able to identify the species most common in culture. After all we speak about only 25 +/- species, plus some newer introductions. Just remember that most species in cultivation are selected clones which only give ONE expression of each of them. Nature has lots of more!

I will go through some features for an easy-start identification. Let us begin with flower colour and then move on to other diagnostic features.

Yellow flowered *Lapponica* species

In this group we have two species and two varieties:

R. flavidum, R. mianningense, R. rupicola var. *chryseum, R. rupicola* var. *muliense.*

The most common in gardens and nature are *flavidum* and *rupicola* var. *chryseum.* They are easy to tell apart. *R. flavidum* has erect growth habit, while *rupicola* var.

R. rupicola var. *chryseum*, Beima Shan, Yunnan.

R. mianningense, one of the best newer lapponica introductions.

R. thymifolium.

R. tsaii, an important newer introduction which also occurs with pure white flowers (not an albino shown here).

chryseum is mostly compact (plus some flower details).

The recent introduced *R. mianningense* is far bigger in all parts and still very rare in cultivation.

To separate the two yellow varieties within *R. rupicola*, one must look at minor details on the calyx. The difference has no garden interest.

Lapponica with white flowers

All lapponicas can be found with white flowers, so-called albino forms. I have found pure white *R. intricatum* myself in Sichuan, and others have found albino flowers on other species. Only one variety has got a botanical name, *R. orthocladum* var. *microleucum*. It is not considered correct to give an albino plant a variety name. The flower colour will rarely go on to the offspring. Glendoick Gardens has given a white flowering plant the clone-name *R. hippophaeoides* 'Glendoick Iceberg' which is a correct way to do it.

The newly introduced *R. tsaii* are very soft pink, sometimes almost white, so this species can in a way be called a white flowered lapponica.

Blue to purple/pink coloured *Lapponica* species

Lapponicas are often associated with the blue colour, and some species have the most bluish colour in the whole genus. Some of these has been widely used for making blue hybrids. Still very few species are "only or mostly" blue flowered.

R. fastigiatum, R. intricatum, R. impeditum and *R. russatum* are mostly propagated for sale in their blue forms but can also have colours tending towards purple/pink. *R. cuneatum, R. rupicola* var. *rupicola, R. lapponicum* and *R. dasypetalum* are mostly known as purple or pink flowering species.

All other *Lapponica* species (except those mentioned under yellow and white flowering above), can vary between blue and purple with all possibilities in between.

R. flavidum.

R. nivale subsp. *nivale*, Beima Shan, Yunnan.

Lapponica with bigger and smaller leaves

Most *Lapponica* species have small leaves, about the same size, 1.5 – 2 cm (0.6-0.8 in) long. Three species have bigger leaves:

R. cuneatum, up to 7 cm (2.8 in).

R. mianningense, up to 5 cm (2 in). *R. russatum*, up to 4 cm (1.6 in). Some species have markedly smaller leaves:

R. thymifolium, narrow leaves up to 1.2 cm (0.5 in).

R. nivale, up to 0.9 cm (0.35 in). High alpine forms much smaller (0.5 cm, 0.2 in)).

R. nitidulum, up to 1.1 cm 0.43 in). R. complexum¸ up to 1.1 cm (0.43 in).

R. telmateium, up to 1.2 cm (0.47 in).

Some species can be found as compact small leaved forms. One example is the selection *R. impeditum* var. *pygmae*.

Leaf size will vary with growing conditions and altitude. High alpine forms will always have small leaves. Well-kept plants in gardens will often have bigger leaves than they have in nature.

Upright or creeping growth habit

Some *Lapponia* species are known for "mostly" having an erect growing habit. This goes for *R. bulu, R. capitatum, R. flavidum, R. thymifolium* (though never tall), *R. tsaii, R. websterianum* and *R. zheguense*. For these species this is important for identification work.

Lots of species can have erect growth, but also other growth habits.

Some species have creeping forms (among others) due to high altitude. Some examples are *R. lapponicum, R. nivale* (very common at high altitudes) and sometimes *R. fastigiatum.*

Leaf colour

A few *Lapponica* species have a special leaf colour which can be useful for identification.

R. fastigiatum, glaucous green or glaucous-grey. (important to separate if from *R. impeditum*)
R. hippophaeoides, pale, glaucous green
R. intricatum¸ pale greyish green
R. rupicola var. *rupicola*, very dark green, almost with a brownish touch.
R. tsaii, greyish green.
R. websterianum, pale greyish green.

All lapponicas have aromatic leaves when crushed.

Leaf scales and hairs

Well, this is the big issue, well described in several books. As mentioned above, it is not always straightforward since there are variations within each species, and then there are the natural hybrids. On the other hand, if you intend to know the lapponicas from each other, you MUST go into this subject.

John McQuire and Mike Robinsonhave in their book, "Pocket Guide to Rhododendron Species," a table which can be a good start for lapponica identification. They have divided the most known and planted

R. rupicola var. *rupicola*.

R. nivale with the Gongga Shan (7556 m; 24,800 ft) behind, which has the tallest mountains in the world outside the Himalayas.

R. websterianum along one of the main roads in Sichuan, where it is widely distributed but is surprisingly rare in cultivation.

Hans Eiberg studying *R. websterianum* in Sichuan.

Lapponica species into three groups based on scales on the leaf lower surface. The three groups are then divided into two more groups based on flower colour. I see no point in repeating their words, but highly recommend it for all readers.

Additional comments on some species

R. capitatum is a good garden plant and should be grown more often. It is very hardy and comes early into flower.

R. complexum is close to *R. intricatum*, and both have a very short style and stamens. They can easily be distinguished by the number of stamens, five in complexum while intricatum has ten.

R. dasypetalum is maybe a natural hybrid between a *Lapponica* species and *R. saluenense*. The v-shaped cross section of the leaves is a good feature for identification.

R. nivale with the smallest leaves I have ever seen. Pan Pan Pass, 4700 m (15, 420 ft), Sichuan.

R. fastigiatum is often confused with *R. impeditim* and is often wrongly sold under that name. *R. fastigiatum* differs in having bluish leaves and opaque instead of brown scales on the leaf lower surface. Both are good garden plants.

R. flavidum is most likely one of the parents to the proposed natural hybrid R. x wongii. White flowered flavidum-plants are suspected to be hybrids.

R. lapponicum. This is the most naturally widespread rhododendron species of them all, growing from Japan, all the way through the Eurasian continent via Greenland to Canada and the northwest USA. Even in my home country of Norway we can find a very alpine form of this species, so far found impossible to grow at lower altitudes.
Due to its vast distribution, other names have in the past been used for this species, such as *R. parvifolium* and *R. confertissimum*. The variation within the species is great, both in hardiness, growth habit and garden potential. The Russian Parvifolium form (var. *parvifolium* or Parvifolium Group) is the easiest for cultivation. In Greenland, *R. lapponicum* crosses with *R. subarcticum* (former *Ledum palustre* subsp. *subarcticum*) resulting in the hybrid *R. x vanhoeffenii*. This fact was important when the genus *Ledum* was included in *Rhododendron*.

R. nitidulum is most often sold as the variety var. *temoemse*, but the differences are just in minor details. Both varieties grow on the same mountain.

R. nivale has a very wide distribution and is thus also very variable, from upright shrubs at 1.5 m (60 in) to flat creeping hardly above ground level. No rhododendron species is growing at a higher altitude, as it has been found at 5800 m (19,000 ft). Lots of former described species has been lumped into R. nivale. Some of these plants are so different that collectors tend to use the old names to make clear which plants they talk about. Then the whole concept of lumping is, in a way, wasted! One of the popular forms (or hybrid?) of *R. nivale* is sometimes called *R. x edgarianum*.

R. ortocladum and ***R. polycladum*** are quite similar species, both are good garden plants. The first is most popular in its white (albino) form, while the latter is usually in cultivation as the selected clone Scintillans Group.

R. rupicola* var. *rupicola has the most beautiful deep purple flowers in the subsection. Var. *chryseum* is the most common yellow flowered lapponica in cultivation.

R. russatum in its best forms has the darkest blue colour of all *Lapponica* species and is popular in gardens. It is used a lot in hybridisation.

R. tapetiforme and ***R. yungningense*** are both known to be hard to identify in nature. Cultivated forms can also vary and not always fit to the descriptions.

R. telmateium is a species "composed" of a lot of plants earlier defined as separate species (*diacritum, drumonium, idoneum, pycnocladum*). That makes *telmateium*

Author Ole Jonny Larsen among lapponicas on the Beima Shan, Yunnan.

Remi Aleksander Nielsen with lapponicas in the Oslo Botanical garden, some of them being his own introductions.

hard to identify in the wild, and collectors like to stick to the old names which give more sense from a garden point of view. I have had success with planting *telmateium* on the north side of a sunken rock, thus keeping the roots cool while the rest of the plant gets full sun.

R. tsaii has only been known as the collection R. tsaii aff. which is closer to *R. hippophaeoides.* The "real thing" is now in culture.

R. websterianum was not introduced before 1990. I find this very odd since I have seen thousands of them recently growing along the main roads in Sichuan.

R. setosum and ***R. fragariiflorum*** have been in and out of subsection *Lapponica*. They seem to fit best in their own subsection due to botanical details

R. x burjaticum is a natural hybrid between *R. lapponicum* var. *parvifolium* and R. fragrans, growing near Lake Baikal in Russia. Most likely it is not in cultivation, but seeds are available from a Russian company (Prof seeds, also having other rare rhododendron seeds.)

R. x lysiolepis is a natural hybrid in culture. Its parents are uncertain.

Newer introductions

R. bulu, introduced from Tibet in 1995 by Kenneth Cox. There are very few plants in cultivation, and I have never seen a photo of a well grown specimen. It seems to be more heat tolerant than other lapponicas, but at the same time less hardy.

R. zheguense, introduced by Jens Nielsen in 2004. Very rare in cultivation. I grow one plant myself which is slow growing but easy in cultivation. Flowers are blue.

R. zekoense, also introduced by Jens Nielsen in 2004. Very rare in cultivation.

R. amundsenianum, introduced by Jens Nielsen in 2009. Has been spread since then, but still quite rare. Compact plant with small leaves. Easy in cultivation. Named after a Norwegian missionary (not the polar explorer!).

R. taibaiense, introduced by Jens Nielsen 2011. Has been spread since then, but still quite rare in cultivation. Easy and hardy. (All the three Nielsen introductions mentioned above are quite similar plants with various shades of blue flowers.)

R. tsaii, introduced by Jens Nielsen in 2012. In culture since then, but still rare. An important introduction, having very soft pink, almost white flowers. Hardy and easily grown. Erect habit.

R. mianningense, introduced by Jens Nielsen and Remi Nielsen in 2012. In culture since then, but still quite rare. In my opinion the best lapponica introduction in recent years, maybe the best of them all! First reckoned to be a *Maddenia* species, but now accepted as a *Lapponica*, although the leaves are larger than most others. The flowers have a very good yellow colour, and the plant is hardy and easy in culture.

Future new species?

According to *Flora of China*, there are still more *Lapponica* species to be introduced to culture in the future. Of course, the new Nagoya regime makes plant hunting more difficult, so by now we do not know if and when we can expect to grow species like *R. bamaense, dawuense, declivatum, gologense, joniense, labolengense, lungchiense, maowenense, minyaense, qinghanese, xiguense* and *yushuense* in our gardens. On the other hand, there is a tendency among Chinese botanists to be "splitters"—to put species names on plants with little differences from other species, so it could be just twelve new blue flowered plants with minor botanical differences from those we have already.

For those who hoped I would give the final identification guide to the Lapponica subsection in this article, I am sorry to have disappointed you. I have not, simply because I cannot. On the other hand, I have a hope that I have made more rhododendron collectors curious about the lapponicas and that more of you will try to grow them in your gardens. In my opinion they deserve that!

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A Protestant Plant Collector: Pastor Ernst Faber

Hartwig Schepker
Bremen, Germany

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In the history of plant discoveries in China by Western nature travellers from the 19th century onwards, Ernst Faber is unique. His name is mentioned, if at all, only comparatively seldomly when it comes to the plant hunters of days gone by. George Forrest, Frank Kingdon Ward, Ernest Wilson or Joseph Rock roamed the vast country at the beginning of the 20th century in search of new plants, commissioned by nurseries or private individuals, by scientific or horticultural associations and societies. Their experiences and the many plants they collected have since been made known to a wide public through numerous books. However, these men, who came from England or Scotland, benefited considerably from the preparatory work of those mainly French missionaries who, after the end of the opium wars, were sent to the previously almost completely unknown country from 1860 onwards. Some of these names are well known too, as they are mainly found in the Latin names of the new discoveries: Pére Jean Marie Delavay was immortalised, for example, in *Abies delavayi* and *Rhododendron arboreum* subsp. *delavayi,* and Pére Armand David can be found in *Davidia involucrata* and *Rhododendron davidii.*

Ernst Faber falls outside the scope of this list in two ways. Firstly, he is one of the very few German or German-speaking natural scientists who have carried out botanical research in China. Apart from Faber, there are the aforementioned native Austrian Joseph Rock (born in Vienna in 1884 as Joseph Franz Karl Rock), his compatriot Heinrich Handel-Mazzetti, who travelled in China during World War I, and the Baltic German Emil Bretschneider, who investigated the Chinese flora from 1866 to 1883 as a Russian legation doctor. Pastor Ernst Faber was also the only Protestant who made substantial plant collections during his missionary time in China. His merits in the research of the Chinese flora are seldom emphasized, but he also received the honour of plants named after him. Thus, the daisy genus *Faberia* bears his name, as do the maple *Acer fabri* and *Styrax faberi.*

Coburg in Northern Bavaria was the hometown of Ernst Faber, where he was born on April 25, 1839 (Rosenkranz 1959, WU 2014). After an apprenticeship

as a plumber, he entered the seminary of the Rhenish Mission in Barmen in 1858. After studying theology and natural sciences, he was sent to Fumen in the southern Chinese province of Guangdong in 1864, where he worked as a preacher and in literary missionary work until 1880. After that, Faber lived as a free missionary in Hong Kong, south of Fumen. During this time, he wrote an important book *Civilization, from West to East*, which established his reputation as a widely recognized sinologist and later earned him an honorary doctorate from the University of Jena. Faber was also a respected man among the Chinese of his time, as he not only did missionary work but was also very interested in Chinese philosophy and tried to make it better known in the West. In 1885, Faber joined the General Protestant Evangelical-Protestant Missionary Association and worked from Shanghai as their first missionary in China. For a few weeks from April 1898, he became the leader of another station of the missionary association in Tsingtau, today's Qingdao on the north-eastern coast of China. In November 1897, Tsingtau had been occupied by the German Reichsmarine and belonged as a colony to the German Reich until 1914. Ernst Faber died in Tsingtau, on September 26, 1899, after succumbing to the consequences of dysentery and typhoid.

Ernst Faber as a younger man. Photographer unknown.

Pastor Ernst Faber as a missionary in China. Photographer unknown.

When Ernst Faber arrived in April 1887 on the steamer "Kiang-tung" from Shanghai to Yichang (then called Ichang) on the Yangtze Kiang in the central Chinese province of Hubei (O'Brien 2011), he had already made a name for himself as a leading Western scholar of the Chinese faith. His destination was the Emei Shan, a holy place already famous at that time for Chinese Buddhists. Faber was also an enthusiastic botanist, who could already look back on some experiences with the Chinese flora. Some years before, he had explored the northern mountainous region of Luofu Shan with the director of the Hong Kong Botanical Garden, Charles Ford, and discovered the comparatively small and mostly evergreen maple *Acer fabri* in September 1883 (Kilpatrick 2014).

In Yichang he met Augustine Henry, an Irish doctor and botanist who was stationed there for the "Chinese Imperial Maritime Customs Service" and who played a decisive role in the introduction of the handkerchief tree *Davidia involucrata* by the plant hunter Ernest "Chinese" Wilson. *Aconitum henryi*, *Lilium henryii* and *Rhododendron augustinii* are named after Henry. The two researchers already had knowledge about Emei Shan, as ten years earlier, the Briton Edward Colborne Baber had been the first westerner to climb both the Emei Shan and the southwestern neighbouring mountain Wa Shan (O'Brien 2011), but botanically the Emei Shan was still uncharted territory. After a few days in Yichang, Faber continued his journey by boat on the Yangtze Kiang to Chongqing and from there on the Min River to Leshan, an important port of call for travelling in western Szechwan then and now, and about 40 km (25 miles) from his destination.

Buddhist monks had protected the Emei Shan for centuries. Only for building temples or as firewood, trees were taken down. Thus, the original forests had remained unchanged, which at that time, as Ernest Wilson repeatedly described in his reports, were already endangered in China by clearing, etc. As one of four holy Buddhist mountains in China, the Emei Shan has been a popular pilgrimage destination for centuries. At that time, there were more than a hundred monasteries on its slopes, which were connected by a network of pilgrim paths. Because of the Cultural Revolution, there are now only about two dozen monasteries, many of which can still be reached on foot via thousands of steps. Today the Emei Shan area is not only a protected area, but since 1996, it has also been a UNESCO World Heritage Site.

From his former headquarters, a monastery at an altitude of about 1050 m (3450 ft), Faber roamed the untouched mountain forests for fourteen days in the summer of 1887. Among his most significant finds were *Abies fabri* (Mast.) Craib and *Rosa sericea* subsp. *omeiensis* (Rolfe) A.V. Roberts. The impressive fir tree and the pretty shrub rose are not only widespread in Emei Shan, but in western Szechuan as a whole. Ernest Wilson later introduced both species into European gardens. Among the rhododendron species that Faber found on his tours were *R. concinnum* Hemsl. and *R. hanceanum* Hemsl. (Forbes & Hemsley 1886-

1902). On the summit of Emei Shan, Faber finally discovered *R. faberi* Hemsl., a pretty, slightly pink flowering, later completely white species from the subsection *Taliensia*, which occurs in large numbers up here together with *Abies fabri*. His

Rhododendron faberi flower and leaves on top of the Emei Shan. Photo: Hartwig Schepker.

Abies fabri and *Rhododendron faberi* on top of the Emei Shan. Photo: Hartwig Schepker.

find of 1887 is now in the herbarium of the Royal Botanic Garden, Edinburgh as a type specimen, which provided the basis for the first description of *R. faberi*. The species is characterized by dense, round growth and a two-layered indumentum on the underside of the leaf. The upper coat is brownish and decreases with age, while the thin, white lower indumentum remains permanently. Up there, at an altitude of over 3000 m (9850 ft), stands *Primula faberi* Hemsl., another species named after him.

After returning from his four-month journey to Yichang in September 1887, Faber sorted his finds together with Henry. Duplicates of the herbarium receipts were immediately sent by his host to Kew in London. There the head of the herbarium, William B. Hemsley, devoted himself to the finds. It turned out that Faber had discovered a total of 70 new species on the Emei Shan in addition to many already known species. Since then, the author's name Hemsl. has been used to identify these species.

Another set of herbarium specimens with about 700 species remained with Henry (O'Brien 2011). He later sold part of this set to the Arnold Arboretum in Boston (USA). How important this division of the finds was became clear a few years later, as Faber's own collections from Emei Shan were destroyed in a fire in his house in Shanghai in 1892 (Bretschneider 1898).

The news of the Emei Shan's wealth of plants quickly made the rounds in England. Less than three years later, Antwerp Pratt (*Rhododendron prattii* is named after him) set off on his journey. Many more Chinese and international botanists and plant lovers have followed in the last 100 years. Even today, the Emei Shan is without doubt still one of the top floristic destinations in China.

Emil Bretschneider already honoured Faber's botanical collections in 1898 in his book "History of European Botanical Discoveries in China." The Journal of the Linnean

Type specimen of *R. faberi* collected by Ernst Faber in July 1887. Herbarium catalogue Royal Botanic Garden Edinburgh.

Society also lists the extent of Faber's discoveries in detail in several volumes between 1886 and 1903 (Forbes & Hemsley 1886-1902), and in the wonderful book by Jane Kilpatrick "Fathers of Botany" (2014), Faber is honoured on 2.5 pages. The most lasting memory of this only German, botanical missionary in China, however, are the 20 plant species named after him (including *Senecio faberi* Hemsl. and *Machilus faberi* Hemsl.), as well as the Ernst Faber House in Coburg, which was opened in his native town in his honour in 1962.

Primula faberi at Wu Meng Shan. Photo: Pam Eveleigh.

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Successful Cultivation of Rhododendrons on Limestone

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"If that man thinks he can grow rhododendrons around here he has got another think coming!"

These were the words of the local plant guru when she noticed that one of the authors, Colin Mugridge, had planted 400 or so rhododendrons after moving them into the garden of his new property in a limestone quarry in North Wales. But he did grow them—with great success. Here you can read how.

Can I grow rhododendrons in a limestone quarry?

When he contemplated moving his family and rhododendrons to North Wales, Colin had no intention of purchasing a house situated in a limestone area, never mind a limestone quarry with a soil of pH 7.4. But having made the move, he was prepared to give it a go. Like most gardeners, he believed that it was impossible to grow rhododendrons on limestone, but he also knew that Ernest Henry "Chinese" Wilson had written about discovering rhododendrons and other ericaceous plants growing on limestone in China (Wilson 1913). Maybe it was just possible to achieve this in his new garden.

And so he started his research. It wasn't encouraging. Modern books and the internet all indicated that it does not matter what you do, the outcome is always the same—the plants will die. Colin faced up to the dilemma: either the great plant hunters were mistaken, or the modern ideas are wrong. What was he to do?

Rhododendrons on limestone in the wild

E.H. Wilson was just one of many travellers in western China who have

commented on the rhododendrons that are so abundant in the limestone mountains. Euan Cox (1945), George Forrest, Frank Kingdon Ward and others all wrote about it, and noted that the plants seemed to be growing in close contact with the limestone. If you visit the area for yourself, a little digging around soon shows that they really are growing in it, and they are thriving. Euan Cox said "I can state positively that most of the rhododendrons I have collected in that region grow directly in, or on, pure limestone," and he quoted George Forrest as saying "The rhododendron authorities at home talk of the impossibility of growing rhododendrons on limestone. I wish I had them here just now! To see *Rhododendron chartophyllum* and its forma *praecox* (now called *R. yunnanense*), miles (no exaggeration) of bloom, and every plant on pure limestone, many growing on the bare rock…. The above applies to almost all the species on the

Rhododendron rupicola growing in crevices on a limestone cliff. Photo: David Rankin.

The Yulong Shan range in Yunnan Province, China: pure limestone, with rhododendrons from end to end. Photo: David Rankin.

range." (Cox 1945). But rhododendrons do not in general survive, let alone thrive, in cultivation on limestone or other alkaline soils. So the observations of plant explorers have been explained away: the plants are not actually in contact with the limestone; it isn't limestone, but dolomite or at least dolomitic limestone; the limestone is hard and insoluble; heavy rainfall washes dissolved limestone out of the soil. All without a shred of evidence—and all wrong!

Our involvement started when one of us (David) visited the Yulong Shan range near Lijiang, in Yunnan Province in western China, and it was obvious that the rhododendrons really were growing in the limestone. While some appeared stressed, in part because of fungal infection, most were not. He was at the stage in

Rhododendron telmateium growing wild, with the soil cut away at the roots to show pure powdered limestone. Photo: David Rankin.

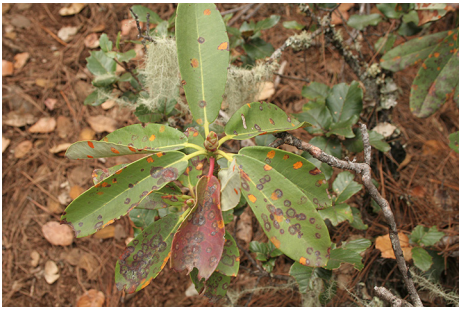
Finely powdered limestone washed by summer rain from glacial melt creates the soil in which rhododendrons grow. Photo: David Rankin.

his career (as an academic inorganic chemist) where he could afford to put some effort into a side-line research area. Two big positives: he would have to do research in China in May, when normally he would have to stay at base torturing students by examining them; and such visits could be tax-deductible. It was a no-brainer. So over the next ten years or so two PhD students and several undergraduates did the work under his guidance.

The chemistry

First they analysed samples of soil, which confirmed the visual evidence. The rock was real limestone, calcium carbonate, with very little of the magnesium that characterises dolomite. And the roots of healthy rhododendrons were growing in contact with the soil, which was substantially, even almost entirely, limestone, with pH up to 8.4, the maximum possible for calcium carbonate.

Before they could answer questions about how rhododendrons managed to survive in such conditions, they first had to find out why they didn't grow well or at all in apparently similar conditions in cultivation. This work was done by Maria Kaisheva (2006), whose entire PhD thesis is available on line. Most importantly, she showed, by analysis of leaves and of soil, that unhealthy cultivated rhododendrons usually have manganese deficiency. That was critical,



Rhododendron vernicosum stressed by manganese deficiency suffering from fungal infections. Photo: David Rankin.

An untreated cultivated plant with manganese deficiency in Colin's garden suffering from defoliation. Photo: Colin Mugridge.

more so than deficiency of iron. That can also occur, but it is usually stated simply that it is lack of iron that is the problem. Both metals become increasing insoluble at higher pH, and so are less readily available to rhododendrons. Excess of calcium, which is the metal constituent of limestone, is completely irrelevant, and the carbonate is only indirectly relevant, acting to raise the pH of the soil. It also became apparent during this work that plants that are stressed by deficiency of manganese (or iron) are prone to attack by all sorts of pests and diseases.

So how do rhododendrons in the wild avoid suffering from a shortage of manganese? Work throughout the ten-year project involved analysis of various elements in both leaves and soils, in both wild and cultivated plants. Results have been published (McAleese et al. 1999, McAleese and Rankin 2000, Rankin 2021) or are available in Maria Kaisheva's PhD thesis (2006), so we just summarise the crucially important discoveries here.

A big surprise was that healthy rhododendrons (and other *Ericaceae, Camellia,* and *Eucryphia*, but not *Magnolia*) accumulated large amounts of manganese in their leaves. Huge amounts. In most plants manganese accounts for between 30 and 300 ppm of the dry weight of the leaves. Less than that, and they are deficient; more and they suffer from manganese toxicity. But rhododendrons usually have much, much more, up to 5000 ppm, and even 15,000 ppm has been reported in blueberries (*Vaccinium* spp.). Accumulation continues throughout the lifespan of individual leaves, which can be up to six years in some species.

Could it be that decaying leaves of healthy rhododendrons act as a slow-release fertiliser for manganese? Our studies showed that plants growing even in the most extremely limestone-rich soils had sufficient manganese (and iron) to survive. Initial establishment of young plants on limestone soil would involve decay of leaves blown or washed in from plants growing nearby, but once there was a healthy population it could become largely self-sustaining. That was our

hypothesis. But hypotheses need to be confirmed or rejected by experiments. We needed to plant a field with large numbers of rhododendron plants, mulch some of them with leaves from elsewhere, and vary the soil pH, monitoring the death of the plants. The cost would be enormous—totally impracticable.

Which is where Colin came along—with effectively a field full of rhododendrons, planted in soil with a high pH, due to the limestone in the soil. He had read the early publications about this research and contacted David. Together we thought through the situation, and worked out what we could do. Would treating the plants with a foliar feed of manganese save them? Would mulching them with rhododendron leaves keep them healthy? If so, could they become self-sustaining?

Growing rhododendrons in a limestone quarry—unsuccessfully

In the years before he came across David's research, Colin tried other approaches to saving his plants. Throughout his experiments he left a group of four plants untreated as a control, i.e., as a standard against which treated plants could be compared.

First he attempted to lower the soil pH from 7.4 by mixing it with peat and adding sulfur pellets, aiming to produce a growing medium of pH 5 – 6.5, which is the normal range for successfully growing rhododendrons and other ericaceous plants. After planting, he spread more sulfur pellets on and around the root plate in an attempt to further acidify the soil, but it was difficult to incorporate sulfur in the soil after plants are present, so it is best done first. Soil bacteria convert the sulfur to sulfuric acid, thus lowering the pH. Application in spring provided the best results, as the bacteria are active when the soil is moist and warm. The soil temperature needs to be above about 13° C (55° F). Aerating the soil and irrigation to maintain soil moisture helped to speed up the process.

Colin cannot say that this technique was particularly successful. The plants survived, but they did not thrive. After a couple of seasons he decided to take a different tack, using aqueous sulfates to lower the pH. Ferrous sulfate reacts rapidly to lower soil pH, but it is more expensive than sulfur and eight times as much is needed. Aluminium sulfate also acidifies soils quickly, but it can be toxic to rhododendrons if high rates are applied.

Attempts to treat the soil chemically were not successful. Photo: Colin Mugridge.

Whatever he did, after about two years the plants grew poorly and began to show chlorosis. The problem was that if the soil contains limestone, it continues to dissolve. The huge

reservoir of calcium carbonate will in time eliminate the relatively small amounts of whatever is added to the soil. Either the treatment must be continued indefinitely, or the pH will rise and the rhododendrons will suffer from chlorosis and ill health. If the limestone has been covered with a layer of acid soil, eventually diffusion of ground water up into the root zone brings dissolved limestone. Either way, it is bad news; the treatment eventually fails.

If treating the soil didn't work, how about treating the plants themselves? Assuming that it was iron deficiency that was causing chlorosis, iron needed to be provided in a form that the plants would accept. Most soils contain plenty of iron, but at high pH it is predominantly in the form of insoluble oxides, and not available for uptake by the plants. The alternative approach is to make the iron available directly to the leaves, by using a foliar spray during the growing season. Such treatments can produce a quick response, often in a matter of days, but they need to be repeated frequently. Colin sprayed his plants every ten days to two weeks from April to September with the chelated iron fertiliser Fe EDDHA Regular. Chelates hold on to the metal tightly, releasing it slowly to the plants, in contrast to ferrous salts, which have iron immediately available, but are rapidly oxidised in soil to insoluble oxides. As a foliar spray, however, ferrous sulfate can be effective, and it is not expensive.

But providing iron in this way did not solve Colin's problems. The rhododendrons continued to grow poorly, and he decided that now, after nearly four years of setbacks and lack of progress, it was time to abandon his experiments and leave the plants to their own devices. After all, there were over 400 of them. They were now a lot bigger after four years of growth, even though the growth was poor and stunted, and the time and effort involved was prohibitively high. It appeared that the great plant collectors had been mistaken; the current belief that you cannot grow rhododendrons on limestone seemed to be correct. Colin decided to make one more play of the dice. He would google "growing rhododendrons on limestone" one more time and see what the internet came up with.

Growing rhododendrons in a limestone quarry – successfully

Colin's search took him to an article by David, which summarised the chemistry. "Nonconformist Rhododendrons" had originally been written in 2000 for the Scottish Rhododendron Society and then archived on line by the Victoria Rhododendron Society. It now is only available on the website of the Scottish Rhododendron Society (Rankin, 2021). At that time the chemist had a hypothesis about how to grow rhododendrons on limestone, but needed to experiment on a field full of plants. The gardener had a quarry full of unhappy plants, and wanted to know what to do. And so began a correspondence and a series of meetings, over more than ten years, that has been most productive (Mugridge 2009).

Applying the principles set out by David and his co-workers of how

rhododendrons and other ericaceous plants are able to succeed in calciferous soils, Colin was able to modify his approach. Previously he had found very little information in any books or any advice that he could take from the internet that indicated the importance of manganese for growing rhododendrons on limestone, but now he realised that it was the most essential element that was lacking. Like iron, but even more so, it gets locked up as insoluble oxides and related compounds at high pH.

He therefore started applying manganese as a foliar spray. He mixed his iron chelate spray with a manganese chelate spray and this combination provided all the nutrients that his rhododendrons required. Within a few weeks the plants became greener and eventually the chlorosis disappeared. In the following seasons the plants were restored to their optimum growing characteristics: green, vigorous and free of disease. Success at last! Then David Rankin pointed out that expensive chelate compounds were not essential for foliar sprays and that ordinary soluble iron and manganese salts would be sufficient. Indeed they were. Relatively cheap ferrous sulfate and manganese sulfate were all that were required.

After treatment with a manganese foliar spray, *Rhododendron decorum* at last grew healthily. Photo: Colin Mugridge.

Although Colin had now found the key to growing rhododendrons on limestone successfully, he was not prepared to spend a large amount of garden time tending just rhododendrons. After all it was a large garden (over 0.8 ha (two acres)) and there were many menial tasks to be accomplished. He continued with these sprays throughout that current growing season, but significantly he had largely ignored what was going on in the rest of the garden, with the rhododendrons that he had left to cope on their own. Inadvertently he had started the second experiment that was needed.

Colin brought to the garden over 400 rhododendrons, far more than he was able to attend to, with the workload of the spraying that was required. He had no choice but to leave the majority to their own devices. There was only a limited number that he was able to attend to on a regular basis, spraying and feeding. The remaining plants grew poorly, and he was afraid that he was going to lose them all. Fortunately the garden is sheltered, not exposed to the prevailing wind. It is also large, and tidying up fallen rhododendron leaves from under plants was not a priority. Consequently they accumulated underneath the growing plants, eventually breaking down to provide a mulch (Fig. 9) . This inaction was critical in his eventual success. The following season he abandoned the constant

attention of spraying and watering plants, but unexpectedly nearly all the rhododendrons "took off," first the ones in raised beds, then the ones planted in the ground. Even the control plants started to grow well, and it was only with the knowledge that he had gained from David's research that he was able to realise what was happening. The manganese slowly being released by the decaying leaves was providing what was needed by the growing plants.

Accumulated fallen leaves decay slowly, releasing manganese to Rhododendron plants growing in limestone soil. Photo: Colin Mugridge.

Today the garden is full of thriving large rhododendrons, some over ten metres (32 ft) high, and Colin has not found a single rhododendron, either hybrid or species, that does not thrive in his pH 7.4 soil. He has also had the same success with camellias. The great plant collectors were correct—you can successfully grow rhododendrons on limestone!

Growing hybrids

Colin started breeding rhododendrons some 40 years ago, but with limited time while he had a full-time aviation career, his early attempts only produced two or three good hybrids. Since his retirement in 2000 he has had more time, which he has devoted to producing some good hybrids, carefully choosing parents and being ruthless in culling poor offspring.

He made ten crosses shortly after retirement; nearly 20 years later he is still seeing these plants coming into flower, and there are still some to show their qualities in future years. These ten crosses produced about 3000 seedlings. Ten trays containing about 300 seedlings each don't occupy much space, but ten years later and still waiting for many to flower would involve 3000 large plants in pots. He does have land available, but entrusting so many seedling rhododendrons to the limestone soil would be too much of a risky experiment. So he decided to grow them all in pots rather in the

All Colin's hybrids grow without difficulty and without treatment. Photo: Colin Mugridge.

open ground, and deal with the watering, the re-potting every year and nematode application to prevent vine weevil infestation.

Of every 100 seedlings, no more than five or six were worthy of registration and naming, leaving an almost endless supply of hybrid rhododendrons to experiment with. Their numbers were reduced by waiting until they flowered, then selecting the best to plant out in raised beds on the limestone where they were carefully looked after using the methods we describe in this article. A by-product of rejected plants was their leaves, which were used as mulch in the new beds to create a manganese-rich environment. Four rejects were used as control plants. It really did not matter if they died, as there was no expense involved.

Colin produced some good hybrids and was encouraged by friends and family to register and name some as well as enter the RHS competitions. He did rather well and in 2017 he won the national competition and was awarded the Crosfield Challenge Cup for three hybrids raised in the garden of the exhibitor. He has continued to produce some high-quality hybrids and decided to donate his collection of hybrids to the Royal Horticultural Society. They kindly accepted his offer, and they are now planted out in the new RHS Garden Bridgewater, which opened in May 2021. Bridgewater have named one of his hybrids after the garden and called it 'Bridgewater Beauty'.

Recipe

Growing young plants in pots. Nothing special needs to be done. You can buy ericaceous compost, including peat-free, or you can make your own. Colin makes his from garden compost of pH 5.0-6.5, mixed with composted *Rhododendron ponticum* leaves. Rhododendrons do not require much fertiliser so there is no need to add more. Grow plants in the usual way until they are ready to plant out.

Planting. There is no need to prepare the underlying soil except for a light forking. Place the rhododendrons on top of the soil, not in it. But you want a mulch of rhododendron leaves to collect around and on the root plate, so ideally plant at least three rhododendrons and preferably more, so that there is at least a level surface between the plants where the mulch will be retained. If you plant a single rhododendron then a mound is formed, so create a low barrier around it so that leaves collect around the root plate. Spread your compost mixture around the plants so that the surface is level with the top of the rhododendron root balls and firm the mixture around them.

Mulching. While the plants are establishing, mulch them with rhododendron leaves spread around and over the root plate. Eventually they should take care of themselves, but you can always top up the mulch. Colin used *Rhododendron ponticum* leaves from local wood clearance, but be aware of phytophthora. Otherwise you can use clippings from overgrown rhododendron plants. One surprising source of manganese is used tea bags. Tea is made from the leaves

of *Camellia sinensis*, and camellias, like rhododendrons, are manganese accumulators. Whatever you use, it is helpful to spread twigs and other debris around the plant base to prevent the wind dispersal of the decaying leaves. In this way, manganese-rich leaf mulch will build up and the recycling of the leaves ensures continued healthy growth.

Clippings from overgrown Rhododendron plants contribute to the manganese-supplying mulch. Photo: Colin Mugridge.

Spraying. No further intervention should be required, but if plants show signs of chlorosis, then apply a foliar spray of a 1% solution of manganese sulfate and a 1% solution of iron (ferrous) sulfate every few weeks during the growing season. They can be mixed. You only need to spray enough to wet the leaf surface. Adding a surfactant to the solution helps this. Manganese sulfate comes as its monohydrate, $MnSO_4.H_2O$, and ferrous sulfate as its heptahydrate, $FeSO_4.7H_2O$. Do not confuse manganese sulfate ($MnSO_4$) with magnesium sulfate ($MgSO_4$ – Epsom salts). Current proprietary brands of ericaceous fertilizers are not recommended because they contain very small amounts of chelated manganese, which is not released fast enough in sufficient quantity for this purpose.

Conclusions

Our experience has shown that problems associated with growing rhododendrons (and camellias) on limestone can be overcome. We have not found any that can't be grown. Limestone-induced manganese deficiency can be treated by mulching with decaying leaves from healthy rhododendrons, eventually becoming self-sustaining, and/or by foliar feeding.

We have only done this one experiment, although on a large scale over many years. We hope that other people will be encouraged to "give it a go." Keep records and photographs, and please report both successes and failures. Chalk soils may well be trickier. They are often very dry, and that causes additional stress to the plants; maybe enough to tip them over the edge. Please let us know how you get on: Colin Mugridge: cmtc.mugs@btinternet.com.

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