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This month a survey of the genus *Nototriche* is presented by Robert Rolfe. Often thought of as resembling crocus flowers growing out of a lovely curly-leaved mat of foliage, these condensed plants are too often very difficult in cultivation but their attraction remains undimmed. Robert Rolfe has been studying these plants for many years and brings his considerable knowledge to the subject.

Cover image: *Nototriche orbignyana*, Abra Ojelaca, Peru - photo R. Rolfe.

Nototriche phyllanthos and guide Oswaldo in the Ecuadorean mountains.

***Nototriche*: observations and revelations, deductions and introductions – text by Robert Rolfe, photos R.R. also (unless otherwise attributed)**

I first encountered the high Andean genus *Nototriche* vicariously, courtesy of a five-page account in Sampson Clay's 'The Present-Day Rock Garden' (1937). The book contains just one uninspiring black and white photograph of a representative – *N. turritella*, squat in a quasi-lunar landscape in southern Peru. But the prose powerfully stirred my schoolboy imagination, imparting the information that plants of this fold, variously praised as 'beautiful, 'brilliant', 'excellent' and 'wonderful', typically 'cling to the gaunt harsh places, on barren stony slopes and otherwise sterile volcanic debris, often at most awful altitudes'.

Well, not always barren or predominantly sterile. On the other hand, the claim that some 'ascend as high as any flowering plant' worldwide is worthy of consideration. The most southerly of them, *N. compacta*, straddles the Argentinian/Chilean border east of Santiago at a comparatively modest 3,100-4,200m. However, travel just over 600 miles north and on Argentinian Nevado de Chañi (5,896m), *N. friesii* persists almost to the summit. That mighty mountain is on the border between the provinces of Jujuy and Salta. Endemic to the latter, *N. rohmederi* reaches 5,200m. Mainly Bolivian *N. flabellata* has been recorded at up to 5,640m. Peruvian *N. aretioides*, *N. carabayensis* (described in 2015), *N. coccinea*, *N. condensata*, *N. congesta*, *N. lanata*, *N. obcuneata* attain 5,100m; *N. nigrescens* 5,200m and *N. sulphurea* 5,400m. Highest of all, an unspecified *Nototriche* was found at the 5,700m summit of the Peruvian Cordillera Vilcanota, to the delight of Hugh Wilson, the mountaineer and freelance botanist who witnessed it there.

Maximum and minimum, annual or soundly perennial

At one extreme these intricately rosetted mountaineers are minuscule, as for example *N. parviflora* and *N. azorella*. At the other, Ecuadorean ***N. phyllanthos*** can form mats well over a metre in extent. Cayambe (5,790m), which lies on the Equator, is one of the northernmost authenticated localities for the genus (its hypothetical range extending to neighbouring Colombia, quite likely but not yet proven). Of late (September 2025, 'New records of *Nototriche hartwegii* A.W. Hill (Malvaceae, Malvoideae) in Ecuador: updated distribution and range extension', Trujillo and Romoleroux), an extension of that similarly substantial species as far north as Volcán Imbabura, under 80 miles from the border, has been plotted.

Nototriche phyllanthos, Cayambe, Ecuador.

Most are perennial, only *N. pygmaea* and *N. pusilla* annual. *N. macleanii* can notch up at least ten years. Of the few long-term studies carried out, *N. caesia* in Argentina's Tucuman Province has been estimated to live for between 10-50 years. A clear indication of longevity is the substantial tap root that many form, grading into a substantial caudex, sometimes projecting above ground with an intricately lobed rosette or cluster of these perched atop. Kew-based Sir Arthur Hill, champion of the genus over a century ago and author of the seminal 'A Revision of the genus *Nototriche*' (1909), observed that his type specimen of *N. famatinensis* (Rioja Province, Argentina), the caudex… measured 2cm in diameter and 22cm in length to the commencement of the root-forking. The "cushion" was 4.5cm in diameter'.

Where and when to find them

Dora Stafford, a high-born Anglo-Peruvian who collaborated with Hill, sending back herbarium material, reckoned that in southern Peru, nototriches were most frequent between around 4,550-4,900m. My limited experience there (two short, early March visits) endorses this. In some localities they occur within an hour or two's drive of habitation (the road from Arequipa to Juliaca at Vincocaya and further west is one such). More usually, anticipate a lengthy foray. The volcanoes with which they are habitually associated can be far from any road, requiring a day to reach, at least another to climb.

Where there is an approach road, it might be in poor condition, or no more than a rough track. A glorious exception: the localised, spectacular *N. vargasii*, which has skeletal, pinnatifid leaves and large red flowers, at their best in February, occurs atop Abra Huallahualla (4,600m, crest of the pass 4,820m), alongside *N. castelnaeana*, 130 miles east of Cusco, the main/only road east to Puerto Maldonado, shortly afterwards spiralling down towards the rain forest.

In Argentina's Catamarca Province, the border with Chile is crossed by ruta 60 over the Paso de San Francisco (4,747m). The only place I've seen (December 2003) nieves penitentes – clusters of hardened snow spikes formed by differential ablation, when the usual melting process is replaced in effect by freeze drying. On the fringes of the Atacama, this remote spot harbours ***N. clandestina***, whitish-flowered with cream-coloured foliage reminiscent of a giant clam in miniature. Thereafter, the next road towards the border is ruta 27, 120+ miles to the north. It terminates at a mining complex, a trail from there leading westwards to the frontier but not onwards to Chile.

Nototriche clandestina

Continuing north, there's another trail to the border 25 miles further on, overlooked by Cerro Llullaillaco (6,739m), referred to again later in this account, home of Section Neoandinium *Viola llullaillacoensis*, whose felted, deeply lobed leaves are somewhat *Nototriche*-like. The next road, over the Paso Socompa, is under 4,000m – too low for most nototriches. The following option, ruta 51 over the Paso Sico (4,092m),

traverses higher terrain to the east. It's 220 miles from the Paso de San Francisco start point, with only the routes mentioned and gaunt impenetrability in between. Changes are afoot, with Chinese, South Korean and multinational mining companies such as Rio Tinto opening new camps to exploit reserves of silver, gold and especially lithium. These obviously require vehicular access but for now expect much churning, for example along ruta 129 south-west of San Antonio de los Cobres (cobres = copper) over the Paso del Gallo (4,630m). Mule or horseback, a trailbike or a 4X4WD vehicle are the only options.

I'd recommend visiting northern Argentina and southern Peru in early March; northern Peru and Ecuador in June. But different species flower at different times: there are records of *N. coccinea* in the Cordillera Blanca from December to February, whereas co-occurring *N. obtusa* and *N. pinnata* perform up to four months later. Dora Stafford found *N. longituba* at San Antonio de Esquilache (Peru) in turf at 4,450m, stipulating it 'blooms from April to October throughout the dry season when the other nototriches such as *N. longirostris* are dying down'. John Watson (pers. comm.) reflected: 'We ourselves visited Peru in May 1994, finding it a virtually ideal time with loads in flower, not least nototriches. Arequipa was our most southerly site, the equatorial end of the Cordillera Blanca the northernmost. Our impression was that flowering seemed to succeed more or less from south to north…. This timing more or less coincided with our 1972 flier in early April, when we photographed *N. flabellata* in flower on [Bolivian] Chacaltaya'.

Nototriche niederleinii - Image by John Watson.

On the aforementioned December 2003 trip, before being joined by the Watsons, I forlornly went to the Sierra de Famatina mine site type locality in search of unusually brown-flowered ***Nototriche niederleinii*****,** only later discovering that its flowering is triggered by torrential rain in the second half of February. Significantly, a NARGS 1976 post-Conference report advises: 'Peru has no seasons in comparison with

those in the temperate zones; flowers appear after it rains. Apparently, the trick is to get into the highlands as soon as the roads become passable again, usually late April or May'.

Nototriche cabrerae

My hard-won encounter with this little-known Argentinian endemic was in February of this year, given that it's an almost 17-hour flight from Heathrow to Buenos Aires, two hours in a second plane to the city of Salta, and a three-hour drive further north-west to the mining town of San Antonio de los Cobres. Thereabouts, the few roads are prone to flooding and landslide disruption during the rainy season (January-March). Large areas are botanically boring or bereft of vegetation. You have to learn where to look.

Leucostele atacamensis subsp. *pasacana* and Nevado del Acay backdrop.

Things can change rapidly. Abra Blanca (4,080m), south of San Antonio, is the highest point reached by ruta 51. It had appeared plant-lite when first explored. True, the monumental columns of ***Leucostele atacamensis* subsp. *pasacana*** (syn. *Trichocereus pasacana*) were present in force as we approached from the south, its white flowers produced three months earlier, in November. Confined to near-vertical cliffs or steep embankments, occasionally alongside the cactus, ***Caiophora chuquitensis*** was an unexpected find, uniformly deep rose but elsewhere orange through to red, rarely yellow or white. Heavily armed with stinging hairs, it's just as well that often it had to be admired from afar due to vertiginous positionings, though in other parts of its distribution, stretching from northern Chile and Argentina to

Bolivia and central Peru at up to 4,500m, screes and sparse, high-altitude grassland are alternative habitats. Hummingbirds and bees are the main pollinators.

Caiophora chuquitensis – close up.

Mutisia hamata

With a similar altitude spread, ***Mutisia hamata*** was present in small numbers, the twining stems reaching a height of around 20cm depending on their support, which was often a *Baccharis*. ***M. kurtzii* var. *anomala***, from rather lower down, much larger at over a metre tall and more across, had very different cylindrical, orange flowers, and I would have hazarded that their structure was designed to attract hummingbirds even if my observant guide and driver Laura hadn't seen one of these in action. (Simultaneously she made another discovery, this time a ***Junellia*****,** by inadvertently parking the vehicle on a tuffet of same!)

Only five days later the scene was transformed by heavy rain. The equivalent of a flowering desert had been triggered. I won't mention all the plants, not least because

some of their identifications continue to elude me. The main display involved a member of the Asteraceae tribe Heliantheae, ***Aldama tucumanensis*****,** stretching into the distance up the mountainsides, accompanied by small-flowered but striking navy blue *Salvia cuspidata*. Both reach waist/chest height or more in a favourable season.

Mutisia kurtzii var. *anomala*

An unexpected encounter with a *Junellia.*

Aldama tucumanensis and *Salvia cuspidata* south of Abra Blanca.

Leucostele atacamensis subsp. *pasacana* and *Salvia cuspidata* below Abra Blanca.

At the opposite end of the scale, after taking an unsignposted side road to the west, which yielded at least half a dozen worthwhile finds, I'll single out just two participants, intermingled on rising ground at 3,700m. *Portulaca perennis*, pink or white here, but bright yellow, orange, pillar box red or violet in some other localities, was barely in bloom, the small, fleshy sprigs offering only the first few waxy flowers.

Its co-habitant, presumably biennial, prostrate ***Evolvulus sericeus*****,** was abundant, at most 3cm in height, the *Convolvulus*-conforming corollas Cambridge blue or white.

Evolvulus sericeus and Portulaca perennis.

Sign at Alto Chorrillo 4560m.

Nototriche cabrerae, February 20th 2026.

Back to ***N. cabrerae***. The type site is Dto. San Antonio de los Cobres, Alto Chorrillos at 4,600m, its discovery made in late January 1949. This can only be **Alto Chorrillo** (4,560m), when I visited an unrewarding spot devoid of flowering plants, perhaps – as was suggested to me – down to climate change. Since the mid-twentieth century, puna has undergone a temperature increase of 1-1.5C, higher than most other ecosystems.

Note the substantial number of flower buds yet to break in specimens from further east, just below **Abra del Acay** (4,895m) at around 4,600m*. This was on 20th February. Despite a billing as one of the world's most dangerous roads, the ascent to the pass from the northern approach, in under two hours, is impressively engineered and went without a hitch. En route we saw Andean foxes, viscachas at close quarters and **vicuña herds**, their headcounts in the teens or high twenties – more than I'd imagined possible from stock photographs.

Abra del Acay

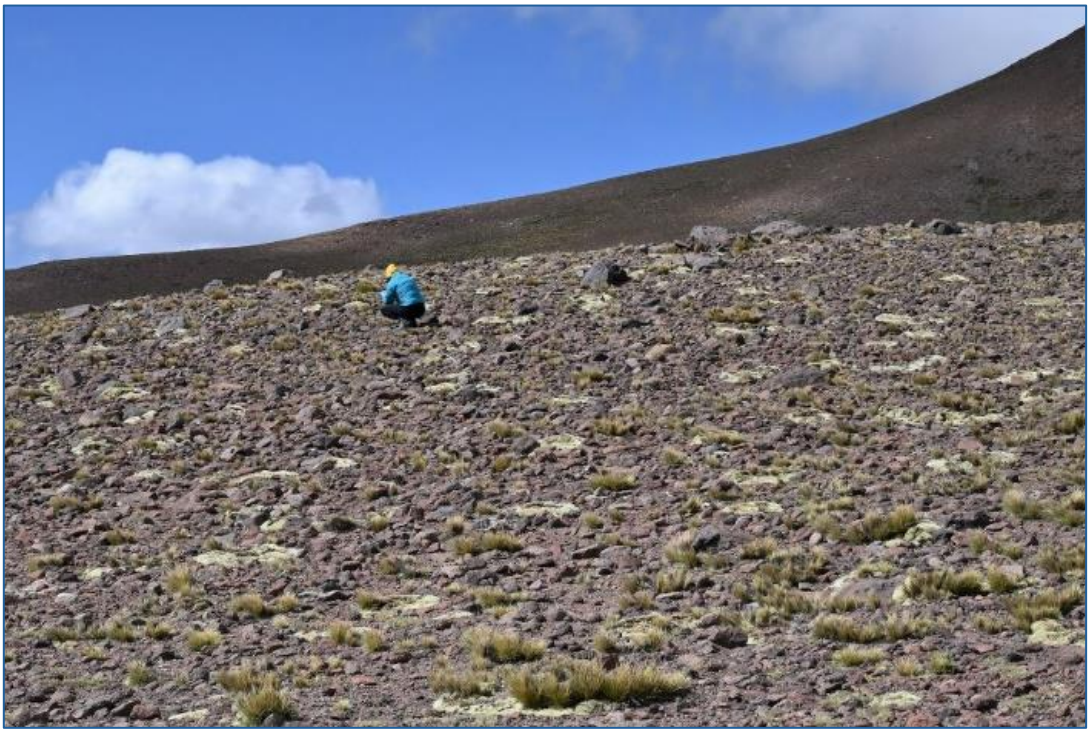
Vicuña, several hundred metres below Abra del Acay.

The summit was barren bar bunch grass but either side proved fruitful, the nototriche's huddled co-habitants including bright yellow, unspeckled ***Calceolaria glacialis***, loftiest of all in its genus, recorded up to around 5,000m, and also the dwarfest, in this location at least. I know of one briefly successful seed introduction from further south in Catamarca Province 20 years ago, unlikely to have endured. This received an RHS Preliminary Commendation in June 2008.

Calceolaria glacialis, 4,750 m, Abra del Acay.

Far more plentiful were shoals of grey, altitude-affirming ***Pycnophyllum bryoides***, one or two nursing the nototriche. It would seem that more than one species was present, the other ***P. molle***. In one spot *Caiophora coronata** was present, sheltered

from the wind by the base of the boulders against which it nestled. As with collections made above the Chilean ski resort of Farellones the large flowers were white, yet a 2007 study advises 'rarely cream, pale yellow, greenish or orange', possibly resulting from hybridisation.



Guide Laura exploring a *Pycnophyllum bryoides* colony.

Pycnophyllum habitat.

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Pycnophyllum molle.

Nototriche cabrerae

N. cabrerae (named for Ángel Cabrera, 1908-1999) occurred often as single rosettes, infrequently small hummocks up to 7cm in diameter. Those I saw match the images in the online *Flora Argentina*[I] and are indisputably salmon pink with an orange flush, whereas the November 1953 type description gives it as 'liliacea (lilac). And I cannot comprehend why the blackish centres of the flowers aren't referenced in the type description, given that this feature is atypical of the genus as a whole. It's what is known among the plant-hunting fraternity as 'a hands and knees job', exquisite in close-up but scarcely visible from ten paces away, the more so since it was often snuggled at the base of the xeric grasses that frequent these altitudes. I encountered no other species, though a further eight are recorded from Salta Province, as many as 14 (including *N. cabrerae*) from neighbouring, mainly more northern and eastern Jujuy Province.

[I] The upper altitude threshold of 4,600m needs revising

*See also the chapter on visitors and pollinators

[2] Notes on the genus *Caiophora* (Loasoidea, Loasaceae) in Chile and neighbouring countries, Ackermann & Maximilian, *Darwiniana*, vol. 45, 2007.

Flowers and associated information

The corollas, subsessile and borne singly, direct from the petiole, are variously cup/bowl/ star-shaped or strikingly *Crocus*-like, opening and closing according to weather conditions in common with crocuses. Unlike any crocus, they are composed of five petals or segments, not six, centred by the Mallow family's trademark fused stamens, the staminal tube, surmounted by a cylindrical or globose head, yellow, purple or grey. Mainly any shade of blue through to pale pink and white, sometimes with contrasting, external brush mark stains, others are scarlet, ruby, light chestnut brown, cream, yellowish (sometimes with ornamental veining) or darkest purple. I've twice seen a southern Peruvian species with small, near-black flowers above small clusters of silvery rosettes that would appear to be ***N. orbignyana*****.** Peruvian *N. nawiyoc*, described from Dpto. Huancavelica as recently as January 2026, has flowers 'externally and internally dark purple to blackish apically to whitish towards the base, with conspicuous yellow veins', its name derived from a local Quechua word translating as 'that has eyes'.

Nototriche orbignyana

Frustratingly, many of the descriptions fail to specify the colour, never mind the main flowering period, which can differ considerably from one to another. Moreover, the details given not uncommonly contradict. The aforementioned *N. turritella* was named in 1909 by monographer of the genus Sir Arthur Hill from El Misti, a volcano overlooking Arequipa in southern Peru. While some of the other species he described have subsequently been relegated to synonyms (*acuminata* and *sericeus* = *argentea*, *pseudoglabra* along with *saltensis* = *anthemidifolia*), in this case he surely knew what he was about. Regarding the corollas, he wrote that: 'In shape they resemble small *Crocus* flowers and with their pale violet colour and deep purple centres [Ed. A colour combination also seen in Afghan *Dionysia afghanica*] form conspicuous and beautiful objects, when in full flower about the middle of March'. Thirty years later Dora Stafford (she of *N. staffordiae*) gave the flowers as 'white, striped red' as witnessed on a November excursion. She also deduced that: 'It apparently flowers the whole year round, as it was in full bloom… in April some years later'.

Peruvian monographer Mazzei's description* of *N. turritella* reads (in translation) 'Corolla violet to whitish, purplish on the outside, 13–17 mm long; corolla tube hairy, 3–5 mm long; petal symmetrical, broadly obovate, with a slightly notched apex, 5–6.5 mm wide'. From this it is reasonable to infer that both colour forms represent the species, whose columnar rosettes inspired its epithet, ('little turrets"). But two, three and probably more species can grow intermixed, and this has led to mix-ups where herbarium type sheets in fact harbour more than one taxon[1].

Nototriche pedicullariifolia

Some descriptions are based on dried material, where flower colour can be transformed – fading, intensifying, or turning yellowish. Long ago, in collaboration with John Watson, I made provisional notes for a never realised update on the genus. He checked flower coloration against various authoritative sources, for ***N. pedicullariifolia*** reporting that the three available gave this as violet or pale violet. The probable explanation is that one author copied another (shock news; it happens), for it is instead whitish, red toward the tips, with violet veining.

*El género Nototriche Turcz. (Malvoideae: Malvaceae) en el Perú: Revisión Taxonómica y Distribución, Piero Mazzei, February 2025

[1]See *Kew Bulletin* 3 (1948). After Sir Arthur Hill's death in 1941, his work was carried on by Bill Burtt and published in this pamphlet, with line drawings courtesy of the renowned Stella Ross-Craig. One Peruvian taxon from San Antonio de Esquilache is given as ***N. pedatiloba* var. *appendiculata***, 'pale lilac flowers and long tap root, March 1943, type mixed with *N. obcuneata*, bare earthy slopes to 4,600m, May 1937. Both forms of *N. pedatiloba* have been collected with it, both in the normal form and its variety *cinerea*.'

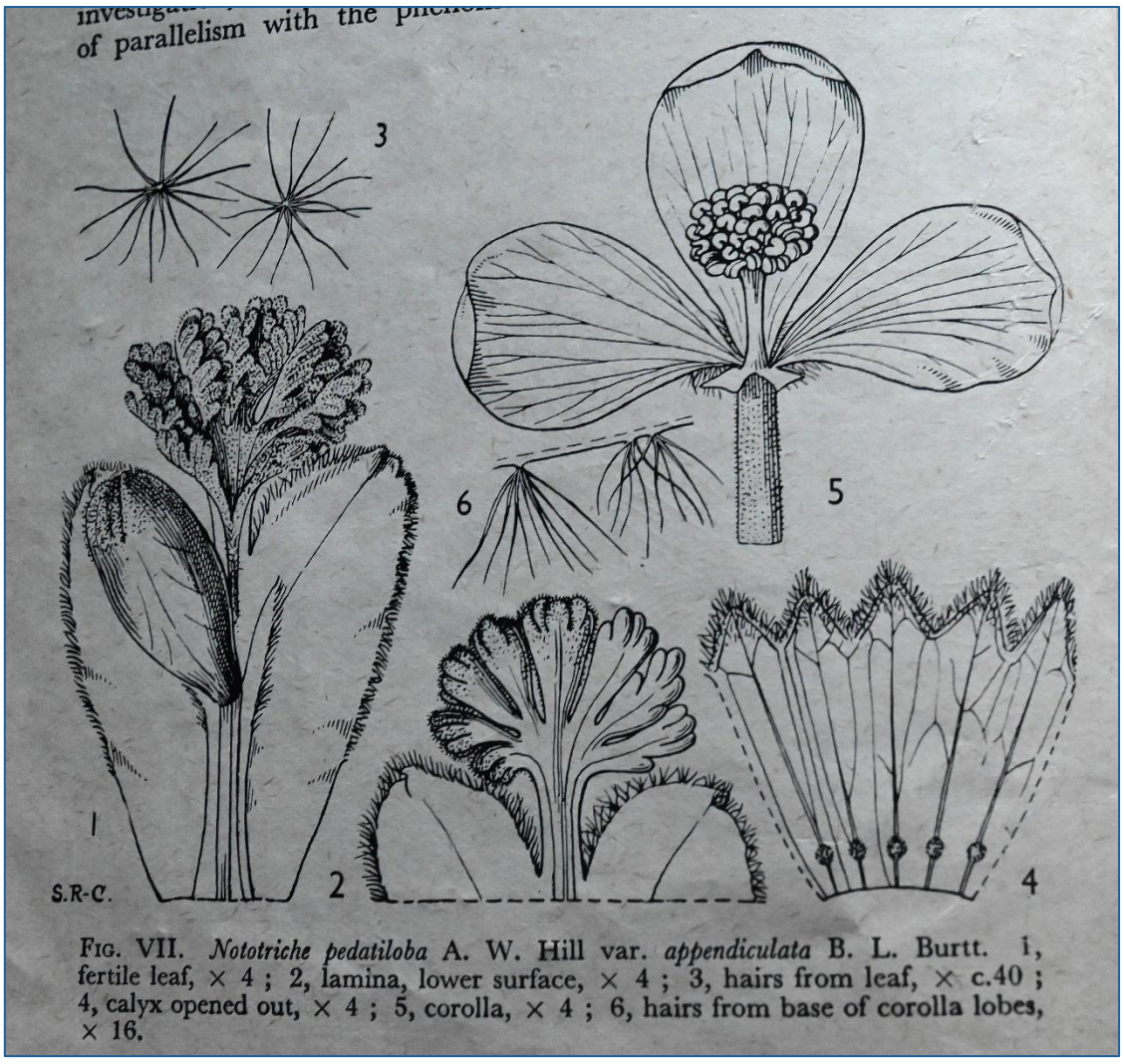

FIG. VII. *Nototriche pedatiloba* A. W. Hill var. *appendiculata* B. L. Burtt. 1, fertile leaf, × 4 ; 2, lamina, lower surface, × 4 ; 3, hairs from leaf, × c.40 ; 4, calyx opened out, × 4 ; 5, corolla, × 4 ; 6, hairs from base of corolla lobes, × 16.

N. pedatiloba var. *appendiculata*, Kew Bulletin, drawings by Stella Ross-Craig.

The *Nototriche* at San Antonio de Esquilache described in 1948 as *N. pedatiloba* var. *appendiculata.*

Nototriche pedatiloba – buds opening.

Nototriche pedatiloba

Pollinators and visitors

In the manuscript for an unpublished book covering her visits to Peru, Dora Stafford observed (of two new species at San Antonio de Esquilache): '[they] must, I feel, at some time have been sought after by man, bird or beast, because they are so camouflaged by nature. In the case of one, the leaves so imitate the soil in which they grow that it is almost impossible from a short distance to see where the plant leaves off and the earth begins. To find the other, one has to go down on one's hands and knees and search the ground where it is likely to grow. I only came upon it by chance because I happened to sit down and put my hand on the ground and found it was covered with little soft cushions. I had ridden that way before without noticing it'. Peruvian *N. aretioides* suggests further defence mechanism evidence through its modification of certain stellate hairs into minute spines.

A little earlier I mentioned the co-occurrence of *N. cabrerae* and *Caiophora coronata*, the latter pollinated by Hymenoptera, passerines, hummingbirds and rodents. Mice have been found up to the 6,739m summit of Llullaillaco in the case of the yellow-rumped leaf-eared mouse (higher than any other mammal), with five other species known from over 5,000m. Analysis of the gut and other organ contents of related mice (genus *Phyllotis*) revealed their diet included members of several plant families,

including Amaryllidaceae, Fabaceae and – significantly for present purposes – Malvaceae*. Aside from *Cristaria andicola*, *Nototriche auricoma* and *N. clandestina* occur at well over 4,000m on Llullaillaco.

Quezada-Romegialli, Quiroga-Carmona, D'Elía, Harrod & Storz. Diet of Andean Leaf-Eared Mice (*Phyllotis*) Living at Extreme Elevations on Atacama Volcanoes: Insights from Metagenomics, DNA Metabarcoding and Stable Isotopes. *Ecology and Evolution*. 2024, Nov 18, 14 (11).

Nototriche sulphurea

Nototriche sulphurea, fly attended in central, upper flower.

Nototriche sulphurea, small fly in left hand side flower.

Butterfly pollination has been witnessed for *N. compacta*, along with small bees and butterflies for Ecuadorean *N. hartwegii* (*pers. obs.*) Beetles, long-tongued bees and beetles have also been implicated. At least two species of fly visit ***N. sulphurea***, as my images from southern Peru, taken in March 2012, attest. In general, different Diptera species are attracted to different flower colours or signals. Within *Nototriche*, corolla size and colour can differ markedly, from 3-3.5mm for dark pink *N. parviflora*, to ten times those measurements for violet-blue ***N. macleanii*****.** Plenty of options and as anyone who has walked high in the Andes will tell you, no shortage of flies.

Nototriche macleanii

Self-help and blowing in the wind

At least three species (*azorella*, *foetida* and *compacta*) are gynodioecious. Individuals bear female or hermaphrodite, bisexual flowers. Studies of the last in central Chile at 3,400–3,470m indicate that both have a similar morphology but females have more stamens and a wider calyx and petals. The conclusion was that *N. compacta* both selfs and out-crosses. *

*García-Franco & Arroyo. Breeding system, sex ratio and individual size of the gynodioecious *Nototriche compacta* (Malvaceae) in the Andes of central Chile.' *Plant Species Biology* 10.3 (1995): 147-153.

When it comes to other strategies, anemophily (wind pollination) is also likely, in view of the number of other high Andeans reliant on this* and the protruding, exposed staminal column typical of many nototriches.

*'Total importance of anemophily in the flora increases towards drier areas (26% of the flora at 22°S) in comparison with wet areas (21.7% at 18°S and 19.3% at 30°S)… biotic pollination is primarily carry out by Diptera and Hymenoptera at both 18°S and 33°S… dipterans are the most frequent visitors at 18°8 (c. 50% of the total flora)… Plant visits by butterflies are lower than 10% at 18°S and close to 20% at 33°S.' Extract from Arroyo et al, Flora and Vegetation of northern Chilean Andes, 1997, in El Altiplano: *Ciencia y Conciencia en los Andes*, Universidad de Chile, Santiago.

For the birds (ornithophily)

The best documented avian relationship involves a high-altitude hummingbird, the Ecuadorian Hillstar, its male with a vivid blue head and a white breast, the female greenish grey. While customarily perching on and feeding from shrublets of orange *Chuquiraga jussieui*, (Compositae), a diet supplemented by insects, this species has also been recorded visiting *N. phyllanthos* (for example in July 2004*). The month is significant: at that time of year the chuquiraga is in sparse flower, the nototriche in full bloom.

A second hummingbird, the Blue-mantled Thornbill, has almost identical tastes, witness a painting by the ornithologist John Gould of the nototriche and two 'hummers' following his ascent of Pichincha in May 1853. This active volcano, which in 2001 spewed ash five mile into the atmosphere, overlooks Ecuador's capital city, Quito, where Gould lived and managed to cultivate ***N. phyllanthos*** 'after many years' trial'.

Nototriche phyllanthos on Cayambe.

Only around a tenth of South American hummingbirds occur at over 4,000m. The Olivaceous Thornbill, from up to 4,700m in Bolivia and Peru, is an atypically non-hovering ground feeder, recorded as visiting red gentianellas ad other alpine flowers in Peru's Cordillera Blanca. These mountains are also home to *N. coccinea*, whose nectar-filled, scarlet flowers surely beckon the bird. Their altitudinal ranges certainly overlap: 4,400-5,100m for the nototriche; up to 4,700m for the bird. I've not tracked down a definitive sighting – then again only a handful of people undertake such studies. Other malvaceous genera are visited by hummingbirds – several species of *Abutilon* in SE Brazil, *Malva sylvestris* (by another high-flying species, the Sparkling Violetear, *Colibri coruscans*) in northern Chile. And by chance I've seen photographic evidence on the website eBird² of the Thornbill taking flight from a scattering of pale blue nototriche flowers. The location (Marcapomacocha, Junín, Peru) indicates the species is *N. aretioides* but the date (late November 2014) surprises.

*Seasonal dynamics in species composition of pollinators in Ecuadorian alpine environment, thesis by Helena Pijálková, Sept 2025

[1] Illustrated in *Curtis's Botanical Magazine*, vol. 16, part 1, February 1999, tab. 1.

[2] Managed by the Cornell Lab of Ornithology.

Omissions

Despite having referenced Bolivia in connection with *N. flabellata*, I've given little coverage to that country's c. 30 species, the majority shared with neighbours, a few (*cinerea*, *coactilis*, *nivea*, *polygama* and the allegedly orange-flowered *trollii*) endemic. When I visited, in June 1988, their flowering periods were several months past. There's an enormous area of suitable, high-altitude terrain and, I've little doubt, unpublished documentation.

Soil analyses and associated floras need much greater examination. Sir Arthur Hill's monograph gave just over a page to substrates, noting the prevalence of volcanic ash in their habitats, also observing that *N. friesii* (from Argentinian Nevado de Châni) grows on 'granite, trachyte and quartzite, the slopes being covered with stones, quartz and sand, with a good deal of salt.' One other saline-tolerant species, Argentinian/Bolivian/Chilean and Peruvian *N. rugosa* has a station on the sandy margin of the Michincha salt flat crossing the border between Bolivia and Chile at 4,200m, associated with *Parastrephia lucida* scrubland. Salt flats are pervasive in northern Argentina and Bolivia. There will be other occurrences.

Nototriches are repeatedly associated with volcanoes but little information is available on the high-altitude flora of limestone parts of the Andes. These incontrovertibly exist (Llaca and Cashan in southern Peru; the Copacabana formation around Lake Titicaca, Peru's Cordilleras Huayhuash Santa formation and northern Argentinian Quebrada de Humahuaca etc). Few are instanced for nototriches. An exception: regarding southern Peruvian locale San Antonio de Esquilache, DS ordained: 'The rock is andesite and the soil alkaline. The mine is worked for lead, gold and silver, and where the minerals are poor, the flora is rich'.

History in cultivation

The earliest introductions I can trace for the UK are those made by DS (Dora Stafford), who sent seed to RBG Kew in 1937 and the following year. Five species germinated quite quickly in her Enfield garden, sown in late spring. A second sowing made after the seed had been placed in a fridge for 48 hours (and presumably imbibed) germinated quickly: the transfer 'worked like magic', she wrote. Somewhere I've her correspondence with RBG Kew, where Sir Arthur tactfully asked if there was

more to follow, given the substantial price charged. She briskly replied that no, there was not, and that he was jolly lucky to have them, whatever the cost.

DS noted that their main growing period aligned with the coming of the rainy season. They 'set seed through the early part of the dry, cold weather when night temperatures are below zero: and then they die down and rest without any covering of snow… from my own experience in growing plants from this part of the Andes I think they should be kept well soaked, even to standing the pots in water every day if the weather is fine and dry during the late spring, summer and early autumn. I use wood ash to sweeten the soil. The difficulty is to keep the young seedlings over the first winter, when they must have a certain amount of moisture to keep them alive, but too much will make them damp off'.

No likelihood of any of them surviving the war years. Fast forward to the tail end of the 1971-1972 Beckett, Cheese & Watson Andes expedition. This concentrated on the temperate Chilean and Argentinian mountains from Santiago and Mendoza southwards, with a brief foray further north tacked-on. It resulted in the introduction of *N. flabellata* from Bolivia, as related by John Watson in an article, 'To have and to have not', part of *Alpines of the Americas*, the report of the First Interim International Rock Garden Plant Conference held in July 1976, based in Seattle. In East Sussex, he wrote, his plant had 'existed quite happily for more than three years' but not flowered. It never did – his suggestion that it was settling down in cultivation proved hubristic.

As part of the Conference programme, a trough planting symposium was held at UBC, with containers discretely tenanted to represent selected areas of the mountains on which the event was themed. Bob Woodward related that one representing the northern Andes housed an unspecified *Nototriche* and shrugged: You may wonder what all the fuss is about if you noticed the little nototriche in bloom… You either like them or you don't, and of course there are more exciting species.'

Watson noted that around this time, horticulturist Pamela Holt was sending RBG Kew material from Peru and Bolivia. These efforts continued until at least 1986, when she led the Anglo-Scottish Womens Andean Expedition, leading to the brief appearance of one nototriche in the living collections.

It needs emphasising that in the 1980s Peru was plagued by the activities of the Sendero Luminoso, a Maoist terror organisation notorious for slaughtering both Peruvians and tourists. Nevertheless, intrepid plant-hunters continued to make

collections in that country, including Helena Beaufort-Murphy (who lived there) and John Whitehead (traveller extraordinaire, who found previously mentioned *N. coccinea* in full flower, on Christmas Day if I remember correctly, and drew attention to its fragrance – an attribute seldom if ever observed in other members of the genus).

Luxembourg-based David & Anke Wraight re-discovered bright yellow *Viola coronifera* in February 1988 on Cerro Colohuincul, surely the first time Europeans had set eyes on that previously near-mythical species since Harold Comber. They offered seed of this and other rosulate violas, but also travelled further north into Chile, witness *Nototriche* WR 8891 from Region Antofagasta, Province El Loa, at 4,200m on the road to El Tatio, site of the famous geysers reliably sending up columns of steam to 10m at dawn. The field notes read: 'Growing in grit on bleak desert altiplano. A wee bun of dissected felty foliage, bearing sessile, silky white flowers with a faint vestige of violet. Sow it and grow it in 90% grit. Less than 50mm of rain annually in this region. £3.50 for 10 seeds.'

The same list contained *N. compacta* WR 88106 from Region Valparaiso, Paso International Los Libertadores (a.k.a. Christo Redentor), on windswept screes. This germinated for a number of subscribers (including me) but, having survived repotting, inexorably bolted like spinach in summer. Further peril: a supplementary note warned against Hollyhock Rust, *Puccinia malvacearum*, advising application of a fungicide every fortnight from early spring onwards. If you thought the sustained, successful cultivation of dionysias, haastias and eritrichiums challenging, try a nototriche!

'[in southern Peru], Where there are glaciers, the snow quickly turns to ice as it falls; where there are no glaciers, it melts away. Below the glaciers there are sometimes ice fields but the ice line depends on how far the glacier has travelled and the height therefore varies. Even at 4,900 to over 5,000m the plants are not covered by snow except for few days at a time unless the storms are unusually heavy and prolonged'.

At which juncture I can interpose a little encouraging news. In June 1990 I spent a madcap week in Ecuador (the World Cup was in progress and every national was fixated by the television screen spectacle), investigating first the mountains near Cuenca, then returning north to Quito and being driven up Cayambe. At the time just three species were known for the country – the two I saw and *N. jamesonii*, though unbeknown to me, that same year *N. ecuadoriensis* was added to the roster, and last year *N. antisanensis* brought the total to five.

Nototriche hartwegii in cultivation, Newcastle.

From the first (Paraguillas, 4,300m) I brought back a few cuttings of ***N. hartwegii*.** This established on a raised scree bed in the Newcastle garden of onetime SRGC President Eric Watson, flowering over several years. Cayambe yielded *N. phyllanthos* (at the time the epithet *pichinchensis* was in currency, after another mountain on which it also occurs) and this lasted at least six years in locations as far apart as Kent and Scotland, rooting freely from cuttings taken in summer but growing more loosely than a typical specimen in the wild (a common setback when growing high altitude plants) and succumbing countrywide to a distressingly warm/hot summer.

Paraguillas, Ecuador - *Nototriche hartwegii*

Paraguillas has an annual precipitation of up to just over 200cm with no dry season; Volcan Cayambe experiences wetter weather from October to late May, April registering the most days of rainfall, the annual total up to 220cm (86 inches), with drier conditions from June to September, when *N. phyllanthos* yields its main display, temperatures peaking at 20C, the nightly minimum, excepting snow, c. 7C in August.

Nototriche macleanii

The scene is set – praise be – for the one enduring success story in the horticultural history of the genus, made by David & Donna Hale (Portland, Oregon). They first visited Chile in 1981, subsequently exploring more northern countries through to Venezuela, with an enduring affection for Peru. I infer it was in the mid-1990s that they tracked down in the Central Highlands Peruvian endemic *N. macleanii*, east of Lima, at around 4,100m, near the mining city of La Oroya, in an area just 15m or so square. The February 2025 PhD thesis by Piero Mazzei affirms that this has a very limited distribution in Peru's Junín Province, (Concepción, San José de Quero, 'límite con la provincia de Yauyos en el distrito de Tomas', a region with numerous lakes, on rocky outcrops and scree). Sampson Clay lauded *N. macleanii* as 'one of the most amazing, and one of the most superb, of the world's alpine plants', making it fortuitous that, against the odds, it has adapted to gardens in not just Oregon but also to my knowledge other parts of the western USA, the UK from eastern Scotland south to Southampton, the Netherlands, Belgium and Germany. Whether it has set seed in cultivation I can't assert with confidence (except to add that it was hybridised with *N. aretioides* by Martin & Anna Sheader) but demonstrably more than one clone has been distributed, the finest of them, as is too often the way, possibly now lost. Clearly sendings have been piecemeal, infrequent and in the main futile, with a few exceptions. I champion once more the fieldwork of John Watson and his wife Anita, who intermittently made available over several decades seed of species nobody else has offered. In the interests of keeping a definitive, cumulative record, I reference the following, together with relevant field notes, some offered in their seed lists, others (JJA) in those of Jim & Jenny Archibald:

1993 *N. flabellata* F&W 7884. 5-8cm. 'We offer a species from this exciting genus at less than our maximum price by virtue of its setting relatively abundant seed… The vegetation forms soft, dense cushions [Chacaltaya, c. 4,500m], the rosettes composed of broad, silver-felted, fan-shaped leaves with wavy and lobed margins. From the heart of these arise narrowly cup-shaped, stemless mallow flowers about 2cm long which open much wider in strong sunlight. They are a clear rosy, crimson-lake with a central black column topped by a distinctive puff of black stamens. The petals are quite narrow after the fashion of *Magnolia stellata*… this slight drawback compensated for by the vibrant colour. £2.50.

This species has been confused with an undescribed red-flowered taxon from east of Cusco. It's one that I saw **below Abra Oquepuño**, Carabaya Province, south of Macusani, apparently also illustrated in a field guide to the flora of Pachatusan, a

4,842m mountain north-east of Cusco.) Crucially, the flowers have broad petals, untoothed at the apex, the leaves greyish, not sulphur-coloured.

Nototriche below Abra Oquepuño.

Atop Abra Oquepuño itself, there's **a further red-flowered species** that I didn't see in situ but was brought down from on high by my guide Ronald. Either *N. cupuliforme*, described from 4,300m, Pampa de Lacka, Carabaya, in 1953, or else new.

Nototriche, Abra Oquepuño ridge, possibly *N. cupuliforme.*

1994, October (Peru collections) Only three species had ripe seed: ‘We did not arrive until… their early summer but were still too early for seed of many of the finest’. ***N. aretioides*** F&W 8172. Junín Site 1. (£1.50, 7 seeds, only 27 packets available). *Crocus*-like flowers of pale ice-blue, deeper on the outside, which open out in the sun to about 2cm and can smother the mat of wee, greenish-fingered rosettes. 4,850m. Another case of etiolation, even when successively top-dressed with coarse grit.

Nototriche aretioides in cultivation, flowering in March.

N. turritella F&W 8223. 5 seeds. Arequipa, 4,200-5,000m.*N.* ? *obcuneata* F&W 8224. ‘Rosettes more open and less columnar than the previous, the fan-shaped, frilly leaves felted grey. Its faintly-veined and pink-flushed, white ‘crocusy’ flowers a bit larger too’. 5,200m.

2001 *N. compacta* F&W 9624. ‘Dense, prostrate cushions of pale grey-green, fan-shaped neat leaves form a bed for small, stemless hollyhock cups of white, palest damask-pink or mushroom with a typical mallow mop of stamens on a column, those yellow. Monotypic colonies on a gentle, loosely sandy, exposed slope’. 3,500m. Several collections made here.

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N. caesia F&W 11270. Argentina, Catamarca, Cerro El Gobbo, 4,000m. ‘Flat, open, exposed summit in loose, sandy soil and among rocks. Variable shades of icy blue, slightly paler in the centres.

N. niederleinii F&W 11515. Argentina, La Rioja, above Mina La Mexicana, 4,300m. ‘SE exposures of summits, persistent snow beds in winter and regular cool, moist mists in spring and early summer… in ‘the coffee-cum-chocolate-with-a-touch-of-chartreuse range’.

These were all one-offs I don’t anticipate being replicated or added to any time soon but laud for the improbable successes achieved by a very few from a very few pinches of seed. R.R.

Nototriche macleanii – nursery stocks.