

# International Rock Gardener

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Polygonatum is a widespread temperate genus with approximately seventy-five species centred in the Eastern Himalaya and Indo-Burma biodiversity hotspots. Aaron J. Floden PhD, is one of the experts in this genus and gives us an oversight of those species in his collection, as first published some time ago in the SRGC Forum. There are further posts from others in the Forum thread, with comments and identifications made by Aaron – these can be seen by [clicking here](#).

Aaron J. Floden, now based in Missouri at the northeast edge of the Ozark Plateau where he is the Flora of Missouri Curator at [Missouri Botanical Garden](#), has many scientific papers to his name, including many on the likes of Trillium in the United States. He has proven a reliable resource for queries to the SRGC Forum over many years and is generous to share his time and knowledge.

Cover image: *Polygonatum biflorum* kindly provided by courtesy of the Missouri Botanic Garden.



Dr Aaron J. Floden – the person shown nearest the camera – a photo taken in India waiting for the road about the Tsiang (Tsangpo) to be cleared so they can drive through. As far as your editor knows, the goats were just local bystanders!

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## A pictorial guide to the species of *Polygonatum* by Aaron Floden

This is a pictorial guide that was published on the SRGC Forum over many years and was started prior to his PhD work that led to new species, generic changes, and better identification skills. It has been partly edited here to match current taxonomy.

I'll do it alphabetically starting with an eastern North American native, *biflorum* in its many guises that now include a puzzle of synonymy with a plasticity of variation that baffles me and obviously several other researchers who have written papers on North American *Polygonatum*. It seems the current consensus, circa 1940 something, (besides researchers not finding any consistent morphology that would lead one to more than one species) is that ploidy levels are the cause of the variation.

The pictures start with some from Kansas (KS). These are somewhat uniform, but two are distinct in "feel" and would be included under the name *commutatum* yet is now *P. biflorum commutatum*. The first five are all of one clone that was native on the property where I once gardened.



*P. biflorum.*

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*P. biflorum.*



*P. biflorum.*



*P. biflorum.*



*Polygonatum biflorum* JOPCO-KS rhizome..

The next is another from Kansas from a woodlot a few miles away that was somewhat smaller altogether with less flowers. And the one immediately following is also from there but is a dwarf that has yet to reach larger than 40cm in height and has pencil thick rhizomes with short internodes.

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*P. biflorum.*



*Polygonatum biflorum thin-leaved* KS.

These three are all from Tennessee (TN) taken in situ except for the rhizome shot. These are large plants for the most part with stems easily to six feet with leaves 25x15cm.



*P. biflorum*, Blount Co. Little River Rd, TN.



*P. biflorum* giant form, Knox Co. TN.



*Polygonatum biflorum* giant rhizome  
Knox Co. TN.

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Here is one more from TN which is fairly typical with a few flowers per leaf axil and not too tall.



*Polygonatum biflorum* Mt. Road, Campbell Co.

I have many more, but not all have photographs. I spent several hours dissecting about twenty clones of *P. biflorum* and making line-drawings and taking measurements. So much variation even within a population!

The molecular data, including whole plastomes and some other markers cannot differentiate between these forms of *P. biflorum*.

The next four are *Polygonatum cryptanthum*. Not much to say about this one. It is in the series Bracteata, a somewhat closely related group of species. This one has cinnamon-like fragrant flowers.



*P. cryptanthum*.

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*Polygonatum cryptanthum.*



Then several *Polygonatum cyrtanema*. It is a nice species and not what people typically sell as *cyrtanema*, but a razor blade and a dissecting scope says otherwise. The filament details are very important! *P. arisanense*, from Taiwan, is a different species and not closely related to *P. cyrtanema*. This almost looks evergreen with thick textured leaves. It does not offset too frequently for me with most plants still only producing one stem each season, some after 8 years.



*Polygonatum cyrtanema* purple leaf.

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*Polygonatum cyrtonema* purple peduncle.



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Here are some of *Polygonatum falcatum* which happens to be a really nice Japanese species. The first are the silver striped selection offered by Asiatica.



*Polygonatum falcatum* with silver stripe.



*Polygonatum falcatum*.

The next (mixed with silver striped form) is one that Hinkley (Heronswood) offered many years ago as said species and then questioned the identity thinking it may in fact be *stenanthum* or *macranthum*. *Polygonatum stenanthum* is a later invalid name for *P. falcatum*. The Heronswood plant is *falcatum* and the filaments are identical to those in a paper on the filaments of the Japanese species. This form is delightfully fragrant.



*Polygonatum falcatum*  
HC970662.

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The next are *Polygonatum filipes*. This is a superb species from China with short stems rarely more than 20cm long, but most of that is parallel to the ground. The abaxial leaf surface is densely pubescent. The nicest part of the plant is the extremely long pedicels with an abundance of white tubular flowers. It has fragrance similar to that of *odoratum*, if I remember correctly.



*Polygonatum filipes* in flower.



*Polygonatum filipes* habit.



*Polygonatum filipes*.



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Here we have *Polygonatum hirtum* (= *P. latifolium*) in a few differing forms starting with *P. hirtum*, dwarf form.

The dwarf really is dwarf and vigorous also. I thought it may be another closely related species that had been synonymised, but it was completely identical to my other *P. hirtum* which all fit the key nicely.



Left: *Polygonatum hirtum*, dwarf form in flower. Below: "regular" *P. hirtum*



*Polygonatum hirtum*  
as *obovatum*.

The *hirtum* as *obovatum* may be distinct. It did not flower in spring when I was dissecting so maybe another year.



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This group of five are *Polygonatum humile*, another of the commonly available species. It has cinnamon fragrant flowers and spreads quite vigorously. The last two are of a *humile* from Jilin Province collection by a friend. They may look like *humile*, but the rhizomes are distinct in being very thin, 1-3mm, with long internodes and have the strange habit of coming out of the ground and then arching back into the ground. I got no flowers the spring after my transplant from Kansas to Tennessee so maybe another year I can confirm the identification.



*Polygonatum humile.*



*Polygonatum humile.*



*Polygonatum humile* Jilin 2008.



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Now that hideous variegated form of *Polygonatum humile*...*Polygonatum hybridum* 'Barkers'.

Followed by two of *P. inflatum* - another of the bracted species. This one is Cheju Giant as offered by Plant Delights. Not sure what is giant about it, but I guess I'll give it more time.



*Polygonatum inflatum*  
Cheju Giant.

Then several of the beautiful *Polygonatum kingianum* in the pink and orange forms. The only bad thing about this species is that it needs something to climb on to

stay upright. Otherwise, you end up with a mass of stems mounded up on the ground all connected to one another by way of the cirrhose leaf tips.



*Polygonatum kingianum* – flowers and habit.

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*Polygonatum kingianum* – juvenile stem and new shoot.

Below: *Polygonatum kingianum* pink-yellow form.



And below, another year of the "pink" "*kingianum*" that is white flowered in 2010!



The next three here are *P. lasianthum* from Japan and Korea. This is really nice species but can run around quite a lot with its long rhizomes. The flowers are held out under the leaves on long pedicels (native to rainy areas?) and are fairly large and fragrant like *odoratum*.

*Polygonatum lasianthum* HC970391.

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*Polygonatum lasianthum* HC970391.



*Polygonatum lasianthum* HC.

This is a picture of the flowers of *macropodum*. Sorry no stem or leaves. I just got this from a friend and the plant looked awful, but the flowers continued. This is what I believe most offer as *cyrtonema*, but since I have yet to verify it I cannot say for sure. The flowers are fragrant, very sweet if I remember right. It is a large plant to 1m.

*Polygonatum macropodum* CY.



This is *P. multiflorum*, the common Solomon's seal.

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The mutant "Multifida" of *P. multiflorum*, which may be "ramosum." Forms like this have been reported several times in *pubescens* and *biflorum* but ended up only as herbarium specimens.

*Polygonatum 'Multifida'*.

Below: *Polygonatum nodosum* ex Chen Yi.  
This is not the true *nodosum*, but a small form of *P. cyrtoneura*. This is a small plant, <20cm, that grows mostly parallel to the ground. It has large flowers, 4cm, for its size. No fragrance that I can sense. It makes a nice low plant with really attractive leaves when not eaten by slugs.



*Polygonatum "nodosum"* habit and flower.



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Left: *Polygonatum odoratum* from a friend who collected it in China. It is distinct from the others and has since been named as *P. caulialatum* despite there being an earlier name at varietal level of *P. officinale* var. *papillosum* Franchet (1884).

The next three are a *Polygonatum odoratum* from Chen Yi under S-66. This has terete branching rhizomes that are about 1-2cm thick and very spreading. It rarely has more than 2 flowers per axil and is non-fragrant. Note the flair of the perianth lobes and the decurrent nature of the leaf attachment point. This provides the angled stem ridges to the variable "odoratum" group. This particular one has an undulate attachment at the leaf and stem and is very distinct from all others that I grow.



*Polygonatum odoratum*



CYS-66.

Right: *P. odoratum* 'Flore Pleno' which is a European form of *P. odoratum*.

I think *P. odoratum* is represented by several species. *P. simizui* was recently shown to be different by its terete stem, more leaves per stem, and smaller flowers (Systematic position of *Polygonatum simizui* (Convallariaceae) based on morphological, cytological and chloroplast DNA sequence data. SHIAN WU, JI YANG, GUANGYUAN RAO. [Botanical Journal of the Linnean Society](#)



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[\(2001\), 137: 291-296.](#) “ Abstract: *Polygonatum simizui* has been treated as a synonym of *P. odoratum s.l.*, but can be distinguished from *P. odoratum* by having a terete stem, more leaves on each individual, and relatively small flowers. The results of morphological study showed that there exist some regular and correlated variations in plants of *P. odoratum s.l.*, and some of them can be identified as *P. simizui* based on the main key characteristics. The results obtained from this study indicate that the morphological differences in plants of *P. odoratum s.l.* are paralleled by some cytological and molecular characteristics. Four NOR loci are observed in the chromosomes of plants that can be identified as *P. simizui* by *in situ* hybridization with the 18S-5.8S-26S rDNA probes. The basic number of chromosome of them is  $n = 9$ , which is very different from that of the other plants of *P. odoratum s.l.* The same variation patterns are found in PCR-RFLP analysis of *trn K* and *rpl 16* genes. As it seems to be unreasonable to include all these plants in a single species, *P. simizui* should be considered to be a distinct species.”

I think *thunbergii*, *pluriflorum* and a possibly a few others are different enough to be recognized as species. I have about a half dozen other *P. "odoratum"* from Europe to Japan and they are all similar but have a few distinct characters that gives them a distinct "feel." I dissected flowers of all those that flowered one year and they are all similar, but distinct. There were two new species described from Korea in the past decade. Both of them were lumped in with *P. odoratum* previously (*Polygonatum grandicaule* and *P. infundibuliflorum*). The latter was introduced by Tony Avent as *P. odoratum* Lemon Seoul and is sweetly and strongly fragrant with a fragrance akin to *Lonicera fragrantissima*.



Now two photos of *Polygonatum prattii*. This Chinese plant is neat, small, durable in this form, with faintly fragrant flowers. It is an interesting species with diploid and tetraploid forms, but the tetraploid tend to be found at higher elevations and are smaller plants.

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*Polygonatum pubescens* is the other American native by current accounts. It has abaxially pubescent leaves with smaller flowers, mostly 2 per axil, but looks very similar to the American *P. biflorum*. The rhizome is distinct and the leaves are more rounded. It is most common in the mountains and rich woods of the Appalachian regions.

*Polygonatum pubescens*

Feather Boa leaf form.



*Polygonatum pubescens* ex PortersCreek.

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Right: This is *P. punctatum* as received from Chen Yi. I missed the flowers while I was away one spring for a week. I am pretty sure on the ID though. The only thing that is strange is that it does not try too hard to remain evergreen.



The next few pictures are unidentified species, but with an affinity to:

1. aff. *cathcartii*. This did not flower this year, so I could not confirm the ID. The leaves are mostly opposite or alternate at the base, and fairly scabrous on the abaxial surface if I remember right.



*Polygonatum* sp 2 CY.

2. aff. *fuscum*. These were received from a friend and flower the first year and have not since. They were in the verticillate group of species and seem to fit in with *fuscum* more than any other. The flowers are similar to *P. zamlanscianense* but are borne on individual pedicels without bracts.



*Polygonatum* sp. aff. *fuscum*.

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Then this is a European form of *P. verticillatum* which looks very different from the next. It has small white flowers, whorled leaves and is not that exciting or vigorous here.



*Polygonatum verticillatum.*



This is what is sold as *P. verticillatum* Rubrum. Not truly red, but with pale pink flowers. I don't see how this is lumped into *verticillatum*. This has a tuberous gingeriform rhizome, not terete, more slender leaves of a different texture, flowers that are larger and probably differing

perianth morphology (will have to wait for flowers on *verticillatum* This is an Indian form that has been treated as *P. verticillatum*, though none of the verticillate samples from India are directly sister to the Eurasian (Europe +



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Caucasus) *P. verticillatum*. It may fit better near *sibiricum* or *erythrocarpum*, but the Himalayan and Chinese plants considered to be *P. verticillatum* are distinct and in need of dedicated taxonomic study.

Originally I had thought the following species from Chen Yi to be *P. zanolanscianense* – I have now changed that opinion. The first time this flowered I was stunned. The stem was over five feet tall and filled with flowers. It has done well, but I never get seed. Then I got several more plants that all flowered but were differently coloured. White and purple vs green and purple. I dissected flowers of both, and they seemed to be *P. zanolanscianense*. They must be from differing parts of its range. The odd thing is that Jeffrey's paper on the East Asian *Polygonatum* says white flowers. His sp. A has some of the same characters (a scabrous peduncle) and the new FOC treatment lists white, purple, and yellow. *P. anhuiense* and *P. kungii* are synonymised under this species.



*Polygonatum* CY - S-143.



*Polygonatum* white-purple flowers.

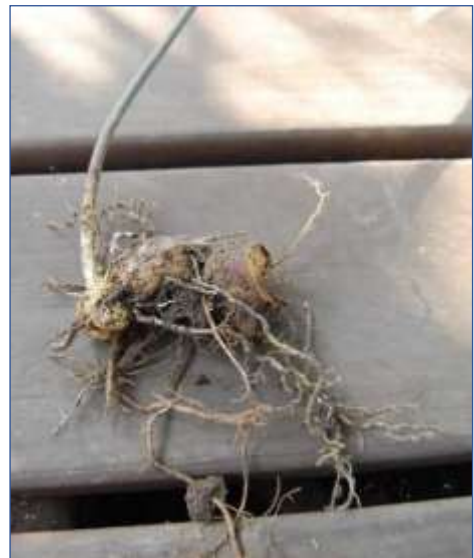


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Below are some recent photos showing some other distinctions between these two, both of which I no longer call *P. zanlansciaense*. Note the leaf arrangement, nearly always in threes with thick subcoriaceous leaves. The terminal whorls do vary. The peduncles are triangular with hyaline scabrous wings. The plant is also very scandent than the *P. sp.2* form.

I must say my concept has changed on this mess.... *Polygonatum zanlanscianense* was described from a plant sans flowers, but likened to another with flowers, *P. trinerve*. I believe that *P. zanlanscianense* should have white flowers but may have a different valid name in the future. What I called *P. zanlanscianense* for the time being is better called *P. fuscum*, at least the green and purple-brown flowered plant. The leaves of this in comparison to the above are membranous, flaccid and in whorls of 4+.

The white and purple flowered plant is distinct in its rhizome, leaf morphology and the overall shape of the perianth -- the former is compressed near the middle and the tepals flare while the latter merely tapers downward and the tepals barely flare out. Under which name this belongs is still unclear to me, but I think *P. bulbosum* and *P. lebrunii* are close. Some herbarium specimens with Wang and Tang at PE and other Chinese herbaria annotations match this plant.



*Polygonatum* aff. *lebrunii*.



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Here is the protologue of *P. lebrunii* (1) and *P. bulbosum* (2), so the latter would have priority being named a year earlier:

1 Affine *P. ericoideo* Levl. sed floribus dimidio brevioribus albis violaceo marginatis distinctum. Pedunculo communi nullo; floribus 2-6 aggregati, E grege *P. sibirici*. Yun-Nan: Sous bois de Tcheou-Kia-Tse-Tong, 2550 m, mai 1912 (E.E.Maire). Juveni Lebrun amore botanicae flagranti et e casu mortali in alpis servato dicatum.

2 E grege *P. verticillati*. Insigne propter radicem non rhizomatous sed bulbosam et propter flores parvos, lageniformes, lobis margine coloratis. Yun-Nan: Paturafes des montagnes derriere Tong-Chouan, 2700 m, juin 1910 (Maire in herb. Bonati, 7471).



*Polygonatum bulbosum*  
perianth  
measured.

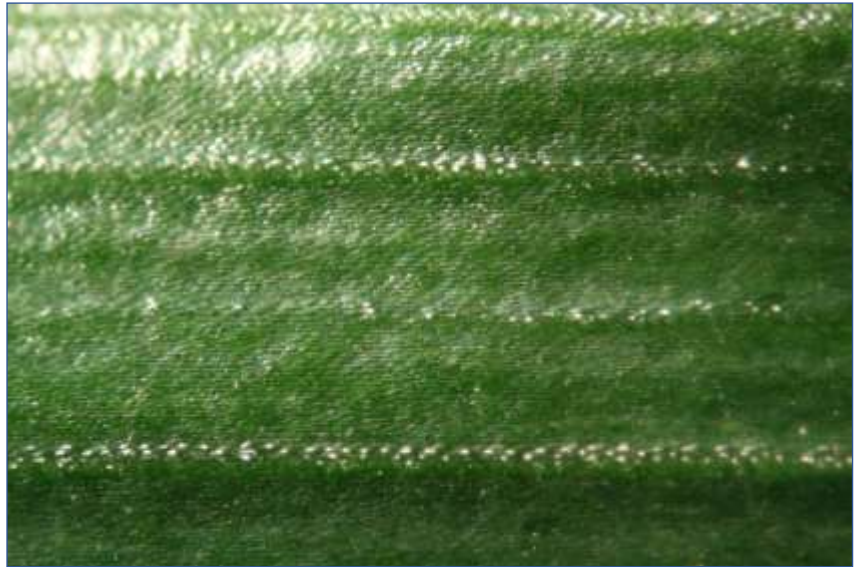
*Polygonatum bulbosum*  
filament @ 40x  
magnification.





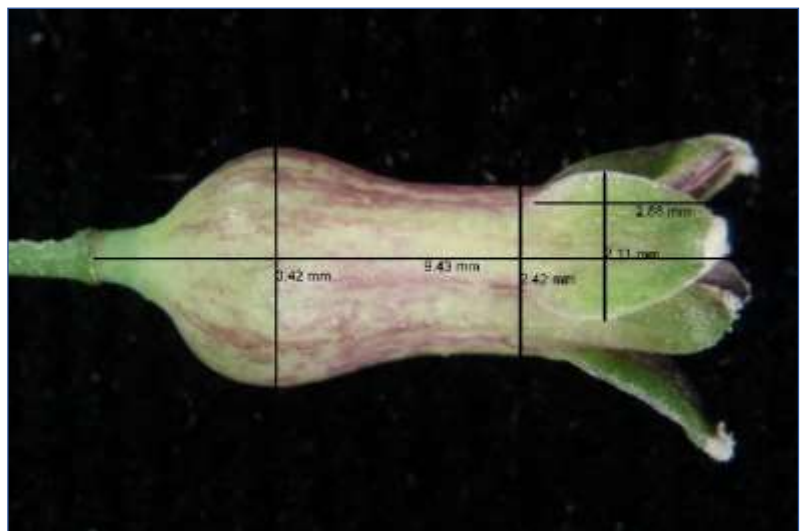
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*Polygonatum bulbosum* leaf-adaxial @ 15x magnification.



*Polygonatum bulbosum* perianth-dissected @ 10x magnification.

Right: *Polygonatum fuscum* perianth @ 8x magnification.



Above left: *Polygonatum fuscum* filament 1.35mm shown @ 40x magnification.

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This is a species that had not flowered at any point in the last 5 years but had the most amazing red pigmentation at the leaf and stem juncture and is less scandent. The leaves are whorled it has a tuberous gingeriform rhizome. When it finally flowered it turned out to be the same as the brown and green flowered plant.

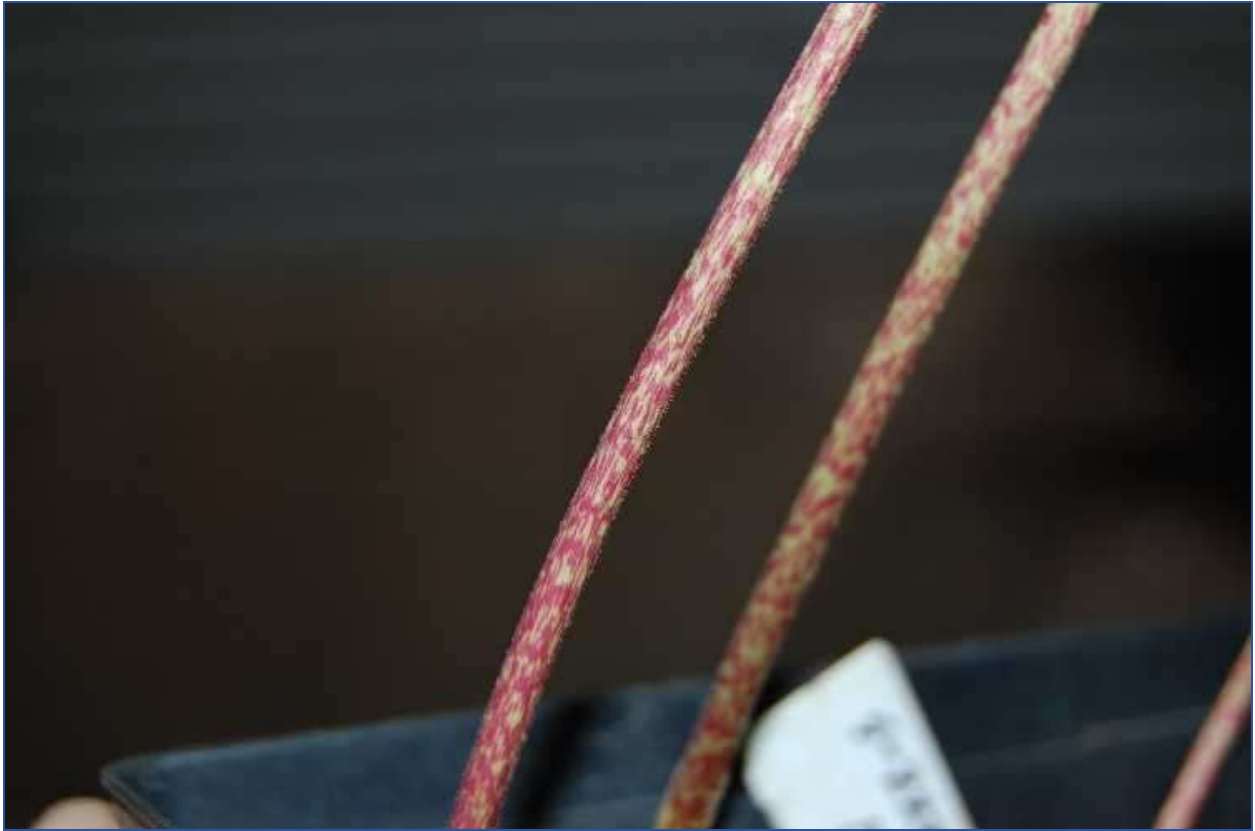
*Polygonatum* sp. 2.

The next has been previously pictured here on page 20 as *P. punctatum*, but under Jeffrey it keys out to *P. marmoratum*. After seeing about 50 herbarium specimens of *P. marmoratum* (all later annotated as *P. punctatum*) I can safely say that *P. marmoratum* is a valid species, but it belongs in *Heteropolygonatum*. Note its hirsute, red-maculate stem, individually borne flowers (not always), and imbricate vs. valvate tepals. The ovary/style ratio is also equal, both are very short. It also has chartaceous leaves that look like they'll be evergreen but are promptly deciduous.



*Heteropolygonatum* aff. *marmoratum*.

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*Heteropolygonatum* aff. *marmoratum* - red marked stems.



*Heteropolygonatum* aff. *marmoratum* - rhizome.

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*Heteropolygonatum  
marmoratum.*



The next I call *P.*

*punctatum*, but it is not! In  
FOC this is what it keys to,  
but it is clearly distinct. It  
came in the same batch of  
plants as the above, but

this does remain evergreen and only drops old stems after the new have matured. It has similar urceolate perianths, but are white and green, no lilac spotting, and has the short ovary and style of equal lengths. This is now named *P. urceolatum*, and it grows in Vietnam, and adjacent provinces in China (Guangxi, Guizhou, and Yunnan).



*Polygonatum urceolatum.*

Here is another that made it way to me from someone who got it from a friend in NZ! (what a long trip from its original collection in the Himalayas to the UK to NZ and back around the world) Apparently all material currently in cultivation descends from Grey-Wilson's collection in the 1970's. *Polygonatum graminifolium* is a nice little species with large flowers of a strange scent, I liken it to the old bubblegums - the kind that is that pepto-pink and turns to

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rubber after about 1 minute. It forms a group with *P. hookeri*, *P. quinghaiense*, and the synonymized *P. pumilum*.



*Polygonatum graminifolium* GWPH803.



*Polygonatum graminifolium* GWPH803.

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Well, the *P. graminifolium* has become quite the world traveller. This species, *P. hookeri*, and *P. kansuense* are alpine species and difficult to grow in warmer climates. Chen Yi, who I heard was difficult to order from in AU and NZ, has sent out what is likely the very different *P. pumilum* which is similar to *P. graminifolium* in gross morphology, but grows in the range of *P. hookeri* (separated by elevation) and east of it in the Dabashan Mtns, is not precocious, and has smaller flowers, 10-12 mm.

The next is a species collected by Ogisu in China that was first thought to be an undescribed species. It shares features with *inflatum* - thick compressed pubescent filaments, and also with *omeiense* and *adnatum* - peduncles adnate to the stem ca. 5 mm. It does not key to anything in the Flora of China. And here is another clone collected as seed by the D. Probst that is the same undescribed species as the Ogisu collection. Having white and green flowers it is a very attractive species. The stems are purple maculate and the leaves shiny dark green.



*Polygonatum* sp. Ogisu 94047.

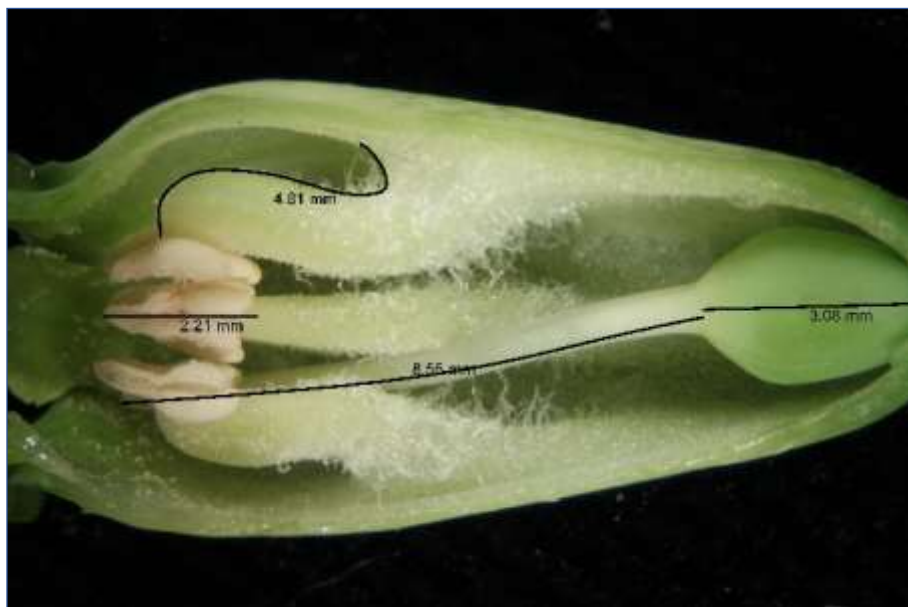
Pers. comm. from Julian Sutton on the SRGC Forum: "The troublesome *Polygonatum* sp. Og94047 was discussed back in 2010. Roy Lancaster, back from a trip to China with Ogisu, tells me that Ogisu now considers it to be a distinctive, outlying population of *P. acuminatifolium*, collected in the Wolong Valley [Sichuan Prov.]. It was previously known (from) a lot further north east. They suggest a cultivar name, 'Wolong'."

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Aaron replied: " I disagree! I have the Ogisu plant as well as two other collections of this species. I recently had a paper published reinstating the long synonymized *P. yunnanense*.

See: <http://www.mapress.com/phytotaxa/content/2012/f/pt00058p064.pdf>

I would say that it is allied to *P. acuminatifolium*, but distantly related. I just recently acquired *acuminatifolium* and have not yet added that species to the DNA matrix, but I have sequenced Ogisu's collection. Based on cytology (probably  $n=11$ ,  $2n=22$  based on specimens reported in literature as *P. omeiense* (not from Mt. Omei), and filament shape and the bracts it is in the same group with *acuminatifolium*, *cyrtanema*, *nodosum*, *adnatum*, and *omeiense*. Hopefully DNA will sort out their relationships better than distribution and morphology. It is a beautiful garden plant with small glossy leaves and relatively large typical flowers."



*Polygonatum yunnanense*  
perianth dissected 6.7x  
magnification.

*Polygonatum acuminatifolium* dissected,  
6.7x magnification.

In reply to my confusion:  
*Polygonatum* in the  
alternate group can be  
group based on filament  
shape and cytology ( $n=9$ ,  
10, 11). I assume, based

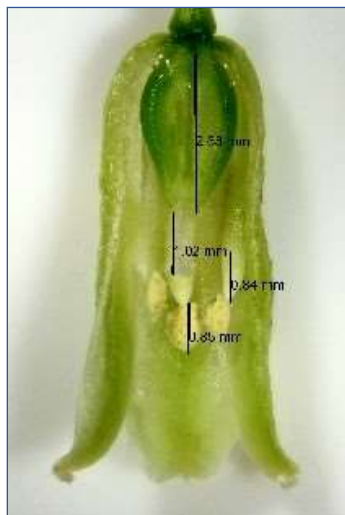


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on morphology, that *acuminatifolium* its base number is 11. I have no report of the number yet, so I'll set it aside and pull some roots off this week. *P. yunnanense* is similar if one looks at the filaments, but the plant looks very different. McDonough has posted some images of it either on SRGC or the NARGS forum. I have some of the Ogisu plant posted in this thread. The small oval leaves are glaucous beneath, lustrous above, not strongly veined and the peduncle is adnate to the stem which is shared with *adnatum* and *omeiense*. These three are a Hengduan group of taxa and *acuminatifolium* is allied to *inflatum* of NE China/Korea's. See the *acuminatifolium* filaments in comparison to *yunnanense*. Similar, but different.

Yes, confusing, but all the alternate *Polygonatum* in most people's minds look about the same; alternate with green and white flowers!

Here are some photos of *Heteropolygonatum alte-lobatum*. This is an epiphytic plant from Taiwan, this particular one is BSWJ 1886. Habit photo and the single flower dissected. Still attempting a mitotic chromosome count. Note the small, abruptly tapered filaments, nearly equal style and ovary, and the imbricate tepals. This aborted all but one flower and had one with the terminal leaf.....



*Heteropolygonatum alte-lobatum*  
BSWJ1886 and perianth and with  
measurements.



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Here are some of the *Polygonatum "punctatum"* ex Chen Yi. It has terminal flowers! Or would these be subterminal since two leaves are borne at the apex? These are very close to what [Crûg Farm](#) calls *P. tonkinense* (*P. tonkinense* is actually a *Disporopsis*) in appearance, but I am waiting for that to flower. They say their plants have terminal flowers and may belong in *Heteropolygonatum*.

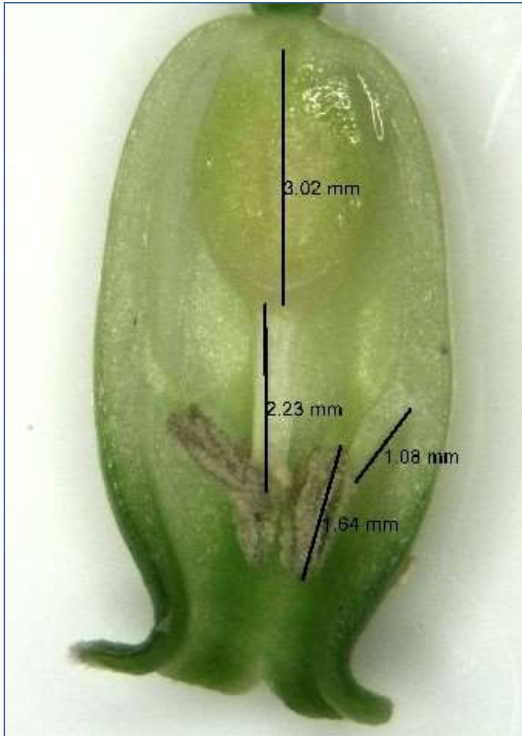
Also note that the inflorescences are held erect above the leaves. The dissected flower shows the length of the filament and the stamen. The filaments are mostly glabrous with a small number of papillae on the outward side near the stamen attachment.



*Polygonatum urceolatum* S-222 CY.

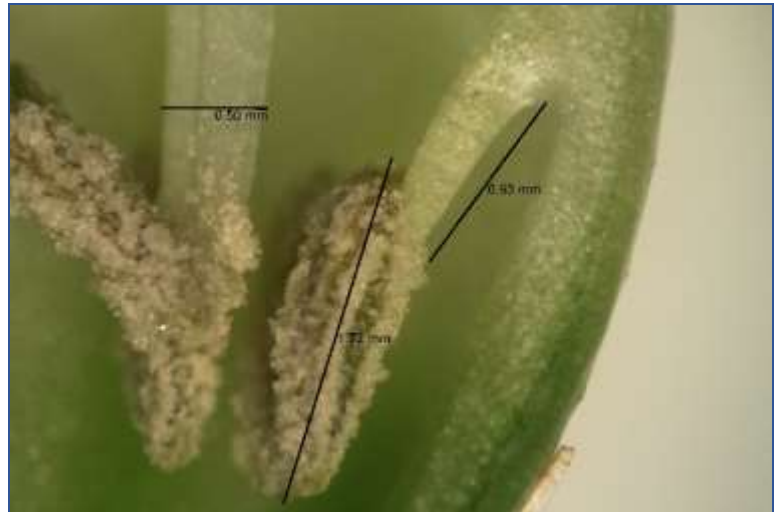


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*Polygonatum* S-222 perianth dissected, measured.

*Polygonatum* S-222 filament measured.



This is true *P. oppositifolium* BSWJ 2537. It can have subopposite leaves proximally. Note the densely papillose filaments near the stamen, but thinner and glabrous above.

*P. oppositifolium* BSWJ 2537 – flowers.



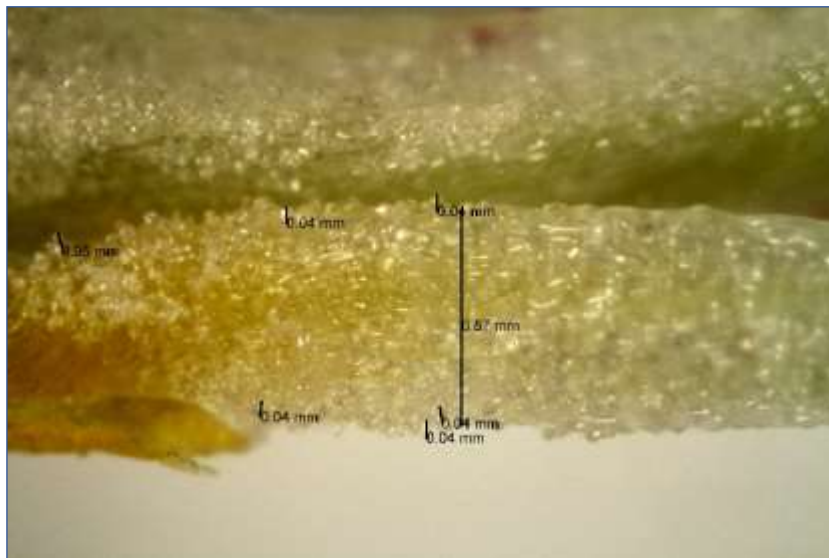
*P. oppositifolium* BSWJ 2537 – leaves.



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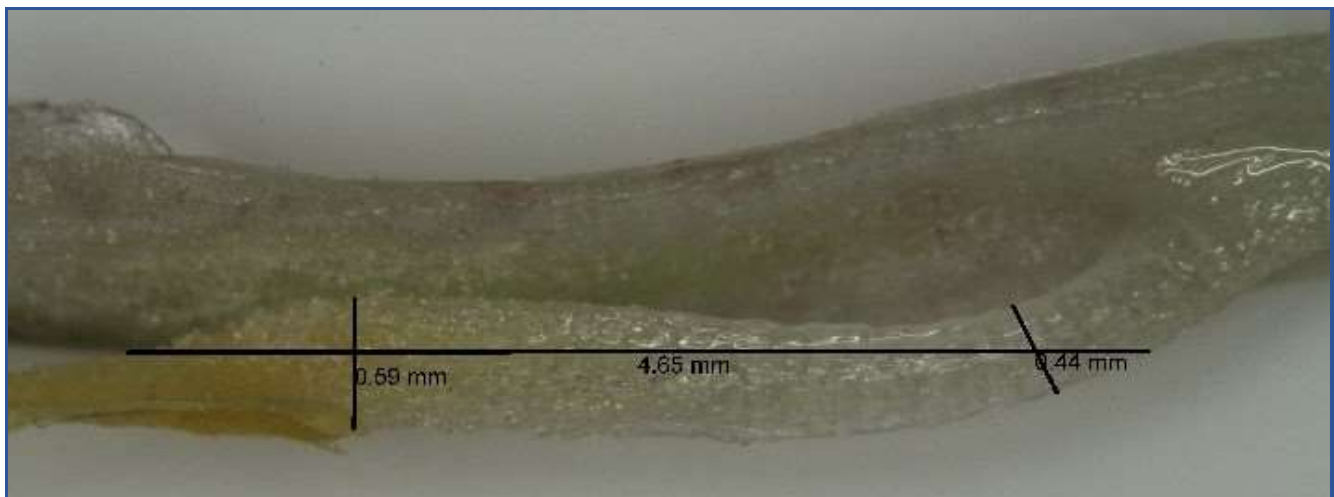


*Polygonatum oppositifolium* dissected.



*Polygonatum oppositifolium* filament 40x magnification, measured.

Below: *Polygonatum oppositifolium* filament measured.



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There has been a fair amount of work done on seed germination of *Polygonatum* due to its use as medicine and food. I have followed the protocols and found that 30-60 days cold, followed by 60-90 days warm when the seed germinates and makes a root, followed by 30-60 days cold, and then a warm period again will get the first leaf produced within the first year rather than in two years. Some species may need longer cold cycles depending on their origin, but so far this has worked on many from differing sections. Surprisingly several species have bloomed within three years for me.

I could recommend many species! I currently have 153 accessions representing 40+ correctly identified species and numerous plants that I have not yet put a name on. I also have several clones of many of the more common species.

Here is one that is in flower that many call *P. roseum*, but it is not. The fragrance on it is very sweet and the pink flowers are even better. A small plant and NOT *P. roseum* is



what has been sold as *P. roseum* collected from the Kanchenjunga in Nepal/Tibet(?). I do not know what it is and have not seen an herbarium specimen that looks like this plant. The small flowers, 8-10mm, are highly fragrant, but short lived. Ron McBeath lists a lot of plants with SBQE collection numbers. The collection information for the *P. "roseum"* plant variously offered is SBQE1310 -- Sino-British Qinghai Expedition 1997, 1310, 26 July 1999, China: Qinghai:Haibei Zang Aut. Pref. Zhugu Xiang, Dongxä village. Latitude: 37° 7' 8" N, Longitude: 102° 18' 59" E. The voucher specimen is housed at RBGE. I am still unsure of the identification, but I should have a clearer answer in future. I recently saw *P. kansuense* in the herbarium at Missouri Botanical Garden and cannot see how that species is in synonymy with another. The pubescence on the stem and leaf abaxial surface are distinct. I am uncomfortable putting any name on it yet, but *P. kansuense* may be a possibility as other species described from Gansu/Kansu have a broad range into that part of Tibet.

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Here is another form of *P. prattii*, received from an SRGC forum member, that is far taller and more floriferous than the previous form pictured on page 18. Unfortunately, this one lacks the stronger violet fragrance of the former. The filaments of both are nearly identical – these photos are of the taller form.



*Polygonatum prattii* ex MGoetz.



*Polygonatum prattii* ex MGoetz perianth-dissected 8x magnification, measured.

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The next three are *P. orientale* (*polyanthemum*). The first two are the FS364 collection, and the last is a form from the Caucasus.



*Polygonatum orientale* FS364.



*Polygonatum orientale* FS364 flower, dissected, measured.

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*Polygonatum* SB-1 Pyatigorsk perianth-dissected 6.7x magnification.

Here are some new ones; *P. amabile*, finally given species status again by Tamura in his 2009 treatment of the Japanese species. An outstanding almost trough sized plant with beautiful leaves (in this form) and fragrant flowers. Plant and dissected flower (saved from a rainy weekend so not quite open).



*Polygonatum amabile*.

*Polygonatum amabile* dissected.



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And a few from Crûg Farm. The first, a form of their *P. tonkinense* (= *P. mengtzense*), is closely related to *P. urceolatum* (Chen Yi's S-222).



*Polygonatum mengtzense* BSWJ551.



*Polygonatum costatum* BSWJ6599.



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*Polygonatum annamense* BSWJ9752.

Some oddities:



*P. multiflorum ramosissimum* - the branched form. The flowers are significantly smaller than the typical form. And, strangely enough, this seems to be partially self-fertile.

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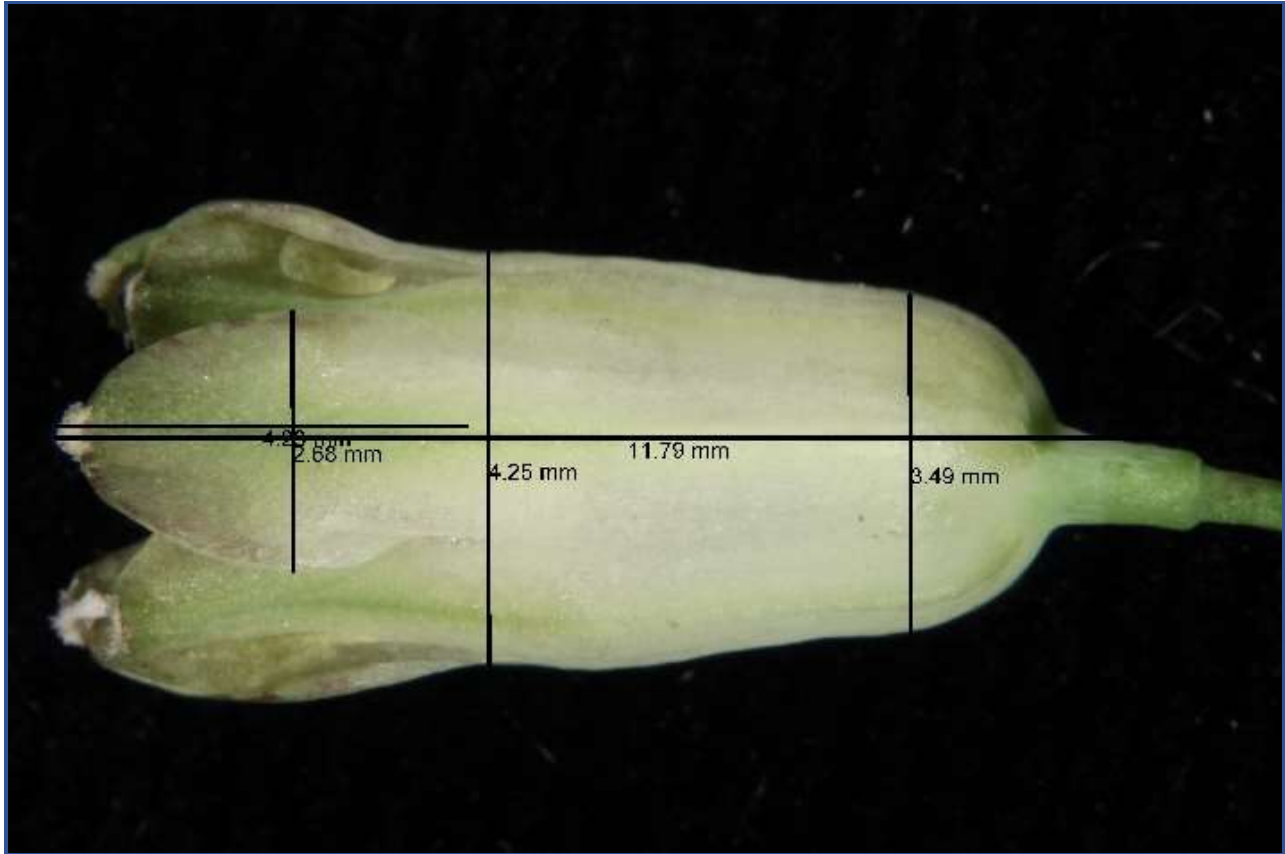
*P. odoratum* ex JW, collected near Cheng Du in the 1980's. It has terminal flowers! It also has abaxially papillose leaves and distinct flowers without scent. This has now been named as *P. caulialatum*.



And *P.* sp. ex CY. Not a clue. The leaves are borne opposite, alternate, and 3-whorled, pubescent abaxially, with greenish flowers with purple spots on the lobe margins. Dissected flower included.



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*Polygonatum* S-76 CY perianth 6.7x magnification.

Two clones of what came to me as *P. nodosum* follow, but these are both *P. cyrtonema*. N. B. *P. nodosum* should not be scabridulous abaxially. My two clones are completely glabrous throughout.



*Polygonatum cyrtonema* CPC01.4.29.1 perianth-dissected 6.7x magnification.

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*Polygonatum cyrtonema* perianth-dissected 6.7x magnification.

Now some more of the cyrtonema mess! I rescind any identification that I have previously called *P. cyrtonema* until seeing the flower dissected! Flowers of three clones dissected below. The overall plant habits can be seen in the last. The purple plant (dark green on left side of picture), red veins on bottom to right of middle and the other in the upper right quarter of the picture. The latter flowers two weeks before the other two.

*Polygonatum cyrtonema* purple red veins comparison 6.7x magnification.





*Polygonatum cyrtonema* #1 dissected 6.7x magnification.



*Polygonatum* mix.

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I hope the diagnostic images will help some with identifications. I have over 500 images now of important morphological features of about half my 154 accessions. The first few were on a white background, but the shadows were too obvious and the depth was not good. A piece of black felt beneath the flowers enhances the images greatly.

Here is *P. stewartianum* (not *prattii*) CLD325. It is a small plant with enormous quantities of flowers in the lower leaf axils. It lacks any detectable fragrance.



*Polygonatum stewartianum* CLD325

*Polygonatum stewartianum*  
CLD325 filament-2  
25x magnification.



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*Polygonatum stewartianum* CLD325 perianth-2 8x magnification.

And here is a comparison of two forms of *P. pubescens*. One is from an alkaline area on the Powell River northeast of me (about an hour's drive) and the other about one-half hour west on an acidic hillside with *Hepatica americana* (with red pistils) and a few other desirables.



*Polygonatum* aff. *pubescens* comparison 6.7x magnification, measured.

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*Polygonatum* aff. *pubescens* filament comparison 15x magnification.

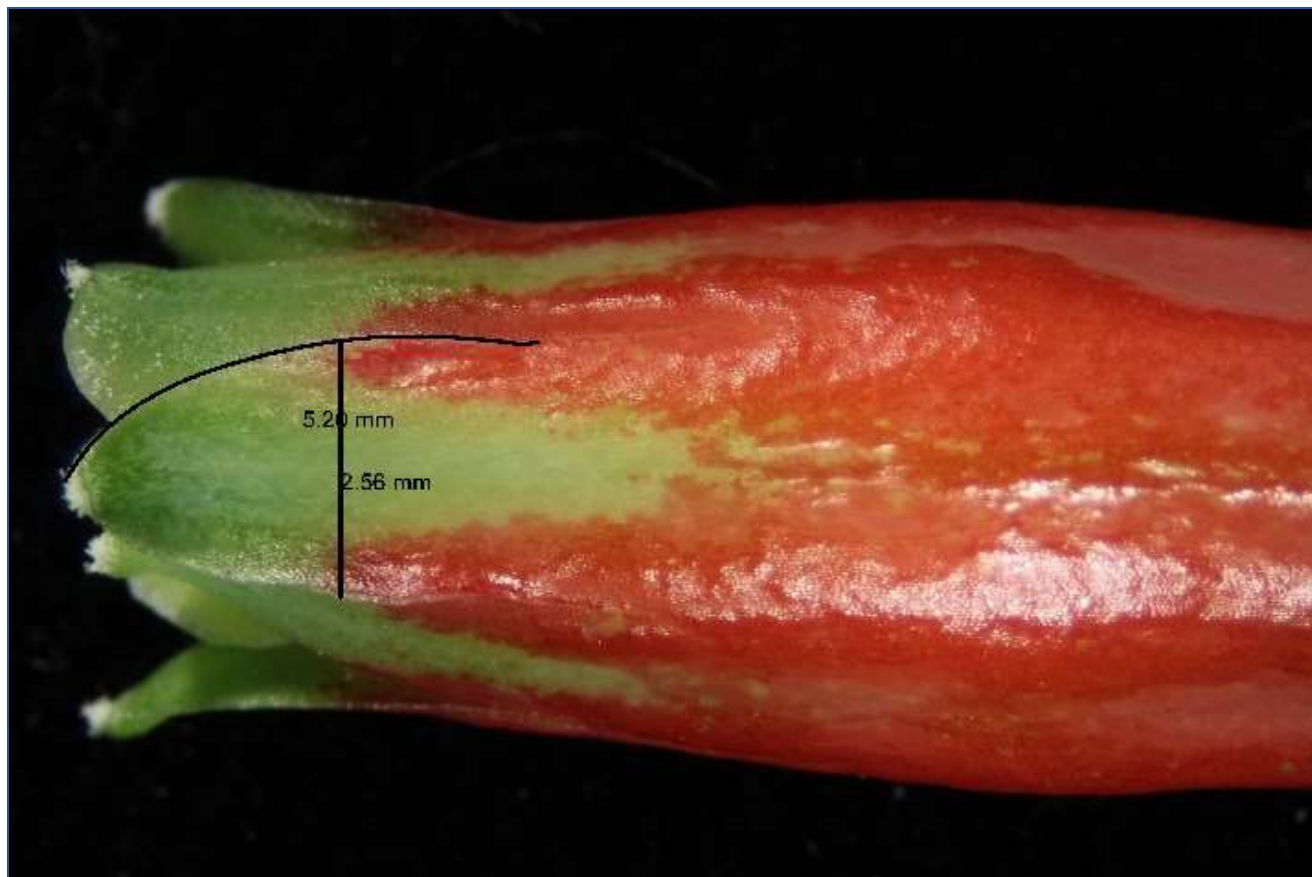
*Polygonatum kingianum* in cultivation have nearly all apparently come via Chen Yi. She offered it as a red form of *cirrhifolium*, sp. pink, and various other names. I personally don't think any of these are the true *P. kingianum*. It was described with short glabrous filaments, and purple to rose flowers with broad leaves. It was described from the Shan Hills of Myanmar. The Chen Yi material better fits *P. huanum* (the red-orange and green) and *P. agglutinatum* or *P. esquirolei*... or *P. ericoideum*!

Following are some dissected perianths of both of the latter possibilities which I grow that have flowered. I would love to get the true *P. kingianum* to compare these to. Also, I have both collections of the yellow *P. kingianum* from Crûg Farm -- I had yet to flower these at the time of writing, but they are obviously closely related. These all share the gingeriform rhizomes, basal leaves (even when mature) with a silvery central stripe, and the large cylindrical, coloured flowers.

On scent -- the red form is scented like Tiarella - one of the finest fragrances in the world (imho) and the other is unscented.



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*Polygonatum* aff. *huanum* perianth-dissected 6.7x magnification, measured.



*Polygonatum* aff. *huanum* perianth 6.7x magnification, measured.

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*Polygonatum kingianum* pink-yellow perianth-dissected 6.7x magnification, measured.

What we call *P. kingianum* may be *P. huanum* -- the description for that species fits better. Also, FOC (Flora of China) gives a range of 1.7-5 mm for the filament length and a pink or white perianth. The filaments of *Polygonatum* are constants and some species can be identified just from them. This range is too great. The white/pink flowered plants may be a different species from *kingianum* also. Either way the red flowered plant wintered for me in eastern Kansas for 6 winters down to -15F. I would call it fully hardy. There are few species that are not hardy, but I am waiting to try some of the new ones outside until I have divisions or seedlings to spare.



Newly described species 2015:

*Polygonatum autumnale* -- the first described autumn-flowering species seen here in fruit in May 2014 Arunachal Pradesh.

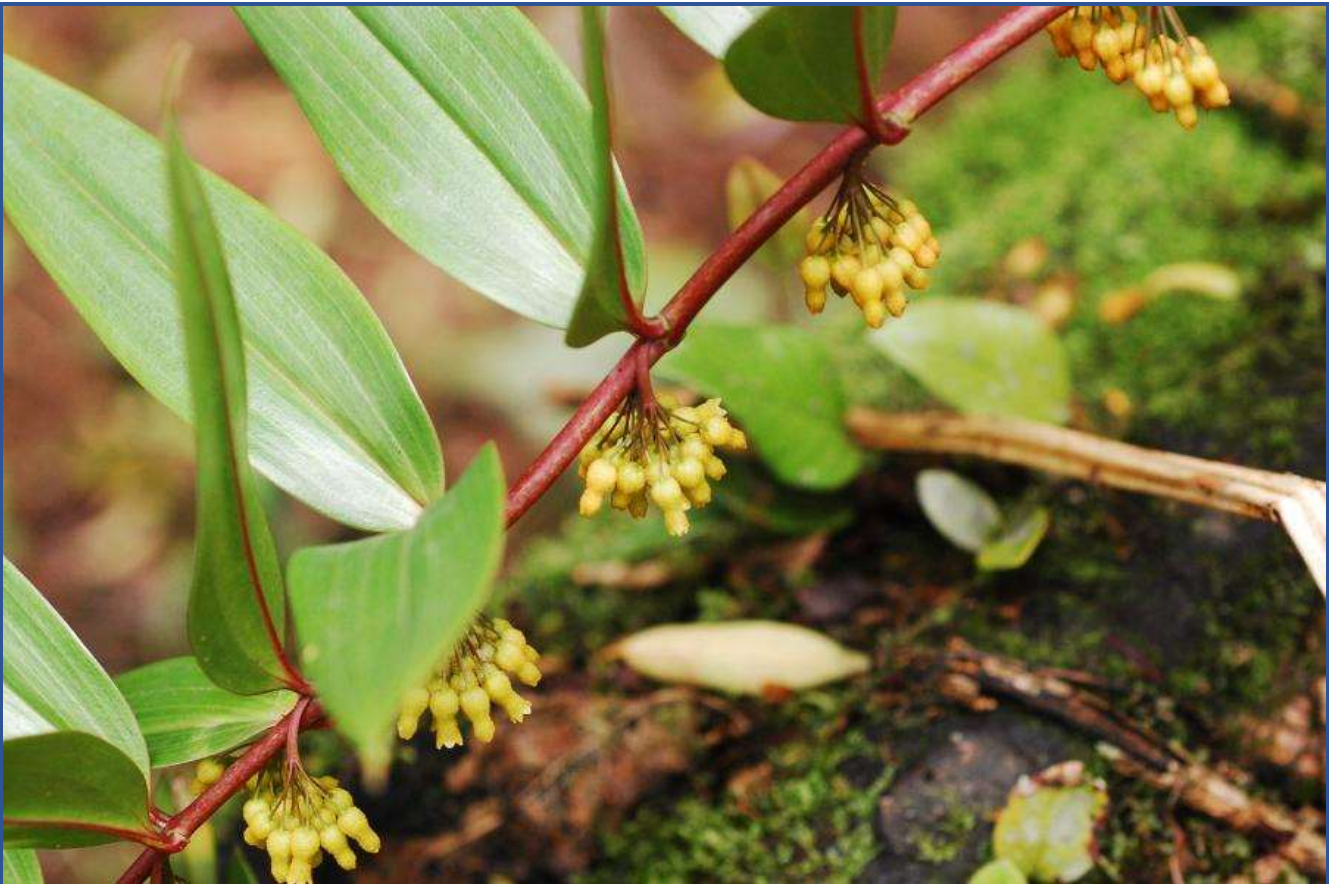
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Also newly described in 2015: two images of *P. angelicum* with its white verrucose perigone, also taken in Arunachal Pradesh (AP) a few days later..



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And this is *P. luteoverrucosum* with its yellow perigone....



*Polygonatum autumnale* is known from a single site in AP, and the other two are known along the eastern side of the Tsiang (Tsangpo) in AP and into Tibet. These latter two were a serendipitous discovery when our original itinerary was cancelled due to the landslides which had closed the road north to our original destination. I had previously only seen bad specimens from Tibet in fruit of what I described as *P. luteoverrucosum*. In habitat they are separated by elevation with *angelicum* growing nearly 600 metres higher in elevation than *luteoverrucosum*. Also seen on these treks were at least three other species.

Ed,: These species are published by Aaron Floden [Three new Solomon's Seals \(Polygonatum: Asparagaceae\) from the Eastern Himalaya Article in Phytotaxa 236\(3\):273 December 2015.](#)

Abstract:

Three new *Polygonatum* (Asparagaceae) are described and illustrated from the Eastern Himalaya. These species, *Polygonatum autumnale*, *P. angelicum*, and *P. luteoverrucosum*, have opposite leaves and are evergreen. The foremost is the first autumn-flowering species in the genus and is known from a single locality in Arunachal Pradesh, India. *Polygonatum angelicum* and *P. luteoverrucosum* are the first species in the genus to be reported with distinctly verrucose perigone surfaces. These two are

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sympatric in Arunachal Pradesh, India, and Xizang, China, but occur at different elevations. Their relationships to other opposite-leaved species are discussed and a key is provided to these and related species.

Ed.: Another of Aaron's latest papers:

[A new Solomon's Seal \(\*Polygonatum\*: \*Asparagaceae\*\) from northern Thailand](#)

[\*Polygonatum costatum\* Floden sp. nov Article in Phytotaxa 236\(3\):279 · December 2015](#)

In the autumn of 2015, I saw the true *Polygonatum nodosum* in Chongqing Province, China.... Nearly all other plants in cultivation with purple leaves or silvery centres are something related to *P. cyrtonema*.



This is a very small plant with up to about 7 leaves and long nodose rhizomes that were crawling along the surfaces of moss-covered rocks and logs.

**Germination times:** I am often asked details about germination. It depends on the species is the best answer! The alternate temperate species of sect. *Polygonatum* require a minimum of 30 days cold, but need a warm period after that and then cold again, before producing a leaf. Species of sect. *Verticillata* vary with the alpine or high elevation verticillate-leaved species typically needing the above treatment, but some small percentage will germinate immediately and produce a leaf. Species in series *Punctata* and series *Oppositifolia* mostly are immediate epigeal, but *cathcartii* has a double dormancy. Series *Grandiflora* (*huanum*, *kingianum*, et al.)

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are immediate hypogeal with some immediate epigeal. The only species in sect. *Sibirica*, *P. sibiricum*, is double dormant.

The related *Disporopsis* is an immediate epigeal and *Heteropolygonatum* seems to behave as double dormant for the few seeds I've been fortunate to be able to try.

## Other authors' [papers on Asparagaceae](#)....

Aaron writes: It should also be noted that [Polygonatum gongshanense](#) was published from Yunnan in 2014 and is a segregate of *P. cathcartii* (though I believe it is more closely related to *P. autumnale*). And [Polygonatum campanulatum](#) was recently published from Yunnan; This is an evergreen species with bell shaped yellow flowers and grows as an epiphyte in the Gaoligongshan. I agree with the authors that both are novel species and the second one they chose the same name I had in a draft manuscript.

**Testing and using complete plastomes for authentication of medicinal *Polygonatum* species (Asparagaceae)** [Elsevier Vol. 197, July 2023](#).

## Papers from Aaron Floden (or including him as an author) on Asparagaceae...

**Reinstatement of *Polygonatum yunnanense* (Asparagaceae).**

Phytotaxa 58(1) July 2012 DOI: [10.11646/phytotaxa.58.1.3](https://doi.org/10.11646/phytotaxa.58.1.3)

**A New Combination in *Polygonatum* (Asparagaceae) and the Reinstatement of *P. mengtzensense*.**

Annales Botanici Fennici 51(1-2):106-116 April 2014

DOI: [10.5735/085.051.0115](https://doi.org/10.5735/085.051.0115)

**New names in *Heteropolygonatum* (Asparagaceae).**

Phytotaxa 188(4):218-226 December 2014 DOI: [10.11646/phytotaxa.188.4.4](https://doi.org/10.11646/phytotaxa.188.4.4)

**A new *Polygonatum* (Asparagaceae) endemic to the Truong Son of southern Vietnam.**

Phytotaxa 197(2):125-131 February 2015 DOI: [10.11646/phytotaxa.197.2.5](https://doi.org/10.11646/phytotaxa.197.2.5)

**Lectotypification of *Polygonatum franchetii* and *P. tsinlingense* (Asparagaceae).**

Phytotaxa 218(3):299-300 July 2015 DOI: [10.11646/phytotaxa.218.3.9](https://doi.org/10.11646/phytotaxa.218.3.9)

**A new *Disporopsis* (Asparagaceae) transferred from *Polygonatum*.**

Phytotaxa 222(2):159-161 August 2015 DOI: [10.11646/phytotaxa.222.2.10](https://doi.org/10.11646/phytotaxa.222.2.10)

***Heteropolygonatum hainanense* (Asparagaceae), a new species endemic to Hainan (China).**

Phytotaxa 369(1):59 September 2018 DOI: [10.11646/phytotaxa.369.1.8](https://doi.org/10.11646/phytotaxa.369.1.8)

**Using phylogenomics to reconstruct phylogenetic relationships within tribe Polygonateae (Asparagaceae), with a special focus on *Polygonatum*.** Molecular Phylogenetics and Evolution 129 September 2018 DOI: [10.1016/j.ympev.2018.08.017](https://doi.org/10.1016/j.ympev.2018.08.017)

***Polygonatum undulatifolium* (Asparagaceae), a new species from the eastern Himalaya.**

Phytotaxa, November 2018. DOI: [10.11646/phytotaxa.374.3.10](https://doi.org/10.11646/phytotaxa.374.3.10)

**Nomenclatural Novelties in *Polygonatum* (Asparagaceae) and Notes on Some Recent Species Distributions.** Annales Botanici Fennici 56(1-3):5 February 2019. DOI: [10.5735/085.056.0102](https://doi.org/10.5735/085.056.0102)