Cuban novelties in the genus Alsophila (Cyatheaceae)

Authors: Caluff, Manuel G., and Serrano, Gustavo Shelton

Source: Willdenowia, 32(2) : 303-309

Published By: Botanic Garden and Botanical Museum Berlin (BGBM)

URL: https://doi.org/10.3372/wi.32.32211

Novitiae florae cubensis No. 6

MANUEL G. CALUFF & GUSTAVO SHELTON SERRANO

Cuban novelties in the genus *Alsophila (Cyatheaceae)*

Abstract

Caluff, M. G. & Serrano, G. S.: Cuban novelties in the genus *Alsophila (Cyatheaceae)*. – Willdenowia 32: 303-309. 2002. – ISSN 0511-9618.

Three new interspecific hybrids of *Alsophila* have been detected in Cuba: *A.* ×*boytelii* in the Sierra Maestra range, E Cuba; *A.* ×*medinae* in the Trinidad Mountains, Central Cuba; and *A.* ×*fagildei* in the Guantánamo province, E Cuba. They have spores of normal appearance and might therefore well be fertile, as suggested by the presence, in the Gran Piedra area, of a large population of *A.* ×*boytelii;* a full range of intermediates linking this hybrid with its parent species suggests the occurrence of backcrossing.

Introduction

Hybridisation is common in the tree fern family and has been reported many times (e.g. by Conant 1975, Knobloch 1975, 1976, 1986, 1995, Knobloch & al. 1984). Crossing between species often takes place in disturbed ecosystems but occurs in virgin forests, too (Conant 1975).

In order to prepare the *Cyatheaceae* account for the "Flora de la República de Cuba", three new interspecific hybrids of *Alsophila* R. Br., recently detected, have to be described. Remarkably, all have spores of normal appearance and might therefore well be fertile. Their main morphological features, as compared with those of their presumed parent species, are summarised in Table 1, which also provides the Latin diagnoses needed to validate the names of the new taxa.

Alsophila ×***fagildei*** Caluff & Shelton, **nothosp. nova –** Holotype: *Caluff & Fagilde 2090 A-D* (BSC). **–** Table 1.
[*Alsophila minor* (D. C. Eaton) R. M. Tryon × *A. woodwardioides* (Kaulf.) Conant].

Trunk erect, 0.3-1 m tall and 3-7 cm in diameter, stoloniferous at the base and occasionally producing adventitious buds, covered with persistent petiole bases and spines. *Leaves* 8-10, bipinnate-pinnatifid to bipinnate-pinnatisect; *petiole* 5-10(-40) cm long and 13-15 mm wide at the base, subcylindrical, brown to blackish purple, with 2-3 mm long spines, dull to shiny, scurfy to

Table 1. Synopsis diagnostica nothospecierum novarum generis *Alsophilae* earumque progenitorum.

	A. minor	*A. ×fagildei*	*A. woodwardioides*	*A. ×boytelii*	*A. balanocarpa*	*A. ×medinae*	*A. cubensis*
Dimensiones trunci [m]	≤ 1.2 × 0.035	≤ 1 × 0.07	≤ 8 × 0.18	≤ 4 × 0.15	≤ 7 × 0.2	≤ 2 × 0.15	≤ 9 × 0.18
Longitudo petioli [cm]	0-5	5-10(-40)	(5-)15-30(-50)	5-46	0-20(-50)	60-70	20-130
Spinae petioli [mm]	0	2-3	≤ 15	≤ 11	≤ 8	≤ 8	≤ 12
Vernatio	geniculata	geniculata	normalis				
Squamulae acaroides abaxiales			rarae	rarae	copiosae	rarae	rarissimae
Costa cum rhachide			atrobrunnea vel atropurpurea	brunnea vel atropurpurea	pallide brunnea vel fulva		
Pneumathophora			adsunt	adsunt	desunt		
Ambitus laminae			ovato-lanceolatus	lanceolatus vel ovato-lanceolatus	lanceolatus	lanceolatus vel ovato-lanceolatus	ovato-lanceolatus
Reductio apicalis laminae			abrupta	gradualis vel abrupta	gradualis	abrupta	valde abrupta
Dimensiones laminae [m]	≤ 1.37 × 0.44	≤ 1.35 × 0.66	≤ 2.8 × 1.32	≤ 3.05 × 1	≤ 2.8 × 0.8	≤ 2.5 × 0.85	≤ 2.6 × 1.4
Numerus pinnarum [paria]	35-65	36-45	17-20	24-37	40-55	22-24	14-20
Dimensiones pinnae [cm]	7-22 × 1-3	23-33 × 4.5-9	38-68 × 9-18	37-50 × 8-12	23-40 × 4-7	31-32 × 5-9	45-73 × 14-24
Numerus pinnularum [paria]	23-43	30-41	23-32	37-50	40-53	30-42	22-30
Dimensiones pinnulae [mm]	5-15 × 2-4	23-45 × 3-12	65-100 × 13-22	40-60 × 7-10	20-35 × 3-8	30-50 × 6-9	70-120 × 18-28
Nervi laterales [paria pro segmento]			8-9	4-9	2-4	5-7	≤ 12
Sori [paria pro segmento]			1-3(-6)	1-2(-4)	1-2		
Pili inter nervos abaxiales	adsunt	interdum adsunt	desunt	glandulares	glandulares	glandulares, rari	desunt
Indumentum indusii	pilosum	pilosum	deest	glandulosum	glandulosum	deest	deest

smooth, beset towards the base and in the adaxial furrow with linear, brown scales of 7-15 × 0.5-1 mm with paler and erose margin, sometimes also with some small curled hairs; *blade* with geniculate, "drop-type" vernation, 1.52-1.95 × 0.46-0.66 m, obovate-lanceolate, chartaceous to coriaceus, sometimes abruptly reduced below the apex, acuminate, truncate at the base when long-petiolate, or gradually narrowed into a base consisting of skeletal pinnae; *rachis* resembling the petiole in colour and indumentum, the adaxial furrow with linear to lanceolate, bicoloured scales, distally pubescent with rusty, translucid, flexuous hairs; *pinnae* alternate, perpendicular to the rachis or slightly oblique, in 35-45 pairs, oblong-lanceolate to ovate-lanceolate, short-acuminate, the basal ones 2-8 × 1.5-2.5 cm, occasionally with a 3-5 mm long petiolule, the middle ones sessile, 23-33 × 4-9 cm; *costae* brown to blackish purple, with one axillary, prominent and dark pneumathophore, scurfy, with crested, "acaroid" squamules and flat linear-lanceolate, bicoloured, dark centred scales up to 1 × 0.2 mm, medially pubescent with 0.5-0.8 mm long curled hairs and filamentous, whitish scales with one to several dark setae, distally beset with rigid but subflexuous, 0.8-1 mm long whitish hairs; *pinnules* in 30-41 pairs, 2.3-4.5 × 0.35-1.2 cm, varying from linear-spathulate, subentire to crenulate and obtuse to lanceolate-lobulate, short-acuminate and acute, the proximal with up to 1 mm long petiolule, the others sessile; *costules* with or without axillary pneumathophores, basally with flattened, bicoloured scales, medially with flattened and bulliform, whitish squamules, one to several dark setae and distally predominant, rigid, pluricellular uniseriate hairs, but glabrous adaxially; *segments* in 5-12 pairs, 2-5 × 1.5-3 mm, variably oblong, sometimes all reduced to mere lobes or crenations but generally the basal pair larger, overlapping the costae, the following several pairs reduced and rounded, the next several pairs gradually enlarged, then again decreasing and eventually confluent in the acuminate pinnula apex, all rounded to subacute and with a usually revolute, entire to crenulate margin; *segment midvein* with bulliform, whitish scales, proximally sometimes with "acaroid squamules", distally with rigid hairs, but glabrous adaxially; *lateral veins* in 2-6 pairs per segment, once or twice forked, glabrous or with rigid hairs and antrorse, fulvous to whitish glandular hairs, always glabrous adaxially; *surface* olivaceous to pale brown and glabrous above, brown to dark, with trichomidia and sometimes with rigid hairs brown underneath. *Sori* 1-2(-3) per segment, of unequal size in the same pinnule, those of proximal segments oval, 1.7 × 1.4 mm, those of distal ones solitary, 0.8-1 mm in diameter; *receptacles* either single, very wide, or a tightly united unequal pair, respectively 1.3-1.5 mm and 0.8-1.2 mm long; *indusium* cyathiform to urceolate, light brown, ± translucent, persistent, pubescent; *receptacles* usually included in the indusium; *spores* showing no signs of abortion.

Eponymy. – This new hybrid is dedicated to José Fagilde Celeiro, outstanding Cuban amateur botanist and excellent companion on many collecting trips and in various projects.

Specimens seen (all in BSC). – Guantánamo province: Headwaters of Río Toa, reserve of Cupeyal del Norte, 500 m, two plants on the riverside, exposed, in montane rainforest, 27.8.1986, *Caluff & Fagilde 2090 A-D.;* ibid., 600 m, one plant by the river, in shade, trunk 0.25 m tall, 27.8.1986, *Caluff & Fagilde 2091 A-D;* ibid., 500 m, two plants on the riverside, gallery forest, trunks 25-50 cm tall, with spines and stolons, 27.8.1986, *Caluff & Fagilde 2093 A-D;* ibid., 450 m, gallery forest, among the parent species, very rare, 27.8.1986, *Caluff & Fagilde 2130 A-C;* Arroyo Frío, Quibiján, Baracoa, 200 m, single plant in a *Carapa guianensis* wood, on ferralitic soil, trunk 1 m tall, 31.3.1988, *Caluff & Reyes 2681 A-D;* gully near the hamlet of Viento Frío, Sierra del Purial, 550 m, submontane rainforest, a sterile plant, trunk upright, 30 cm tall, 20.4.1992, *Caluff & Shelton 3084 A-E*. – In the fern garden of Santiago de Cuba lives an individual of *A.* ×*fagildei* collected at the type locality in 1988.

Distribution and habitat. – Endemic to Sierra de Moa and Sierra del Purial in the Guantánamo province, NE Cuba. In submontane rainforest near water courses and in gallery forest, on ferralitic and metamorphic soil, in the undergrowth or partially exposed, at 200-550 m of altitude.

Note. – *Cyathea* ×*irregularis* Brause, described from Hispaniola, was ascribed the same parentage, *Alsophila minor* × *A. woodwardioides,* by Conant (1975, 1983). Its true parentage, however, is *A. woodwardioides* var. *hieronymi* (Brause) Gastony × *A. major* Caluff & Shelton (2002). The latter, just described, has long been confused with *A. minor,* which in reality is an endemic of NE Cuba.

Alsophila* ×*boytelii Caluff & Shelton, **nothosp. nova –** Holotype: *Caluff & Couso 589 A-D* (BSC). **–** Table 1.
[*Alsophila balanocarpa* (D. C. Eaton) R. M. Tryon × *A. woodwardioides* (Kaulf.) Conant].

Trunk erect, up to 4 m high and 15 cm in diameter, occasionally stoloniferous at the base and producing aerial buds and branches, covered with persistent petiole bases and spines. *Leaves* 8-12, bipinnate-pinnatifid to bipinnate-pinnatisect; *petiole* 5-46 cm long and up to 1.5 cm wide at the base, brown to blackish purple, with up to 11 mm long spines, scurfy, beset towards the base and in the adaxial furrow with rigidly crested "acaroid" squamules and with linear, brown to blackish scales up to 20 × 1 mm tipped by a dark seta and with somewhat paler and slightly erose margin; *blade* 2.2-3.05 × 0.74-1 m, ovate-lanceolate, chartaceous to coriaceous, gradually or somewhat abruptly reduced toward the apex, gradually narrowed toward the truncate base; *rachis* brown to blackish purple, somewhat shiny, subglabrous, adaxially scurfy and with scales similar to those of the petiole and, in addition, with lanceolate, brown to blackish purple, pale-margined scales tipped by a dark seta; *pinnae* alternate, slightly oblique, in 24-37 pairs, oblong, narrowed to triangular-protracted, the proximal ones 8-18 × 1.4-3 cm, spaced by up to 30 cm, borne on a 1-2 cm long petiolule, deflected in a plane perpendicular to the lamina, the middle ones 37-50 × 8-12 cm, sessile, spaced by 5-12 cm; *costae* similar to rachis in colour and indumentum but with axillary, prominent pneumathophores; *pinnules* alternate, sessile, in 37-50 pairs, 4-6 × 0.7-1 cm, oblong-lanceolate to triangular-protracted, short-acuminate to obtuse, entire or crenulate; *costules* often with axillary pneumathophores, with dark, lanceolate and brown, nearly bulliform scales, "acaroid" and light brown bulliform squamules as well as with rigid but subflexuous, 0.3-0.4 mm long whitish hairs that are distally more abundant, but glabrous adaxially; *segments* in 15-19 pairs, 3-6 × 2-3 mm, oblong to deltate, slightly oblique, obtuse to rounded, the base slightly widened, the margins entire, revolute, basal segments somewhat larger, overlapping the costa, occasionally shortly petiolulate, the following separate to within 1 mm or less from the costa; *segment midvein* with ± bulliform, light brown to whitish scales and one to several dark setae, proximally with occasional "acaroid" squamules, distally with scattered hairs similar to those of the costules and with antrorse, tawny to whitish glandular hairs, but glabrous adaxially; *lateral veins* in 4-9 pairs per segment, simple or once forked, with abundant antrorse glandular hairs and occasional rigid hairs, but glabrous adaxially; *surface* with antrorse glandular hairs below, glabrous above. *Sori* in 1-2(-4) pairs in the proximal third of each segment, close to the midvein; *indusium* deeply cyathiform, 0.8-1 mm in diameter, light brown, entire, persistent, with tiny glandular hairs on the margin and outer surface; *receptacle* large, exserted from the indusium; *spores* showing no signs of abortion.

Eponymy. **–** This new hybrid is dedicated to the memory of Fernando Boytel Jambú, outstanding Cuban investigator, who devoted many years of his life to the study and preservation of the botanical and historical values of the Gran Piedra.

Specimens seen (all but the last in BSC). – Santiago de Cuba province: Gullies below the Jardín La Gran Piedra, 900-1000 m, 19.10.1984, *Caluff & Medina 702;* summit of La Gran Piedra, 1150 m, 27.8.1984, *Caluff & Medina 706;* slope below the flying road from the coffee shop to the huts, Gran Piedra, 1000 m, 28.12.1984, *Caluff & Medina 707 A-B;* path within the Reserva Gran Piedra, 950 m, plant with numerous aborted croziers along the trunk and some malformed leaves with spiralled tips, perhaps a backcross with *Alsophila woodwardioides,* 28.12.1984, *Caluff & Medina 708 A-B;* Reserva Gran Piedra, cloud forest behind La Isabelica,

1000 m, 18.11.1983, *Caluff & Couso 589 A-D;* Reserve of La Gran Piedra, waysides, 900-1000 m, 28.12.1984, *Caluff & Medina 709;* summit of the Loma San Juan, 1050 m, Sierra del Cobre, 11.7.-14.8.1921, *León & al. 10533* (HAC).

Distribution and habitat. – Endemic to the Sierra Maestra, SE Cuba; common in the Gran Piedra range and unfrequent in the Loma del Gato, Sierra del Cobre, the only localities from where it is known. In montane rainforest and cloud forest, in the undergrowth, at 900-1150 m of altitude.

Note. – Conant (1975, 1983) already interpreted this plant as resulting from the cross between *Alsophila balanocarpa* and *A. woodwardioides*. Normally, *A.* ×*boytelii* has well formed spores. The paternity of *A. woodwardioides* was confirmed by Caluff (1985) following comparative field studies in the Gran Piedra range, where this hybrid, forming a large population, coexists with both its parents and may even be backcrossing with them, since a full range of intermediates exists between the hybrid and either parent.

Alsophila* ×*medinae Caluff & Shelton, **nothosp. nova –** Holotype: *Caluff 1282 A-D* (BSC); isotypes: HAC, HAJ). – Table 1.
[*Alsophila balanocarpa* (D. C. Eaton) R. M. Tryon × *A. cubensis* (Undew. & Maxon) Caluff & Shelton].

Trunk erect, up to 2 m tall and 15 cm in diameter, retaining or shedding the petiole bases, spiny. *Leaves* up to 10, bipinnate-pinnatifid to bipinnate-pinnatisect; *petiole* 60-70 cm long and up to 1.5 cm wide at the base, straw-coloured to brown, with up to 8 mm long spines, scurfy with crested squamules, "acaroid" squamules and linear, brown scales, up to 12 × 1 mm with but slightly lighter margin and tipped by a dark seta; *blade* 2.2-2.5 × 0.62-0.85 m, ovate-lanceolate, herbaceous to papery, abruptly reduced below the apex, gradually narrowed towards the base and eventually truncate; *rachis* straw-coloured to brown, somewhat shiny, abaxially subglabrous, adaxially scurfy, with crested squamules, lanceolate bicoloured scales and linear, brown, pale-margined scales tipped by a dark seta dispersed throughout the adaxial furrow; *pinnae* alternate, perpendicular to the rachis or oblique, in 22-24 pairs, oblong to oblong-lanceolate, abruptly narrowed and acuminate, spaced by 5-7 cm, the proximal ones up to 12-21 × 3-5 cm, borne on a 4-15 mm long petiolule, the middle ones 31-42 × 5-9 cm, sessile; *costae* without or with inconspicuous axillary pneumathophores, their colour and indumentum similar to those of the rachis but distally scurfy and with uniseriate pluricellular, rigid, 0.8-1 mm long hairs; *pinnules* in 30-42 pairs, 3-5 × 0.6-0.9 cm, oblong-lanceolate, bluntly acuminate, the margin entire to crenulate; *costules* without axillary pneumathophores, their indumentum composed of crested squamules, "acaroid" squamules, flat lanceolate scales and, distally, rigid but subflexuous whitish, up to 0.3-0.5 mm long hairs; *segments* in 13-18 pairs, 3-5 × 1.5-2.5 mm, oblong to deltoid, obtuse to rounded, the base slightly widened and oblique, the margin entire to crenulate, flattened or slightly revolute, separate to within 1 mm from the costa, the basal segments somewhat larger and somewhat overlapping the costa; *segment midvein* with whitish bulliform scales, and flattened ones with one to several dark setae, furthermore with rigid hairs similar to those of the costules and with antrorse, tawny to whitish, scattered glandular hairs, but glabrous adaxially; *lateral veins* in 5-7 pairs per segment, simple or once forked, with antrorse glandular hairs, but glabrous adaxially; *surface* olivaceous and with some antrorse glandular hairs underneath, dark brown to blackish and glabrous above. *Sori* in 3-6 pairs spaced over the whole segment; *indusium* deeply cyathiform, 0.6-1 mm in diameter, light brown, somewhat translucent, entire, persistent, with occasional glandular hairs on the margin and outer surface; *receptacle* large, exserted from the indusium; *spores* showing no signs of abortion.

Eponymy. – This new hybrid is dedicated to the memory of Eduardo Medina Castillo, who in spite of his advanced age was the senior author's untiring and enthusiastic companion on several years' collecting campaigns.

Specimens seen (all in BSC). – SANCTI SPIRITUS PROVINCE: Arroyo Jesús Delgado, Cudina, Topes de Collantes, Alturas de Trinidad, trunk up to 2 m tall, several plants, gallery forest, 500-600 m, 24.4.1985, *Caluff 1282 A-D;* arroyo Titi el Mocho, Cooperativa de Producción Agropecuaria Amistad Cuba-Rumanía, La Chispa, Topes de Collantes, Alturas de Trinidad, several scattered, sterile plants, trunk up to 1.5 m tall, exposed, 27.3.1985, *Caluff 1209 A-C.* — CIENFUEGOS PROVINCE: El Palomar, Cumanayagua, Alturas de Trinidad, 600 m, montane rainforest, several plants in woodland along the road, 28.4.1985, *Caluff 1391 A-B;* El Palomar, Cumanayagua, Alturas de Trinidad, 600 m, montane rainforest, 4 plants on a cliff by the river, 14.1.1986, *Caluff 1871*.

Distribution and habitat. – Endemic to Alturas de Trinidad, Central Cuba, in the environs of Topes de Collantes; to be looked for around the Pico San Juan in Cienfuegos province and in the Sierra Maestra of SE Cuba, where both parents also coexist. Montane rainforests and natural or degraded gallery forest, in the undergrowth and exposed, at 500-600 m of altitude.

Note. – Alsophila ×*medinae* is morphologically intermediate between the only *Alsophila* species growing on the Alturas de Trinidad, *A. balanocarpa* and *A. cubensis,* which we accept to be its parent species.

Discussion and conclusion

The three newly described hybrids can, with a little practice, be distinguished in the field quite easily by the outline of the blade and number of pinnae. In Cuba, the genus *Alsophila* is represented by two very clear-cut species groups. The first consists of *A. balanocarpa, A. brooksii* (Maxon) R. M. Tryon, *A. minor* and *A. major,* with ovate-lanceolate to obovate-lanceolate leaf blades gradually narrowed toward the base and apex, and with 35-65(-100) pairs of pinnae. The second group comprises *A. cubensis* and *A. woodwardioides,* with more or less ovate leaf blades truncate at the base and abruptly reduced below the apex, and with but 14-20 pairs of pinnae. The three new hybrids all combine parents of the two different groups, and their intermediate characters in the dimensions of blades and pinnae, the outline of the blade and the number of pinnae is readily apparent.

Acknowledgement

Thanks are due to Dr W. Greuter for his revision of the manuscript and the Latin diagnoses.

References

Caluff, M. G. 1985: Los helechos arborescentes de La Gran Piedra. **–** Memorias. Primer Simposio Cubano de Botánica **1:** 1-12. –La Habana.

— & Shelton Serrano, G. 2002 (in press): *Alsophila minor* (D. C. Eaton) R. M. Tryon *(Cyatheaceae),* dos especies bajo el mismo nombre. – Moscosoa **13.**

Conant, D. S. 1975: Hybrids in American *Cyatheaceae*. – Rhodora **77:** 441-455.

— 1983. A revision of the genus *Alsophila (Cyatheaceae)* in the Americas. – J. Arnold Arbor. **64:** 333-382.

Knobloch, I. W. 1975: A review of pteridophyte hybrids with special reference to their morphology. **–** Phytomorphology **25:** 249-252.

— 1976: Pteridophyte hybrids. – Publ. Mus. Michigan State Univ., Biol. Ser. **5:** 277-352.

— 1986: On hybrid pteridophytes: second supplement. – I.A.P. News **1:** 3.

— 1995: Pteridophyte hybrids and their derivatives. – East Lansing.

— , Gibby, M. & Fraser-Jenkins, C. 1984: Recent advances in our knowledge of pteridophyte hybrids. – Taxon **33:** 256-270.

Address of the authors:
Manuel G. Caluff, Gustavo Shelton Serrano, Jardín de los Helechos de Santiago de Cuba, Carretera del Caney No. 129, "La Caridad," Caney, C.P. 90400, Santiago de Cuba; e-mail: manolito@bioeco.ciges.inf.cu