

A *Goniophlebium* (*Polypodium*) Hybrid

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Horticulture has developed another hybrid fern. The parents of this hybrid are *Goniophlebium formosanum* (Baker) Rödl-Linder (*Polypodium fimosanum* Baker) of southern China and Japan and *Goniophlebium subauriculatum* (Blume) Presl (*Polypodium subauriculatum* Blume, *Schlellolepsis subauriculatum* (Blume) J. Smith) of tropical Asia. Mr. John Ekstrand of Vista, California, a nurseryman, sowed spores of the parents together about 1975. He reported that of the two hybrid plants obtained in this sowing only one survived. This surviving sterile hybrid has been circulating among local growers and exhibited in fern shows as Ekstrand's hybrid. A formal name honoring Mr. Ekstrand is given as follows:

23952 *Goniophlebium* × *ekstrandii* Hoshizaki, nothosp. nov. — TYPE: California, Vista, from a plant grown by John Ekstrand, November 26, 1982, Hoshizaki 82-7 (LA). Figs. 1b, 2b.

Hybrida inter *Goniophlebium formosanum* (Baker) Rödl-Linder et *G. subauriculatum* (Blume) Presl. Frondes basilater pinnatae, medialiter pinnatisectae, distaliter pinnatifidae; pinnis basalibus truncatis usque cordatis, sessilibus vel leviter adnatis; pinnis medialibus plerumque adnatis; marginibus integris vel paululum serratis-crenatis.

To the casual observer the glaucous, wide-creeping, loosely attached rhizomes, and touches of purple-black on the rachis and stipe of the hybrid relates it to *G. formosanum*, while its greener, longer fronds and general pinna shape relates it to *G. subauriculatum*. The hybrid is further distinguished from its parents by being pinnate basally, pinnatisect medially, and pinnatifid distally; most of the medial pinnae are truncate and adnate. Pinna and lobe margins are entire to shallowly serrate-crenate and usually bear a sparse fringe of hairs. *Goniophlebium formosanum* has pinnatifid fronds with entire lobes that are quite hairy along their margins. *Goniophlebium subauriculatum* has pinnate fronds with sessile, articulate pinnae, the margins are coarsely serrate-dentate and at maturity lack hairs (some wild plants are reported to have persistent hairs). See Table 1 and Figures 1 and 2 for a summary of the salient differences between the hybrid and its parents.

The International Code of Nomenclature for Cultivated Plants—1980 (Article 19a) recommends that any interspecific hybrid introduced into cultivation be given a cultivar name even if no other cultivar of the hybrid is known. Mr. Ekstrand wished to honor his mother-in-law by the cultivar name.

Goniophlebium × *ekstrandii* cv. **Nola**, Hoshizaki, cv. nov.: description, illustration, and preserved specimen as given above under the name *G. ×ekstrandii*.

Though a robust grower the hybrid is not as cold hardy as *G. formosanum*, and

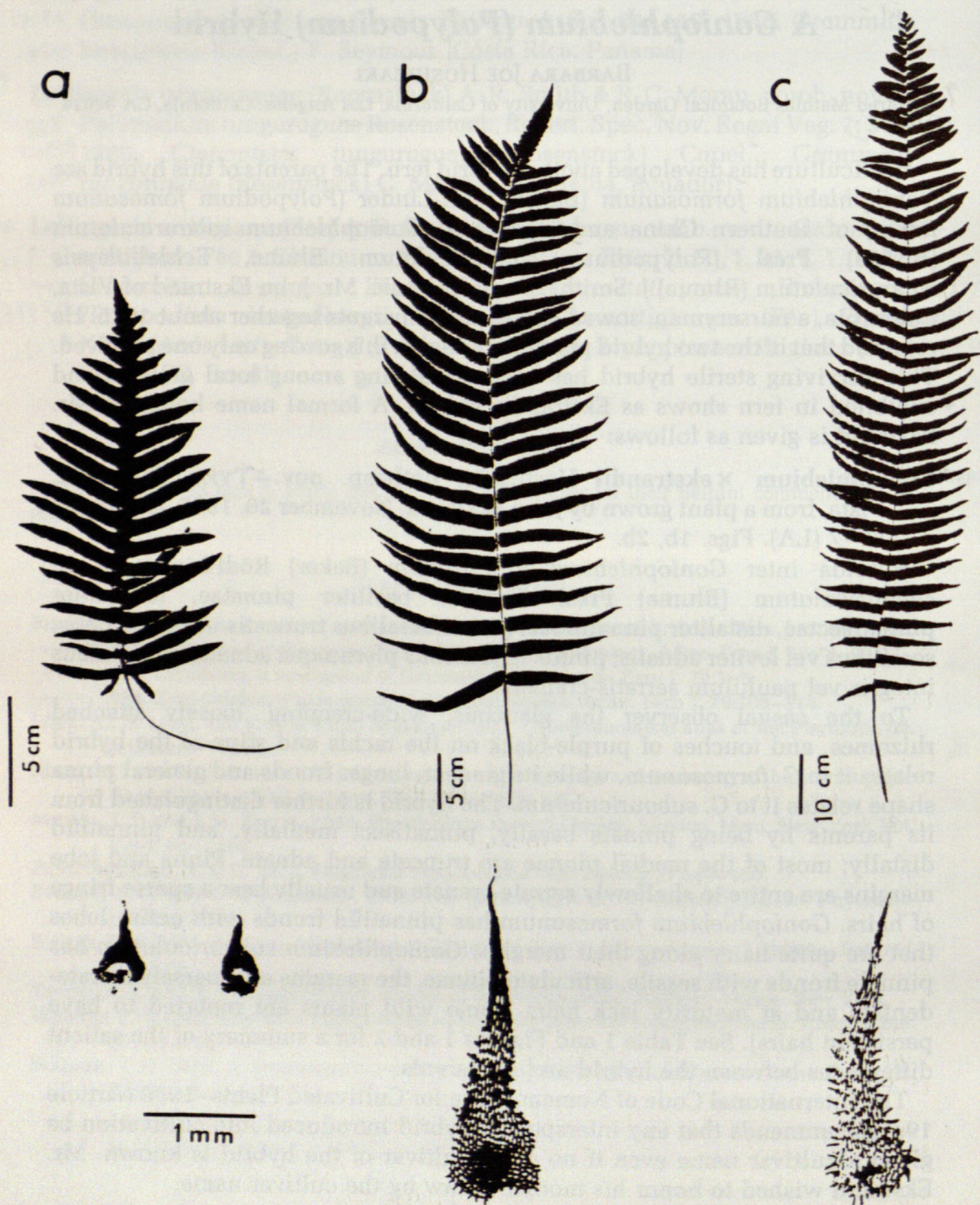


FIG. 1. Fronds and rhizome scales of parents and hybrid: a, *G. formosanum*. b, *G. x ekstrandii*. c, *G. subauriculatum*.

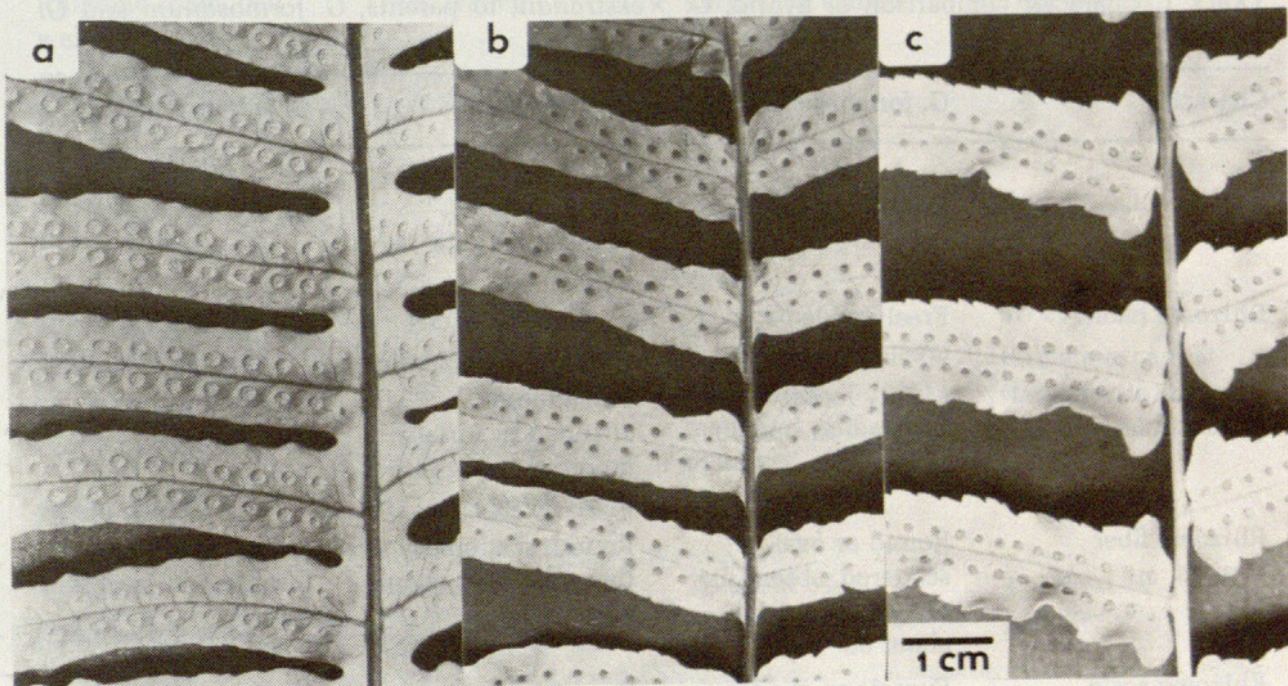


FIG. 2. Fronds, medial part, of parents and hybrid: a, *G. formosanum*. b, *G. x ekstrandii*. c, *G. subauriculatum*.

is best protected from temperatures consistently below 15°C. In southern California, the flush of new growth starts in summer as it does in *G. formosanum*, while in *G. subauriculatum* new growth starts in spring.

A prized *Goniophlebium* in cultivation is *G. subauriculatum* cv. *Knightiae* (*Polypodium knightiae* Baker). Though Rödl-Linder (1990, p. 412) placed it under doubtful species, it is a much laciniate form of *G. subauriculatum* originating in Australia. In morphology and anatomy the rhizome, rhizome scales, stipe features, and laminar induments are identical to *G. subauriculatum*. Unlike its progenitor the laciniate pinnae are often hastate and the venation is greatly distorted with the second series of areoles incomplete, irregular, and interrupted by many long free veins leading into the larger lacinations. Plants have never produced sori, at least in California. It is more cold-tolerant than the species.

Most *Goniophlebium* species were formerly placed under *Polypodium*. *Goniophlebium* has been redefined in a recent monograph by Rödl-Linder (1990) and is separated from *Polypodium* mainly by the circular vascular bundle pattern and scattered black fiber strands in the rhizome, the rhizome scales with clathrate marginal protrusions, the blade with goniophleboid venation, and the sori with hairy and scaly paraphysis. The 23 species are limited to Asia, Australia, and some Pacific Islands.

A few features reported by Rödl-Linder for the parents of the new hybrid were not found in the limited live material I examined. Roots of *G. formosanum* were found to branch amply once the aerial part entered the substrate (reported as unbranched by Rödl-Linder, 1990, p. 291, 407). The reported presence of a green

TABLE 1. Character comparison of hybrid, *G. ×ekstrandii*, to parents, *G. formosanum* and *G. subauriculatum*.

Character	<i>G. formosanum</i>	<i>G. ×ekstrandii</i>	<i>G. subauriculatum</i>
Aerial roots:	Conspicuous, to 20 mm long	Inconspicuous, scant, to 10 mm long	Essentially absent
Rhizome habit:	Freely wide-creeping	Moderately wide-creeping	Short-creeping
Rhizome attachment to substrate:	Mostly loosely attached to surface	Some loosely attached to surface, others growing into the substrate	Growing into the substrate
Rhizome fiber strands:	Round or oval, scattered, absent in outer cortex, to about 60	Round, scattered throughout, to about 90	Round, scattered throughout, to about 90
Rhizome scale distribution:	Fugacious, if a few persistent, rare and very distant	Semi-fugacious, mostly adjacent, rhizome visible between scales.	Fairly persistent, densely overlapping, concealing the rhizome
Rhizome scale color in reflected light:	Often pale at point of attachment, blackish	Not pale at point of attachment, blackish	Not pale at point of attachment, red-brown
Rhizome scale exposition:	Appressed	Spreading	Spreading
Rhizome scale attachment to rhizome surface:	In an invagination	Flat or on protrusion	On protrusion
Rhizome scale shape:	Lanceolate to ovate, but mostly deltate-ovate	Narrow-lanceolate to lanceolate-ovate	Lanceolate to ovate-triangular
Rhizome scale size:	Length 0.8–2.4 mm, width 0.5–0.8 mm	Length 2.4–3.2 mm, width 0.7–0.9 mm	Length 2.0–5.6 mm, width 0.4–1.1 mm
Rhizome scale base:	Mostly cordate to auriculate, auricles short, rounded, flat	Auriculate, auricles pointed and spreading or mostly rounded and overlapped, flat or weakly crisped	Auriculate, auricles mostly pointed, spreading and crisped
Rhizome scale, marginal clathrate protrusions:	Forming very short to short teeth or absent	Forming teeth	Forming slender teeth
Rhizome scale, marginal glands:	Many stout glands and gland-tipped hairs	A few glands or gland-tipped hairs	A few glands or gland-tipped hairs
Rhizome scale, surface hairs:	Absent	Absent	Some scales with a few rhizoid-like hairs

Rhizome scale, cell walls:	Thick walled	Very thick walled	Thin walled
Rhizome scale, cell lumen:	Yellow	Parchment	Hyaline
Stipe vascular bundles:	4	4-9	7-12
Blade shape:	Ovate to oblong-ovate	Ovate-lanceolate to oblong	Lanceolate to oblong
Blade length:	To 50 cm	To 85 cm	To 200 cm
Blade division:	Pinnatifid	Pinnate basally, pinnatisect medially, pinnatifid distally.	Pinnate except at apex
Blade color:	Glaucous-green to green	Green	Green
Pinna/lobe pairs:	To about 20	To about 34	To about 40
Connecting wing width:	1-5 mm	0.5-2 mm	Absent
Pinnae/lobe base:	Width uniform or wider to the winged rachis	Mostly narrow to broadly adnate, basal few cordate or truncate and sessile	Cuneate, cordate, truncate or auriculate, sessile or very short-staked
Pinnae/lobe articulation:	Not articulate	Basal pinnae sometimes articulate	Articulate
Pinnae margins:	Entire	Entire or very shallowly serrate-crenate	Coarsely serrate-dentate
Blade margin hairs:	Present	Usually present	Usually absent
Abaxial rachis scale clathration:	Thick-clathrate, marginal protrusions stout or absent	Thick-clathrate, marginal protrusions spiny	Thin-clathrate, marginal protrusions spiny, delicate
Venation, areole series	1	1, if 2 irregular and incomplete	1 or 2
Paraphysis hairs:	Branched, some branches gland-tipped	Mostly unbranched, some cells glandular	Absent
Paraphysis scales:	Absent	Scales \pm ovate, clathrate protrusions spiny, stalk basally attached	Scales roundish or longer, clathrate protrusions long-spiny, stalk peltate
Sporangia:	Normal	Normal or malformed	Normal
Spores:	Normal	Malformed	Normal

parenchyma sheath around the roots (Rödl-Linder, 1990, p. 291, 407) could refer to the thin glaucous layer sheathing the aerial roots, but it is not parenchymatous. The root cortex, though containing an ample layer of parenchyma cells, was not green. The rhizome scales of *G. formosanum* were reported to lack marginal clathrate protrusions (Rödl-Linder, 1990, p. 296, 406) but at least a third of the scales had these protrusions, a condition that is consistent with her genus delineation. I could not locate the paraphyses of 6-cell-long hairs in *G. subauriculatum* (Rödl-Linder, 1990, p. 402), though sporangia with small aborted cases or detached normal cases, and detached peltate scales left stalks looking very much like hairy paraphyses. Very young sori were observed to have infrequently a few stout 3–4 celled hairs that seem to represent developmental stages of the scaly paraphyses.

ACKNOWLEDGMENTS

I am indebted to W. H. Wagner, Jr. for his preliminary examination of the hybrid, Alan R. Smith for his help in preparing this manuscript, and Gerald Gastony for providing the Latin description.

LITERATURE CITED

RÖDL-LINDER, G. 1990. A monograph of the fern genus *Goniophlebium* (Polypodiaceae). *Blumea* 34:277–423.

Announcement

American Fern Society Meeting and Field Trip in Hawaii, 1992.—Tentative plans for the program will include field trips in Maui and scientific meetings in Honolulu during the period 6–12 August. The major field trips will be to Hanaula, West Maui, and to Waikamoi, East Maui, led locally by Robert Hobdy. Perhaps 100 or more species will be observed in habitats ranging from dry forest to extremely wet mountain rainforest. Following the field trips, the group will travel to Honolulu, for a couple of days of scientific sessions, including contributed papers and a symposium on the pteridophytes of islands, convened by Alan R. Smith. Local arrangements will be made by Daniel D. Palmer. Efforts are being made to keep down the expenses. For information, call or write W. H. Wagner, Biology, The University of Michigan, Ann Arbor, MI 48109, tel. 313-764-1484.



Hoshizaki, Barbara Joe. 1991. "A Goniophlebium (Polypodium) Hybrid." *American fern journal* 81, 89–94. <https://doi.org/10.2307/1547577>.

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