Volume 34 Number 4 & 5 Aug.-Dec. 2007

Fiddlehead forum

Bulletin of The American Fern Society

ISSN 0733-8015

Editors: Joan Nester-Hudson and David Schwartz

The Intriguing Antenna Fern

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A strange fern beckons from a table in the plant nursery. It draws attention because its leaves are of two entirely different shapes: sterile leaves lie close to the surface, covering the four-inch pot, while fertile leaves stand erect, looking like miniature television antennas with eight-inch masts — it is strongly dimorphic. But there is no label, and the nurseryman doesn't know its name. What is it and what accounts for its strong dimorphism?

The fern is traced to the wholesaler, who says that its trade name is *"Doryopteris cordata"*, and that its common name is *"Antenne varen"* (Dutch for Antenna Fern). Curiously, the botanical name is invalid! It has not been published in accordance with the International Code of Botanical Nomenclature, and so has no standing. Nevertheless, a search of the Web using that name yields many hits, some even describing the fern as "rare".

Antenna Fern -- habit

The fern was imported from a propagator in the Netherlands, who has no further information about either the name or provenance. Living specimens are sent to the University Herbarium at UC Berkeley and the Missouri Botanical Garden, to Alan Smith and George Yatskieyvch, respectively, in the hope of learning its identity. They soon identify the fern.

The Antenna Fern is *Doryopteris pilosa* var. *gemmifera*. [A. Smith, pers. comm.] (pilosa – covered with soft hairs; gemmifera – bearing gemmae) (A gemma (pl. gemmae) is essentially a bud that can develop asexually into a new plant when detached from the parent.)

Among its more prominent features, this fern has sterile leaves with short stipes and blades that in outline are roughly triangular, with rounded overlapping lobes and with both surfaces set with fine hairs. In contrast, the fertile leaves have long stipes and pentagonal blades, their dissection being 2-3 pinnate-pinnatifid and with fine hairs. Both the short and long stipes are brown with fine hairs. Sori are borne on the margin;

(continued on page 11)

Summer Fern Course in Maine

The Humboldt Field Research Institute, located near Stueben, Maine, will offer a fern course, Taxonomy and Biology of Ferns and Lycophytes, from 18-22 August 2008. The course will be taught by Robbin Moran, Curator of Ferns at the New York Botanical Garden. It will emphasize the identification, phylogeny, and ecology of local ferns and lycophytes. Lectures will be in the morning and field trips in the afternoon. For more information, visit the following web site: http://www.eaglehill.us You can also contact the Station Director, Joerg-Henner Lotze, Humboldt Field Research Institute, PO Box 9, 59 Eagle Hill Road, Steuben, ME 04680-0009 USA Phone: 207-546-2821, FAX: 207-546-3042; office@eaglehill.us

New Book

Biology of Pteridophytes.I :OPHIOGLOSSUM Linnaeus
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Released:2008-US dollars 50.00; (Fifty abroad)
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Ophioglossum Linnaeus is a Bionature monograph (ISSN 0970-9835) a comprehensive treatise on the genus, edited by H.K. Goswami, S.C. Verma and B.D. Sharma and will be released by the end of January 2008. Important aspects of morphology, anatomy, cytology, population biology, molecular biology and genetics including phylogeny are presented with more than 50 photographs and line diagrams. Bibliography is quite exhaustive; this is envisaged that the publication would be a noble acquisition of all those who are interested in evolutionary plant biology as well as libraries of botanical institutions/departments. The prepublication price valid until March, 2008 is USD 40.00 (Forty US Dollars or equivalent)

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the indusium is formed by the enrolled margin of the blade. As in some other species of *Doryopteris*, this fern can produce gemmae on the blade at the junction of the stipe and rachis on both the fertile and sterile fronds [Burrows and Strauss].

It is of interest to note that, because of mounting morphological, molecular, and other evidence, the Antenna Fern may have to be moved from the genus *Doryopteris* to some yet-to-be-determined genus [A. Smith, pers. comm.]. The circumscription of *Doryopteris* is currently being updated (by Jovita Cislinski-Yesilyurt at the Natural History Museum), and that work may help to resolve the issue.

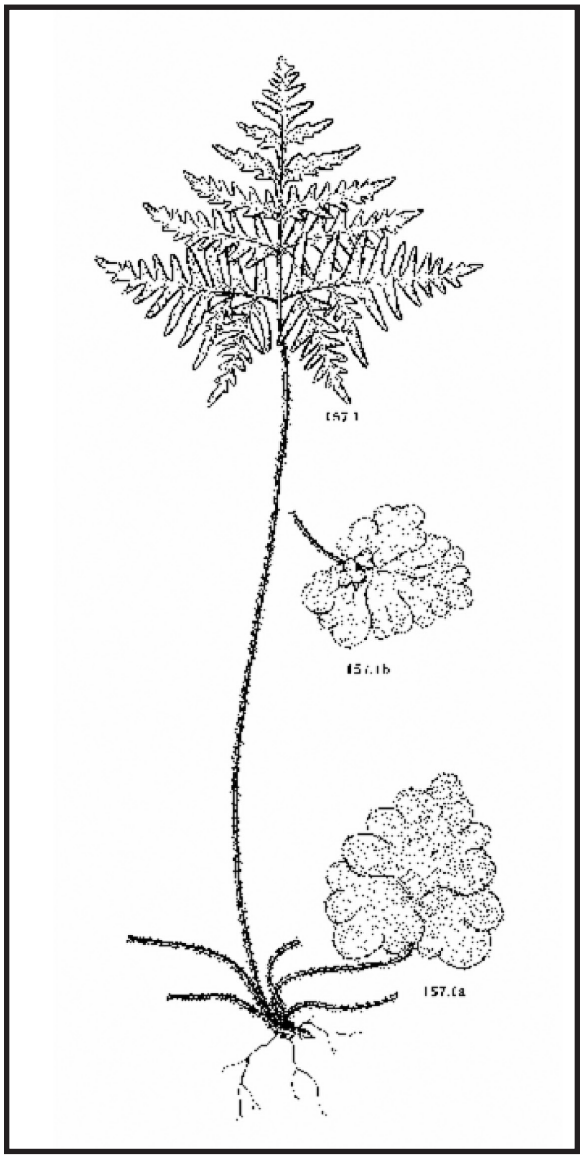
According to [Burrows], "This must be considered a rare fern although botanizing in suitable habitats in the northern Transvaal may turn up new localities." The fern is found in the northern and eastern parts of the Transvaal in South Africa, in riverine scrub along seasonal streams, lightly shaded, 850 – 1350 m" [J.P. Roux]. This region is relatively mild during the winter with temperatures seldom dropping to 5 or 6 deg. C (41- 43 deg. F). The summers are hot, with temperatures to 35 deg. C. (95 deg. F) [J.P. Roux, pers. comm.] .

Dimorphism of leaves or their segments is widespread among ferns. It occurs to a varying degree in "as many as one out of five fern species" [Wagner, Jr. and Wagner]. But what gives rise to the strong dimorphism of the Antenna Fern?

There are a number of adaptations which may result in dimorphism [Wagner, Jr. and Wagner]. Among them are those exemplified by the Antenna Fern:

- The stipes of the fertile fronds generally are longer than those of the sterile fronds, in order "to elevate the spores ... into the wind stream for maximum dispersal."
- The blades of the fertile fronds tend to be contracted, permitting "more extreme drying effects to enable sporangia to open and close efficiently."
- The sterile blades are broadened and spread out horizontally for better light reception.
- The sterile blades are placed in the "most humid surroundings to counteract water loss."

The Antenna Fern is striking in appearance, rare in distribution, and of uncertain genus. It is at once both charming and intriguing.



Doryopteris pilosa var gemmifera [from Burrows, with permission]: 157.1 fertile frond; 157.1a sterile frond; 157.1b sterile frond with gemmae.

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Elizabeth and the Curly-Grass Fern

Robbin Moran
The New York Botanical Garden

Fig. 1. Box of microscope slides that belonged to Elizabeth Gertrude Britton.

Moving, even moving an office, often turns up lost treasures. Several years ago while moving my office at the New York Botanical Garden, I came across a small wooden box containing microscope slides. It was among the odds and ends that I inherited upon becoming Curator of Ferns at the Garden; I had no idea where the box came from. Looking inside, there were four removable trays of microscope slides stacked upon one another, each tray holding six slides (Fig. 1). Glued to the inside of the lid was a printed paper label listing the prepared slides that originally came with the box when it was sold by James W. Queen & Co. of Philadelphia, Pennsylvania, a leading scientific supply house and instrument maker during the 1800s. Neatly penciled on the label's upper right-hand corner was "E. G. Knight, 1882." The original slides had been replaced by later ones prepared from specimens collected on 3 July 1900 at Forked River, New Jersey. These specimens, presumably collected by E. G. Knight, were of the gametophytes and young sporophytes of the curly-grass fern, *Schizaea pusilla*, an odd, small, fascinating fern discovered in 1805 in the Pine Barrens of southern New Jersey.

About a year later in preparation for a field trip to the Pine Barrens, I read a paper published in 1901 in the *Bulletin of the Torrey Botanical Club*. It described and illustrated in remarkable detail, and for the first time, the gametophytes of the curly-grass fern. The first sentence read: "The material on which these studies were based was collected at Forked River, New Jersey, on the third of July, 1900." The co-authors of the paper were Elizabeth G. Britton and Alexandrina Taylor. A bit of checking revealed that, sure enough, Elizabeth G. Britton's maiden name was Elizabeth Gertrude Knight—the "E. G. Knight" of my box. The mystery was solved: my box contained the very specimens that Elizabeth had prepared and studied for her 1901 paper.

Elizabeth Britton (Fig. 2) was an outstanding woman scientist. She published more than 340 scientific papers during her career and was one of America's leading bryologists. In 1885 she married Nathaniel Lord Britton, a fellow plant taxonomist, and in 1888 they visited Kew Gardens in England. The visit inspired them with the vision to create a similar botanical garden for New York City. Upon returning to New York, they lobbied hard for their vision, ultimately persuading civic leaders and financial giants such as J. Pierpont Morgan, Andrew Carnegie, and Cornelius Vanderbilt to fund the new endeavor. When the Garden was finally established in 1896, Nathaniel was appointed its first Director, a position he held for 33 years. Elizabeth continued her research and became one of the first women to edit a scientific journal—the *Bulletin of the Torrey Botanical Club*. She also helped found the Wildflower Conservation Society and what is now the American Bryological Society. These career achievements are made all the more remarkable because they were accomplished at a time when women's roles in science and society were severely, and unjustly, restricted.

Fig. 2. ***Elizabeth Gertrude Britton*** *(1857-1934), leading American botanist, a co-founder of The New York Botanical Garden, and discoverer of the gametophytes of the curly-grass fern.*

In 1879, early in her career, Elizabeth made an important discovery: she found the curly-grass fern in Nova Scotia, about 600 miles northeast of the Pine Barrens (her voucher specimen is housed in the herbarium at The New York Botanical Garden). This stimulated her life-long interest in the fern and boosted her reputation among botanists. Until her discovery, the fern was known only from the Pine Barrens except for one specimen in the Paris Museum of Natural History that bore a label saying it was collected in Newfoundland. Botanists doubted this locality because it seemed too far distant from the Pine Barrens; they suspected a labeling error. Elizabeth's discovery, however, proved that the fern occurred much farther north and made plausible its occurrence in Newfoundland. Within a year the fern was found in Newfoundland by another botanist, and additional localities were found in Nova Scotia. Today it is realized that the main range of the fern is Nova Scotia and Newfoundland, not the Pine Barrens (Fig. 3). The only intervening populations known between Nova Scotia and the Pine Barrens are on eastern Long Island, not far from the Pine Barrens. More recently, and more remarkably, the fern has turned up in Ecuador and Peru. No other fern—or for that matter, plant or animal—has a similar geographic distribution.

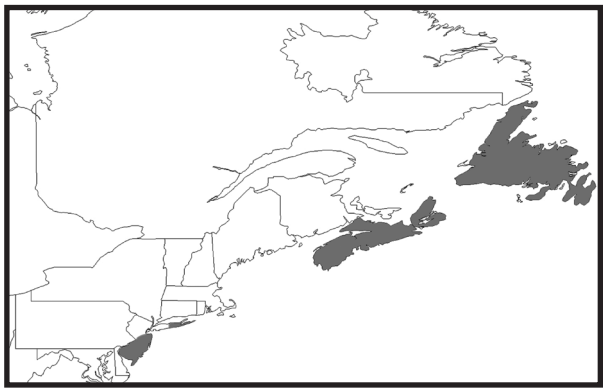

Fig. 3. The distribution of the curly-grass fern in North America.

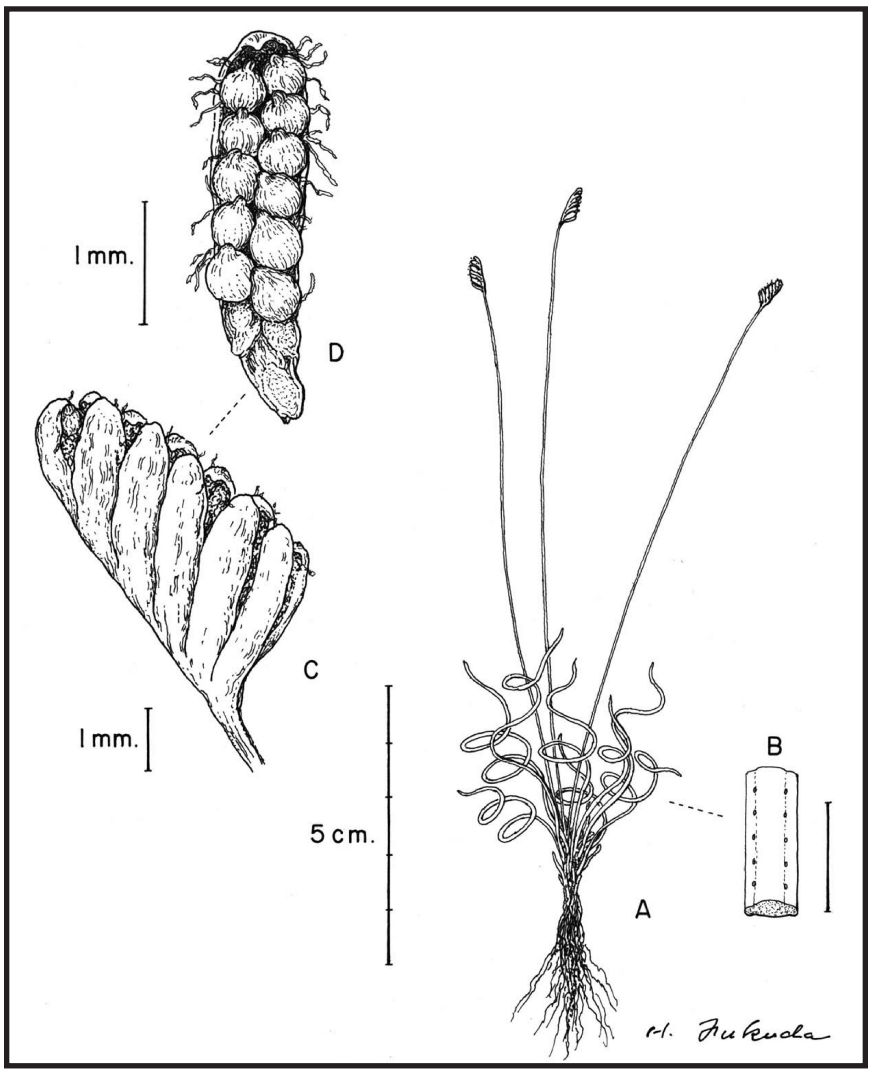

Fig. 4. The curly-grass fern. ***A.*** *Habit of plant, showing leaves of two forms: the sterile ones helically coiled, the fertile (spore-producing) straight and tall.* ***B.*** *Lower surface of the sterile leaf with two rows of stomata (almost all other ferns have randomly scattered stomata).* ***C.*** *Fertile blade, folded lengthwise.* ***D.*** *Lower surface of pinna detached from fertile blade, showing sporangia with apical annuli.*

The name "curly-grass" refers to the fern's sterile leaves that are coiled like a corkscrew (in my experience, they are always coiled counter-clockwise as one looks on them from above). These leaves are one to two inches tall and form a wiry, green tuft at the base of the plant (Fig. 4). They are overtopped by the fertile (spore-producing) leaves, which look completely different. Instead of coiling, they stand straight and erect, up to 5 inches (13 cm) tall, elevating the spores to where they are more likely to be picked up by air currents. Most of the fertile leaf is petiole except at its tip where it bears a triangular blade resembling a tiny comb. The blade consists of 4-6 pinna pairs (the teeth of the comb), and these face each other because the blade is folded lengthwise. On the lower (inner) surface of each pinna lie two rows of sporangia. Each sporangium is ovoid with the annulus completely encircling the apex. This type of sporangium is distinctive among ferns and defines the Schizaeales, the order to which the curly-grass fern belongs (the other families belonging to this order are the Anemiaceae and Lygodiaceae).

Late in the growing season the fertile leaves turn cinnamon-colored (the sterile leaves are evergreen), and the spores mature within the sporangia. The spores are the largest of any fern in North America—about twice the length of

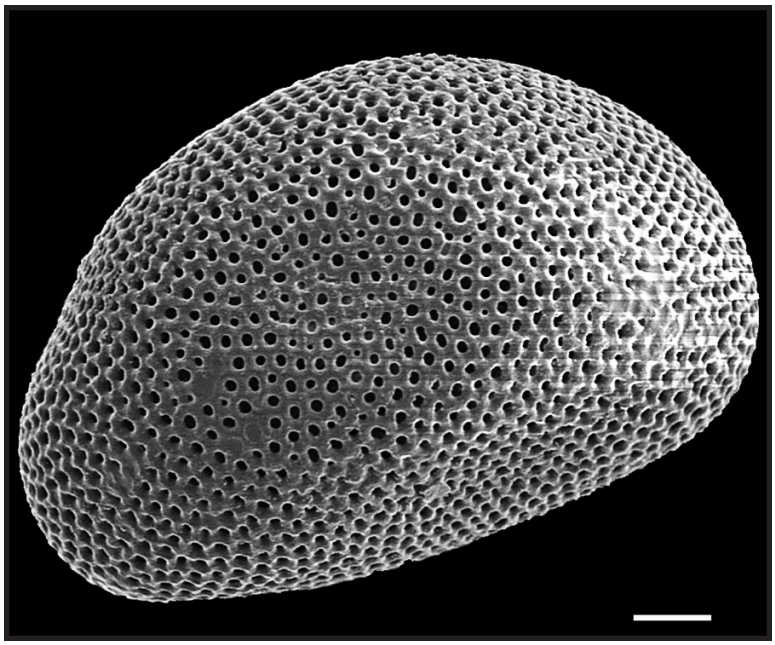

Fig. 5. A spore of the curly-grass fern. Scale bar = 10 micrometers. (Photo by Judith Garrison Hanks and Robbin Moran)

most ferns (Fig. 5). Their surfaces are perforated by regularly arranged holes and in general aspect resemble the surface of a thimble. During September and October the spores are shed and, with luck, land in a suitable spot to germinate.

What interested Elizabeth Britton for her 1901 paper was the plantlet that develops from the germinating spore. This plantlet, which represents the gametophyte or sexual (gamete-producing) phase of the life cycle, turned out to have a completely unexpected form. Instead of being thallus-like and heart-shaped as in most ferns, it was composed of fine green threads that branched and intertwined to become a tangled mass (Fig. 6; the only other fern with similar filamentous gametophytes is *Trichomanes*, a filmy fern). A later botanist found that the curly-grass fern gametophytes are perennial, tolerating repeated freezing temperatures and remaining alive in culture year after year.

Elizabeth observed that every so often the filaments produced a pair of large spherical cells, called rhizoidophores. These in turn bore one or two hair-like cells, the rhizoids. These structures are unique to *Schizaea*; no other fern genus has them. More remarkably, she observed the rhizoids were the site of infection by a fungus. The fungal hyphae penetrated the rhizoid and grew within it to the rhizoidophores, which it also penetrated (Fig. 7). Once inside the rhizoidophores, the fungus branched several times and the resulting branches swelled to form bladders (technically known as vesicles) that filled most of the rhizoidophore. The fungus seemed content to live in this specialized cell; it did not infect the normal green cells of the filaments. After infection, the rhizoids dropped, leaving behind the fungus-filled spherical cells attached to the filaments.

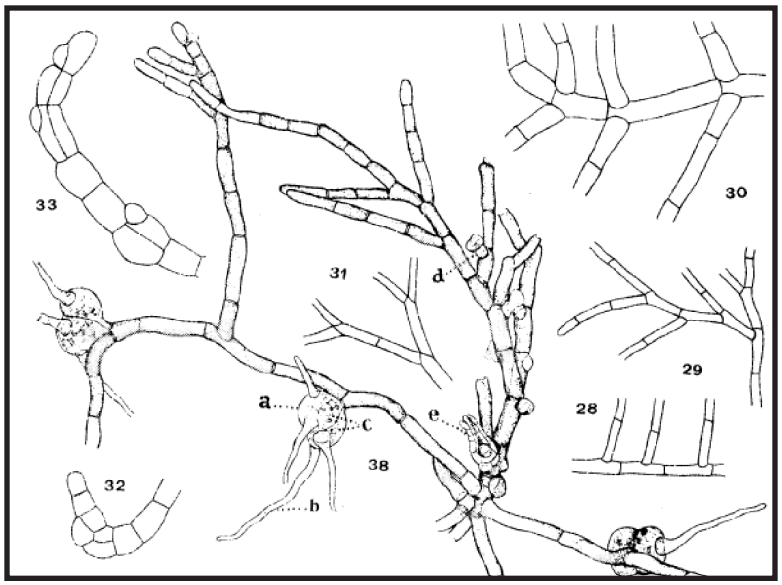

*Fig. 6. The filamentous gametophytes of the curly-grass fern: **a** is a rhizoidophore; **b** a rhizoid; **c**, the fungus within the rhizoidophore; **d**, antheridium; **e**, archegonium. (From Britton and Taylor, 1901).*

This fern-fungus relationship is highly developed, not casual, as Dr. John Kiss and his collaborators at Miami University in Ohio have shown experimentally. They found that some of the gametophyte filaments grow into the soil, away from light, which is highly unusual because other fern gametophytes grow toward the light or orient themselves perpendicularly to it. This downward growth presumably increases the chance of encountering the hyphae in the soil, where the fungus lives independently. Furthermore, the fungus grows toward the gametophytes, apparently attracted by a chemical released by the rhizoids. Besides infecting the gametophyte, the fungus infects the roots of the fern. This specialized symbiotic relationship is obligate: if not established, the sporophyte and gametophyte die. The species of fungus has not yet been identified, assuming it even has a name. It might be a new, never-before-described species.

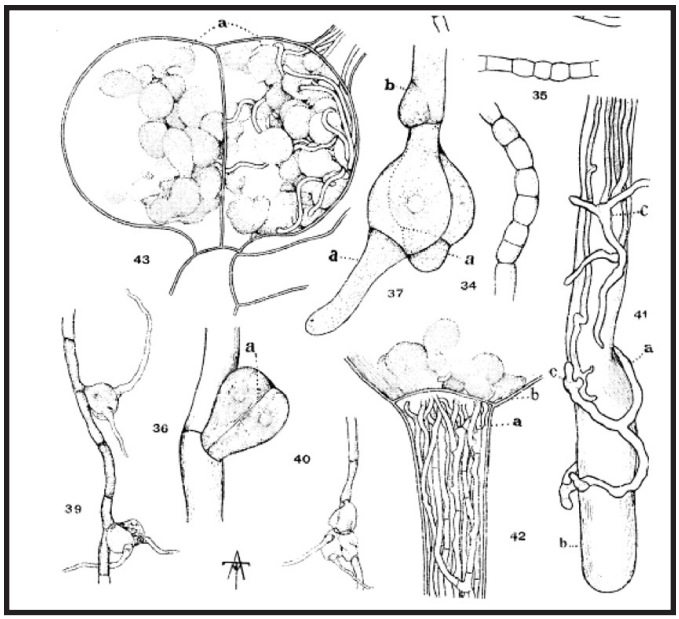

Fig. 7. The fern-fungus relationship. ***34*** *and* ***35*** *are filaments of the fern gametophyte.* ***36*** *shows formation of a rhizoidophore by longitudinal division of original cell.* ***37*** *shows an older rhizoidophore with rhizoids (a) developing; (b) is a new filament branch.* ***39*** *and* ***40*** *show mature rhizoidophre with filaments.* ***41*** *shows fungal hyphae penetrating a rhizoid.* ***42*** *shows hyphae in rhizoid entering the base of the rhizoidophore.* ***43*** *shows rhizoidophore with fungi within that have swelled to form vesicles. (From Britton and Taylor, 1901).*

How does this fungus-fern relationship benefit both partners? Presumably, the fungus gets a safe place to live and receives photosynthates produced by the fern. These benefits seem likely because they have been documented for other plants with fungus-root (mycorrhizal) symbioses. The fern apparently gains by obtaining a partner that is efficient at mining nutrients from the soil, and in the nutrient-poor soils of the Pine Barrens, that is a good partner to have. The soils of the Pine Barrens hold only about one-tenth of the nutrients found in normal agricultural soils. Moreover, Pine Barrens soils are highly acidic (pH 3-5), making it extremely difficult physiologically for roots to uptake those few nutrients present. Here is where the fungus helps. Fungal hyphae can penetrate a larger volume of the soil and present a far greater surface area for absorbing nutrients than the roots of the fern. Also, fungi are unhindered by soil acidity when it comes to the uptake of nutrients. The acquired nutrients are translocated from the fungus to the fern, nourishing the fern in a tough environment.

When the American Association for the Advancement of Science met at Philadelphia in 1884, most of the botanists in attendance took a field trip to see the curly-grass fern and the Pine Barrens vegetation near Egg Harbor City, New Jersey. In his *The Plants of Southern New Jersey*, Witmer Stone described this trip, saying that the 90 degree heat of the day was matched only by the zeal of the botanists when they found the fern in a bog beside a railroad embankment. "All great and small went down on hands and knees to gather the precious little fern of such unfernlike aspect." Present-day botanists still experience the same magnetism of this fern. Everyone who has seen it in the wild seems to have a favorite story about finding it for the first time.

Finding a curly-grass fern elicits my exclamations of admiration as much from its daintiness and odd leaves as from the appreciation that it flourishes in highly infertile soils. Garden ferns may surpass it in splendor, but one need only reflect on the amount of care lavished upon them—the weeding and watering, fertilizing and fencing, slug removing and deer-discouraging—to marvel at the unattended growth and survival of the curly-grass fern in the wild. The real beauty of the curly-grass fern is that it exists at all.

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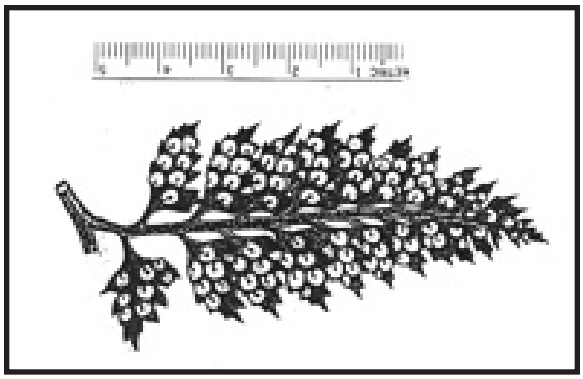
A New Species of Arachniodes in United States Cultivation

by Barbara Joe Hoshizaki

The *Arachniodes* species cultivated in the United States are best known by three species, the House holly fern *(A. aristatum)*, the so called Upside down fern *(A. standishii)* and *A. simplicior* and its variegated form. Most members of the genus look like plants between *Dryopteris* and *Polystichum*. For years botanists were uncertain whether these plants belonged to one or the other genus or deserves being placed in its own genus. Currently the choice is to place these plants in their own genus, *Arachniodes*. The name of the genus is derived from the Greek word arachnion, a spider's web and -odes means "having the form of", probably in reference to the cob-webby-like fine scales seen on the axis of the fronds. The species epithet of *Arachniodes aristatum* refers to the aristate or bristle-like structures seen along the margin of the segments. *Arachniodes standishii*, though probably named after the finder, received its common name, Upside down fern from Sylvia Leatherman, a nursery woman who specialized in selling ferns and begonias in the 1950 era in El Monte, a city near Los Angeles. The name Upside down fern came about because on her plants the pinnae tended to overlap each other in the reverse direction from most other ferns (that is the pinna closest to the tip of the frond slipped beneath the pinna below it rather than over it). Though this feature is not consistent, the common name is still used in some areas for this fern. *Arachniodes simplicior* and its variegated form appeared in cultivation and the trade about 1985 and reportedly have been found to naturalize in parts of the Southeastern United States. Other *Arachniodes* have been found among fern collectors but have not made their way into the trade. For distinguishing details on the genus and the three popular trade species see Hoshizaki and Moran (2001).



Arachniodes davalliaeformis : a fertile pinnule taken from the base of a pinna . Note the broad teeth along the margins of the segments.

While I was visiting Hachijo Island, south of Tokyo in 2002, I noticed a fern that looked very much like *Arachniodes aristatum* growing on the retaining wall of our inn. The fronds were growing in a cluster from very short-branched rhizomes and lacked any of the long creeping rhizomes of *A. aristatum*. Futhermore its fertile fronds (Figure 1) were like the sterile fronds, unlike *A. aristatum* where the fertile fronds are taller and more contracted than the sterile fronds. This fern was later identified as *A. davalliaeformis*, a name implying it had a davallia-like frond form. The cut of the frond was slightly different from *A. aristatum*, particularly noticeable were the broad teeth along the segment margins (Figure 2). Because people have always been attracted to the foliage of *A. aristatum*, I immediately thought this species might have horticultural potential. Its more compact and erect growth habit would prevent it from growing out of place and looking untidy as sometimes happens with *A. aristatum*. It has the same handsome dark green, evergreen fronds of *A. aristatum* and was about the same height. A commercial grower once told me that he did not grow *A. aristatum* for the trade because it was too slow from spore. I was pleased to find *A. davalliaeformis* grew from spores readily and formed very robust sporelings. From this first sowing it took about 13 months to grow from spore to 2 ½ inch pot size sporophytes. I had enough plants from this sowing to distribute them to growers and botanical gardens. This was a few years ago and I understand that *A. davalliaeformis* has now been introduced into the trade. It grows easily in southern California but I think it would do better in more humid climates as there is a tendency for the pinnae tips to abort during the drier seasons. Plants growing in a more protected humid area did not have this problem. Its hardiness is still uncertain but since it seems to be a close ally of *A. aristatum*, it should be able to grow well in Zone 7 or lower. Whether it will spread into the native flora might be of concern in the southeastern states, and this should be monitored.

Arachniodes davalliaeformis: fertile frond.

Early botanist thought that *Arachniodes davalliaeformis* was only a variety of *A. aristatum*. The differences between the two plants in rhizome habit and monomorphic and dimorphic fronds constitute strong enough differences to warrant elevating the variety to species status. Formal names changes were made by T. Nakaike, who changed *Polystichum aristatum* var. *davalliaeformis* (Christ) Christ ex Matsum. to *Arachniodes davalliaeformis* (Christ) Nakaike (see Nakaike 1992, 2001).

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American Fern Society Speakers for 2008

SPEAKER	TYPE OF ACTIVITY / SEASON/ LOCATION OF ACTIVITY	TOPICS
Ralph C. Archer 459 Turnberry Ln. Shelbyville, KY 40065 (502) 647-9326 ralpharcher@bellsouth.net	Demonstration in spring or fall. Garden tour, spring to fall, of fern stumperie and woodland garden. Louisville, KY	Fern propagation. Shade gardens and growing hardy ferns. Planting a stumperie
Sharon Banister Texas A&M University, Horticulture Dept. HFSB College Station, TX 77843 (979)458-3969 or 845-8553 s-banister@tamu.edu	Hands on work shop, demonstration or illustrated talk. Will travel, not during winter	Growing ferns from spores. Also on plant propagation, tissue culture, and landscaping. Will tailor activities for children.
Wendy A. Born 6625 Barbara Dr. Sebastopol, CA 95472 spores@excite.com	Workshop Illustrated talk	Spore propagation of ferns Identification of California Native Ferns
Bill Coblentz 2547 Trinidad Street Sarasota, FL 34231 (941) 924-9253	Demonstration	Fern Growing Staghorn Ferns
Patricia Cox Dept. of Botany, University of Tennessee Knoxville, TN 37996 (865) 974-6225 pbcox@tva.gov	Talk, all year. Foray in June to October. Great Smoky National Park, TN or will travel	Fern Flora of the Great Smoky National Park.
Mary Elliott 41038 S. Range Rd Ponchatoula, LA 70454 985-386-0709 marymcc@bellsouth.net	Demonstration talk	Southeast Fern growing and use of native plants.

SPEAKER	TYPE OF ACTIVITY / SEASON/ LOCATION OF ACTIVITY	TOPICS
Dr. Joan Gottlieb 2310 Marbury Rd Pittsburgh, PA 15221-3670 (412)242-6738 milton.gottlieb@verizon.net	Garden tour,spring to fall. Foray spring to fall. Western PA advance notice req'd	Private fern garden tour of over 180 taxa;"Temperate Ferns for all Seasons," "Ferns of the Ecuadoran Andes", "Ferns of Costa Rica", "Ferns of New Zealand", "Ferns of China".
Prof. Warren D. Hauk Dept. of Biology, Denison University Granville, OH 43023 (740) 587 5758 hauk@denison.edu	Forays Late spring and summer Central OH	Liverworts, moonworts, rattlesnake ferns, unusual ferns of Hocking Hills area, Blackhand Gorge, Central Ohio
Michael Heim 9151 N Co. Rd. 'E' Hayward, WI 54843 (715) 634-5336 4heim@cheqnet.net	Garden & woodland tour anytime, but August to September best (USDA hardiness Zone 3) North WI	Ferns for the north woodlands. The garden has over 123 fern and fern ally species and forms, both natives and exotics.
James R. Horrocks 2444 Camino Way Salt Lake City, Utah 84121 Phone: (801) 942-0065 Jimothy1947@hotmail.com	Talk, slide presentation; demonstration. Will travel (limited)	Temperate ferns in semi-arid climate; spore growing; ferns for Master Gardener program; general cultivation.
Chad Husby Department of Biological Sciences Florida International University 11200 S.W. 8th St, #OE167 Miami, FL 33199 (305) 348-6047 chad.husby@fiu.edu	Illustrated talk Demonstration Digital projector, laptop	Searching for the giant horsetail, *Equisetum giganteum*, in South America Growing ferns, lycopods and horsetails in inorganic media
Daniel D. Jones 5038 Vale Lane Birmingham Alabama 35244 (205) 988-0480 djones5038@charter.net	Illustrated talk Tour	Native and non-native ferns for Southeastern gardens Birmingham Botanical Garden Fern Glade (May to September)
Judith Jones Fancy Fronds 40830 172nd Street SE Gold Bar, WA 98251 (360) 793-1472 judith@fancyfronds.com	Illustrated talk	Temperate Ferns or Xeric Ferns with the talk tailored to the audience. Inquire

SPEAKER	TYPE OF ACTIVITY / SEASON/ LOCATION OF ACTIVITY	TOPICS
Garrie Landry Dept. of Biology Univ. Louisiana Lafayette PO Box 42451 Lafayette, LA 70504 (318) 828-5957 gpl9972@louisiana.edu	Illustrated talks Fern forays	Subjects: Ferns of SE US, hort. interests: *Pyrrosia,* Staghorns, *Selaginella, Lycopodium;* & native fern gardening. Louisiana; Trinidad; Oaxaca, Mexico
Dr. James Montgomery Ecology III, 804 Salem Blvd. Berwick, PA 18603 (570) 543-2191 jdm@sunlink.net	Foray, June to October Central and Eastern PA	Ferns and fern allies of central or eastern Pennsylvania
Dr. Robbin Moran The New York Botanical Garden 200th Street & Southern Blvd. Bronx, NY 10458 718-817-8663 rmoran@nybg.org	Illustrated Talk Will travel Req'd: Digital projector, pointer, and screen	Ferns and People Other talks: inquire
Sue Olsen 2003 128th Ave. S.E. Bellevue, WA 98005 425 747-2998 foliageg@juno.com	Illustrated Talk Garden tour	Hardy Ferns May - September
David Schwartz 9715 Chirtsey Way Bakersfield, CA 93312-5617 (661) 588-4027 XericFerns@aol.com	Illustrated talk	Xeric Ferns in the Garden Companion Plants to the Xeric Fern Garden
Christine (Chris) Spindel 3985 S. Galloway Dr. Memphis, TN 38111 (901) 685-9835 fernlady@att.net	Demonstration	Introduction to Ferns Growing Ferns from Spores
Tom Stuart PO Box 517 Croton Falls, NY 10519 (845) 277-3699 tstuart@westnet.com	Illustrated Talk Digital projector req'd	Rock Garden Ferns *Pyrrosia*, the Felt Ferns

SPEAKER	TYPE OF ACTIVITY / SEASON/ LOCATION OF ACTIVITY	TOPICS
Michael Sundue The New York Botanical Garden 200th Street & Southern Blvd. Bronx, NY 10458 msundue@nybg.org	Illustrated Talk Digital projector req'd	Ferns of Parque Nacional Amboro, Bolivia
Reggie Whitehead 6880 S. W. 75 Terrace South Miami, Florida 33143 (305) 666-0219 Regferns@aol.com	Illustrated Talk	Ferns around the World: Introduction to Tropical Ferns
Don Woods 9914 Calmada Ave. Whittier, CA 90605 (562) 698 7696	Demonstration-talk Season and travel negotiable.	Staghorn Ferns (*Platycerium*)
Dan Yansura 330 Carmel Ave Pacifica, CA 94044 650- 359-1706 Yansura@gene.com	Illustrated Talk California, Colorado, Michigan are convenient	Cultivating Tree Ferns

Birmingham Fern Society Annual Events

at The Birmingham Botanical Gardens, 2612 Lane Park Road, Birmingham, AL

May 21, 2008 - **Annual Fern Lecture**

"(R)evolutionary thoughts on Alabamian ferns"

Dr. Alan R. Smith, Emeritus Research Botanist from the University of California - Berkeley
7:00 PM in Lecture Hall at the Botanical Gardens
No admission fee Open to the public

June 18, 2008 - **Fern Show & Sale**

No admission fee Show and Sale open to the public from 1-5 PM

Fern Show -- featuring hardy ferns
Entries accepted for Fern Show from 8-10 AM *(Judging will be done between 10:30 AM & 12 N)*

Fern Sale -- *benefits Fern Society's projects in Fern Glade at the Gardens*
More than 40 species of hardy ferns are suitable for Alabama gardens

For additional information: Call (205) 879-7348

Fourth Symposium on Asian Pteridology and Garden Show

by R.H.G. Ranil, Sri Lanka

Figure 1: Marilog Forest; a fern dominant mossy forest in the Philippines. Photo courtesy Erna Elias, Philippines

The Fourth Symposium on Asian Pteridology and Garden Show was held 12-18 November 2007 at the Farmers Training Center, Central Mindanao University, Musuan, Bukidnon, Philippines. It was organized and hosted by Central Mindanao University and in collaboration with the Philippines Horticulture Society (Fern Group), Japan Pteridological Society and the Los Angeles International Fern Society and in cooperation with the National Committees for DIVERSITAS. The theme of the symposium was the Richness of Asian Ferns: their uses and study. More than 100 participants including eminent scientists and other fern enthusiasts from China, India, Japan, Mexico, Nepal, Netherlands, New Zealand, Philippines, Singapore, Sri Lanka, Taiwan and USA participated and shared information on their experiences. I was very lucky to participate and present a paper on Sri Lankan Pteridophytes in the symposium, while sharing knowledge and research experience with the eminent in the field.

Prof. Chunxiang Li, Dr. Shi-Yong Dong, Mrs. Kochang Yanfen (China); Dr. V. Irudayaraj, Dr. Paul Raj, Mr. S. Benniamin (India); Prof. Masahiro Kato, Dr. Kunio Iwatsuki, Dr. Noriki Murakami, Dr. Ryoko Imaichi, Dr. Shigeo Masuyama, Mr. Atsushi Ebihara (Japan); Prof. Frasea-Jenkins (Nepal), Dr. Hans Nooteboom (Netherlands); Dr. Barbara Parris (New Zealand), Prof Victor B. Amoroso, Dr. F.B. Aurigue, Dr. Rodolfo S. Treyes, Dr. Julie Barcelona (Philippines); Mr. R.H.G. Ranil (Sri Lanka); Dr. Wen-Liang Chicu (Taiwan); Prof. Barbara Joe Hoshizaki, and Dr. Edward Salgado (USA) delivered interesting talks on ecology, diversity, phylogenetics, molecular biology, cytology and reproductive biology of Pteridophytes. Twenty-five posters were displayed covering various aspects of Pteridophytes. A garden show was held in the Farmers' Training Center and it showed the diversity and economic importance of the Philippines Pteridophytes.

Figure 2: Part of the participants in Marilog Forest. Photo courtesy Erna Elias, Philippines

As the field visit, all the participants climbed the summit of Musuan Mountain about 645 meters above sea level on 15th November 2007. Musuan Mountain is one Long Term Ecological Research Site in Mindanao Island with natural forest and grassland vegetation types which were covered by 333 hectares. They provide habitats for 40 Pteridophyte species. The summit of Musuan was a good view point for the longest river in Mindanao, Central Mindanao University and Kitanglad Natural Park. Participants also got a chance to visit Marilog Forest, Kitanglad Natural Park and Cagayan de Oro City as tree clusters, (participants divided into three groups and each group selected one field visit) on 16-17 November 2007. Participants were surprised about the excellent diversity of Philippines Pteridophytes in both Marilog Forest and Kitanglad Natural Park. The Marilog Forest is located in the Southern part of Mindanao and its maximum altitude is 1,200 m. It provides habitat for 183 terrestrial, epiphytic and lithophytic Pteridophytes. Kitanglad is the second highest Mountain (2750 m) in the Philippines and the wet and misty climatic condition facilitates the occurrence of 275 Pteridophyte species. It represents 31% of the total Pteridophytes in the Philippines. *Asplenium decorum, Asplenium nidus, Arachinioides aristata, Belvisia mucronata, Blechnum orientale, Ctenopteris obliquata, Cyathea contaminans, Davallia denticulata, Dicranopteris linearis, Elaphoglossum angulatum, Lycopodiella cernua* and *Nephrolepis cordifolia* were observed as the most common species in both forests. All participants agreed that the symposium and field visits helped provide a comprehensive understanding about diversity and ecology of the Philippines Pteridophytes, while developing collaborative networks among eminent scientists and other fern enthusiasts.

Figure 3: Observation of natural habitats of Pteridophytes. Photo courtesy Erna Elias, Philippines

Figure 4: Asplenium decorum; a common, attractive fern species observed in Marilog Forest. Photo courtesy Erna Elias, Philippines

2008 Membership renewals and new memberships can be made online at http://amerfernsoc.org/member. A printable membership application is also available at this website.

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