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Fiddlehead Forum
Bulletin of The American Fern Society

Editors: Joan Nester-Hudson and David Schwartz

2008 Calendar

Corrections and additions to Tom Stuart <tstuart@westnet.com>

Wednesday, May 21, Birmingham Botanical Gardens, 7 PM
Birmingham, Alabama

The Birmingham Fern Society's annual lecture presents Dr. Alan R. Smith, Emeritus Research Botanist, University of California -- Berkeley speaking on "(R)evolutionary thoughts on Alabamian ferns".

Saturday & Sunday, May 31–June 1, Coral Gables, Florida
Fern & Exotic Plant Show & Sale.

Our Fern & Exotic Plant Show and Sale will be on May 31 and June 1 at Fairchild Tropical Botanic Garden (10901 Old Cutler Road, Miami, Florida). The hours are 9:30 a.m. to 4:30 p.m. both days. Admission is only \$20. Ferns from around the world are sold and exhibited. Wonderful opportunity to buy and see interesting ferns and other tropical plants at one gathering.

Contact: Reggie Whitehead (305) 666-0219 or: <http://tfeps.org>

Saturdays: May 31, June 28, August 30, Biodiversity Inventory
Great Smoky Mountain National Park Fern Forays

Volunteers are sought to help determine: the distribution pattern for ferns in the park, to develop a protocol for trail surveys, and to prepare web pages for each species of pteridophyte. Contact: Dr. Patricia Cox at <pbcox@tva.gov> or 865-632-3609

Friday-Saturday, June 6–7, Seattle, Washington
Hardy Fern Foundation Annual Fern Festival

Plant sale featuring an outstanding selection of ferns and companion plants opens at 1:00. The annual festival will feature British fern expert and author Martin Rickard speaking on his favorite ferns. The lecture will be that evening at 7:30 PM preceded by a coffee hour and plant sale at 7:00. Saturday: Plant sale continues from 10:00 - 2:00. The festival will be at the Center for Urban Horticulture, 3501 NE 41st St in the University district in Seattle. Experts will be on hand to help you chose the best plants for your site and preferences. Contact: Michelle Bundy <thebundys5@comcast.net>

Wednesday, June 18, Birmingham Botanical Gardens
Birmingham, Alabama,
Thirty-third Annual Fern Show and Sale

The Birmingham Fern Society's annual fern show and sale are open to the public. All entries must be in place by 10:00 a.m. and remain until 5:00 p.m. Contact Ralph Johnston, President, Birmingham Fern Society: <rsjohn2@bellsouth.net>

AFS OFFICERS

PRESIDENT: David Conant, Lyndon State College, PO Box 919, Lyndonville, VT 05851-0919 David.Conant@lsc.vsc.edu

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The Editors of FIDDLEHEAD FORUM welcome contributions from members and friends, including miscellaneous notes, and reviews of books on ferns. Articles may be submitted electronically on disk (PC compatible) or typed (using a simple font like Helvetica in a minimum of a 12pt font.)

Regular membership in the American Fern Society is on a calendar-year basis and includes access to field trips and the spore exchange. Regular members receive *Fiddlehead Forum*, but not the American Fern Journal, for \$12 (+\$3 expedited delivery fee, except U.S.A., Canada, and Mexico) Individuals interested in regular or journal membership should contact the membership secretary.

AFS HOME PAGE

<http://www.amerfernsoc.org>

July 26-30, American Fern Society Annual Meeting Vancouver, British Columbia

The Society will again have its annual meeting in conjunction with the Botanical Society of America's annual conference. This year's conference is being billed as **Botany without Borders** and will be jointly sponsored by AFS, BSA, the Canadian Botanical Association, and the American Society of Plant Taxonomists. The Congress is expected to attract well over 1,000 participants, who will meet at the University of British Columbia on July 26-30, 2008. The congress will include a large number of symposia, scientific presentations, workshops, and posters on every imaginable topic relating to plants. The American Fern Society will not only be having its annual meeting and luncheon, but also will host a series of contributed paper presentations and posters. All members are invited to participate, and all participants must register for the conference, in addition to the field trip (see below) and the luncheon. For those wishing to attend the entire conference, the basic registration fee is more than \$300. However, members who would like to attend only the field trip may register for a special rate of \$30. For registration information and more details on the entire set of events, please check the web site <http://botanyconference.org/>. Space on the bus for the field trip is limited and the AFS forays tend to fill up quickly each year so be sure to register early.

July 26, Saturday, from UBC, Vancouver, BC *Ferns of Mount Seymour Provincial Park*

Mount Seymour Provincial Park is within a forty-minute drive of the UBC campus. A large network of trails gives us the flexibility to offer a variety of options to accommodate different group sizes, interests and abilities. With a starting elevation of 1000 meters, great views of Vancouver, and Vancouver Island abound. Groups will be on the trail for the entire day. Be prepared for mountain weather. Proper clothing, and footwear are a must in addition to one-two litres of water and insect repellent with DEET. Box lunch provided. The foray is rated as easy, except some scrambling required for *Polystichum andersonii*. **Trip Leader: Chris Sears, University of British Columbia <fundywest@mac.com>**

August 2, Saturday, east of Seattle *Hardy Fern Foundation Perry Creek Falls Foray*

The hike (2 miles in each direction) leads to Perry Creek Falls where along the route close to 30 species, (depending on whether the deer have been browsing on the botrychiums) of ferns and lycophytes grow in varied habitats. It is the richest fern area in Washington State. The date was chosen so as to dovetail with the American Fern Society's late July annual meeting in Vancouver, British Columbia and all are welcome to participate. **Please contact Michelle Bundy to indicate an interest before July 1 at <thebundys5@comcast.net>.**

August 17 - 23, Humboldt Field Research Institute, Steuben, Maine *Taxonomy and Biology of Ferns and Lycophytes*

Instructor: Robbin Moran

This course covers the identification, phylogeny, and ecology of ferns and lycophytes. Morning lectures will review the major families and place these in a phylogenetic context. The afternoon field trips will emphasize identification

and ecology of local genera and species. The course will visit several habitat types along and near the eastern Maine coast to see as many species as possible. Herbarium specimens of northeastern species not found locally will be available for study. Besides identification, we will discuss the distinctive biology of ferns, such as their life cycle, hybridization, polyploidy, unusual adaptations (iridescent ferns, ant ferns, apogamy), biogeography, and uses of ferns by people. We will also discuss the sweeping changes that have taken place over the past ten years in understanding the phylogeny of ferns and lycophytes (for instance, why the term "fern allies" is no longer valid). "Highly recommended" – Tom Stuart. Dr. Robbin Moran is Curator of Ferns at The New York Botanical Garden and the author of four books and numerous papers. **Humboldt Field Research Institute, PO Box 9, 59 Eagle Hill Road, Steuben, Maine 04680 or phone 207-546-2821 or <http://eaglehill.us/>**

September 13, Saturday, Paulins Kill, northwestern New Jersey

Janet Novak & Otto Heck: leaders. The Delaware Valley Fern & Wildflower Society and the New York Fern Society will have a joint foray along the Paulins Kill Valley Trail—along abandoned railroad beds of the New York, Susquehanna and Western Railroad. Meet at 10 AM at the Cedar Bridge parking area. (rain date September 20).

CYRTOMIUMS

by Barbara Joe Hoshizaki

Cyrtomiums are well known ornamental ferns in the United States. They are familiar to us as the Holly ferns. The most popular are *Cyrtomium falcatum* and its cultivar the Rochford Holly fern (*C. 'Rochfordianum'*). Though *Cyrtomium fortunei* is also widely grown, it lacks the glossy leathery texture of *C. falcatum*. Both are very easy to grow and may readily volunteer. They have naturalized in parts of the United States. Other less frequently cultivated members are *C. caryotideum*, *C. macrophyllum*, and subspecies and varieties of *C. falcatum* and *C. fortunei*. The species called *Cyrtomium lonchitoides* I have seen in U.S. cultivation, is not that species but seems to be in the *C. fortunei* complex. All the known material grown in the U.S. are native to Japan.

The Japanese *Cyrtomium* species and their many variants are a perplexing taxonomic problem. The recognition of species and subcategories differs from botanist to botanist. It is difficult to get names on our garden plants or even begin to understand how the plants are related. I was particularly pleased, therefore, to know of a paper by Mr. Taketoshi Oka treating the Cyrtomiums of the Kanto Region. Though the Kanto Region (area around Tokyo) may be a small area compared to the distribution of the genus, it contains all the Japanese species recognized in the Japanese flora except for two.* All the Cyrtomiums currently growing in United States gardens are also found in the Kanto Region. An additional help was that this paper treated the subspecies categories and hybrids. Beyond the purposes of identifying plants, this paper illustrates how complex the relationships of the Cyrtomiums are in just one region. Elsewhere in Japan it is even more complex with a report of a hybrid crossing with other species. This gives us an insight as to why the Cyrtomiums in our garden vary so much and why it has been difficult to apply names to these plant with certainty.

The introductory part of Mr. Oka's paper gives the diagnostic features of the *Cyrtomium* genus, followed by a *Key to the Cyrtomiums in the Kanto Region*. The key is limited to the species and subspecies categories. Hybrids, because they vary between the parents, are omitted from the key because they are difficult to incorporate. However, they are briefly described in the last section entitled, *About Cyrtomium Hybrids*. I have updated the scientific names of the *C. falcatum* complex according to the work by Dr. Sadamu Matsumoto (2003), who has redefined the complex through an extensive study of their reproductive systems and ecology.

Mr. Oka is a member of the Nippon Fernist Club with the duties of helping its members identify their ferns and keeping them informed of new information. He is also a fern grower and hybridizer of fern species, particularly *Asplenium* species. Mr. Oka has kindly given permission to reproduce his work from Japanese to English. We are also much indebted to Mrs. Takeko Hayashi who did the translation and managed to find the answers to my many questions. On behalf of fern hobbyists and myself, I wish to express our deepest thanks to both Mr. Oka and Mrs. Hayashi for their contributions.

HOW TO IDENTIFY CYRTOMIUMS OF THE KANTO REGION

by Mr. Taketoshi Oka

The Kanto Region is located in the area around Tokyo and comprises about 12,500 square miles. Though this region is densely populated, there are areas around towns, villages, forest preserves, and on steeper hills and mountains where native plants such as Cyrtomiums are found. The genus is recognized by the following characters:

Cyrtomiums are evergreen ferns growing on the ground or on rocks. They are mostly medium-sized or slightly larger and bear their fronds in tufts from an erect to ascending short rhizome. The fronds are once pinnate with the tip ultimate pinna usually an independent unit like the side (lateral) pinnae. (Pinnatifid to pinnatilobed tips are found on *C. balansae* and *C. hookerianum*, Japanese species not in the Kanto Region.) The pinnae are undivided, the margins are entire, dentate or serrate. The veins are netted (anastomosed). The sori appear scattered on the back of the pinnae and each is covered with an umbrella-shaped (peltate) indusium. Some species reproduce sexually but many are apogamous (i.e. reproducing asexually from the gametophyte generation). The basic chromosome number is $x=41$.

KEY TO THE CYRTOMIUMS IN THE KANTO REGION*

- A. Pinnae base with a triangular acuminate ear, pinnae margins typically finely serrate; indusium margin with irregular projections. (Figure 1)
 - (1.) *C. caryotideum*
- AA. Pinnae base with or without an ear, pinnae margins entire or distantly serrate; indusium margin entire to with irregular projections.
 - B. Pinnae thick leathery, margin entire to the tip.
 - C. Lower pinnae with base rounded, widest at the base then tapering to the tip; indusium of one color or two colors, entirely pale tannish white or only the margins pale and elsewhere brown-black.
 - D. Total length of the mature frond to about 16 inches or more; indusium with pale margin, elsewhere brown-black or rarely of one color, pale tannish white. (2.) *C. falcatum* subsp. *falcatum*
 - DD. Total length of the mature frond to about 8 inches or less; indusium of one color, pale tannish white. (3.) *C. falcatum* subsp. *littorale*
 - CC. Lower pinnae with base broad wedge-shaped then sides of pinnae parallel before tapering to the tip; indusium with narrow pale margin, elsewhere brown-black. (4.) *C. devexiscapulae* (= *C. falcatum* var. *devexiscapulae*)
 - BB. Pinnae thin leathery or stiff papery, margins serrate close to the tip.
 - C. Pinnae pairs about 10 or more, pinnae base with a triangular acuminate ear or none.
 - D. Indusium of uniform color, pale gray or tan-whitish.
 - E. Pinnae less than 1.25 inches wide, lacking a basal ear.
 - F. Pinnae stiff papery, slightly shiny. (5.) *C. laetevirens* (= *C. fortunei* forma *laetevirens*)
 - FF. Pinnae thin leathery, not shiny.
 - G. Pinnae pairs about 15 or less, upper pinnae with base truncate. (6.) *C. fortunei* var. *fortunei*
 - GG. Pinnae pairs about 20 or more, upper pinnae with base wedge-shaped. (7.) *C. unnamed*, *fortunei* affinity
 - EE. Pinna about 1.5 inches wide or more, base with a slightly developed ear. (8.) *C. fortunei* var. *clivicola*

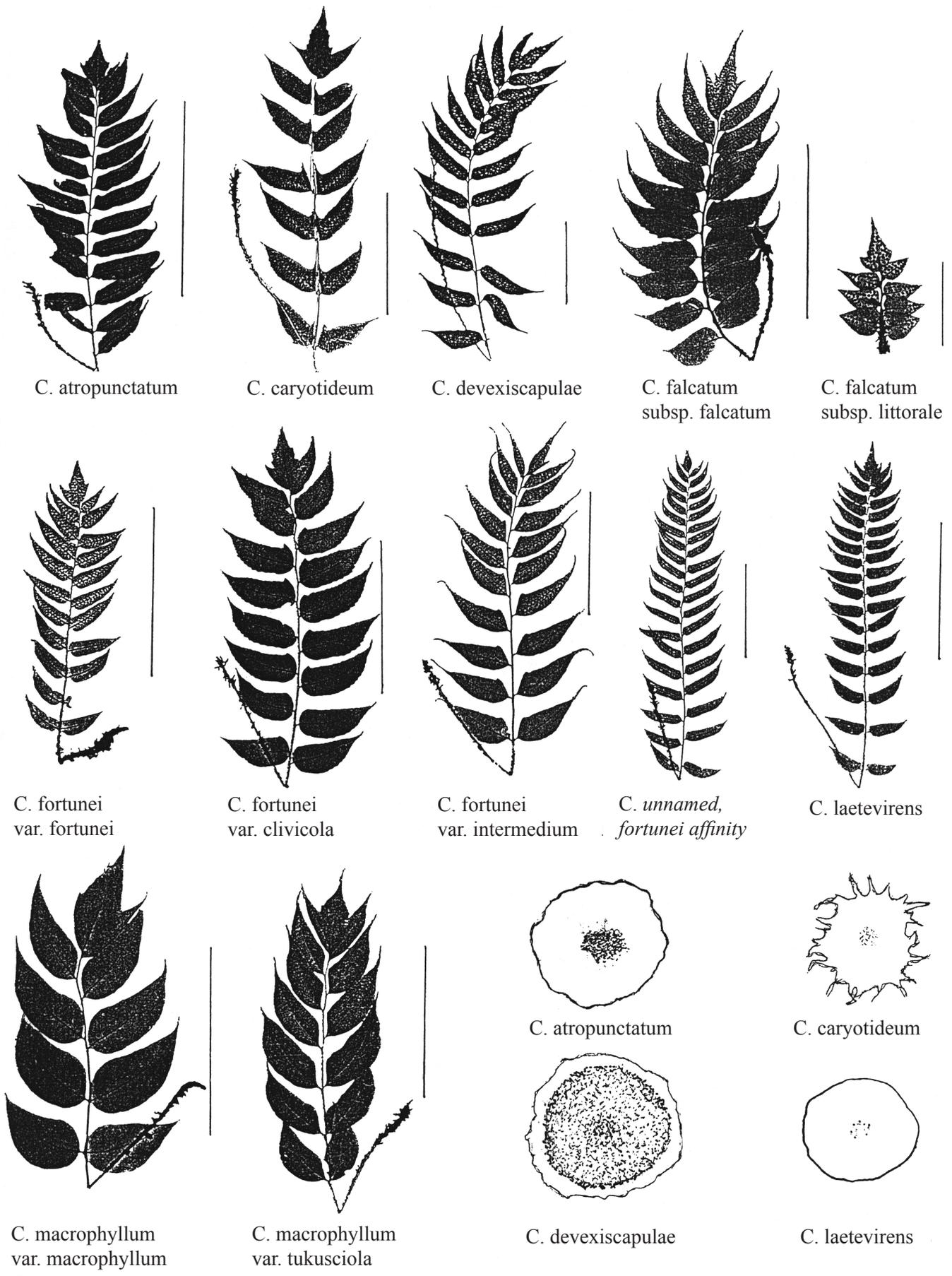


Figure 1. *Cyrtomium* species of the Kanto Region. The line scales represent 8 inches in all except *C. falcatum* subsp. *littorale* where the line scale equals 1.6 inches. Below right, indusia showing the characters used in the key.

DD. Indusium of two colors, black brown in center, whitish elsewhere.

E. Pinnae yellowish-green, basal ear present.

(9) *C. fortunei* var. *intermedium*

EE. Pinnae blackish-green, basal ear absent.

(10.) *C. atropunctatum* (= *C. fortunei* var. *atropunctatum*)

CC. Pinnae pairs usually under 8, pinnae without basal ear.

D. Pinnae 5 cm. or more wide, base rounded; indusium grayish white.

(11.) *C. macrophyllum* var. *macrophyllum*

DD. Pinnae less than 5 cm. wide, base wedge-shaped above, rounded below; indusium darker in the center, the margin subentire to erose.

(12.) *C. macrophyllum* var. *tukusciola*

*All the species and subcategories in the key above are in Figure 1. Absent from the Kanto Region but native to Japan are *C. balansae* and *C. hookerianum*. Their diagnostic features are given as follows: Both these species differ from those in the Kanto area by having their tips pinnatifid to gradually lobate and tapered to the apex, while those in the key have their tips ending in an independent pinna similar to those on the side. *Cyrtomium balansae* is eared on the acroscopic side of the pinnae and its pinnae margins are dentate. *Cyrtomium hookerianum* is not eared and its pinnae margins are subentire. A variety of *C. macrophyllum* not found in the Kanto area is *C. macrophyllum* var. *microindusium* (= *C. microindusium*). It is like the species in the key but has very small indusia that cover only the center of each sori.
-bjh

ABOUT CYRTOMIUM HYBRIDS

Cyrtomium hybrids in the Kanto Region and their parents are shown in Figure 2. Hybrids from the same parents may vary in appearance. Though hybrids are usually sterile, certain events may take place to allow them to produce viable spores. This makes it possible to have hybrid offsprings which could (or have) crossed or even backcrossed with other *Cyrtomium* species or hybrids to produce more variants. This has occurred in the *C. falcatum* complex (see Matsumoto 2003, p. 70,71). The formation of a wide range of intermediate plants by hybridization and backcrossing among parents and progeny is called introgression. It is rarely reported for ferns but has been documented for *Pteris*.

Some features helpful in distinguishing the hybrids of the Kanto Region are given in the list below. The hybrids are listed by their formula name. If a hybrid has a binomial name, that is also listed. Dr. Sadamu Matsumoto, Tsukuba Botanical Gardens, National Science Museum, Tsukuba, Japan reports that all the hybrids below are apogamous and pentaploid. They also all produce viable spores at the 8-celled sporangia stage and sterile spores at the 16-celled sporangia stage. (Additional information was presented by Matsumoto and Ebihara on triploid apogamous *Cyrtomium* parents and hybrids using DNA analysis at the Proceedings of the 6th Annual Meeting of the Japanese Society for Plant Systematics, Niigata, March 16, 2007).

Hybrids found in other areas of Japan, may be growing in the Kanto Region, but I have not been able to confirm their presence. The parents of such a hybrid are *C. devexiscapulae* × unnamed *C. macrophyllum* affinity (that appears much like *C. fortunei* var. *clivicola* and is known under the common name Hirao Yabusotetsu or Hirao *Cyrtomium*). Though I believe I have found both parents in the Kanto region, I have not been able to locate the hybrid. The hybrid is described by Dr. Matsumoto as having wide pinnae and is similar to the unnamed parent but more lustrous and dark green with many pinnae.

1. *C. devexiscapulae* × *C. falcatum* subsp. *falcatum*. Similar to *C. devexiscapulae* with longer pinnae compared to *C. falcatum* but the pinnae are widest at the base and the sides are not parallel.

2. *C. devexiscapulae* × *C. caryotideum* = *C.* × *pseudocaryotideum* Shimura & all, in press. Similar to *C. caryotideum* with some luster, the margins inconspicuously serrate.

3. *C. devexiscapulae* × *C. fortunei* var. *clivicola*. Similar to *C. fortunei* var. *clivicola* but the blade longer and the ear of the pinna not well developed.

4. *C. devexiscapulae* × *C. fortunei* var. *intermedium*. Similar to *C. fortunei* var. *intermedium*, but with wider pinnae, the tip of the pinnae slightly falcate. The center of the indusium blackish-brown.

5. *C. devexiscapulae* × unnamed, *C. fortunei* affinity. Similar to the unnamed parent, but bearing fewer narrower pinnae, and slightly more lustrous.

6. *C. devexiscapulae* × *C. laetevirens* = *C. X kaii* Nakaike, in press. Similar to *C. laetevirens*, but the texture of the leaf is thick and blackish-green, the pinnae are wide and almost entire, the center of the indusium is sometimes slightly blackish brown.

Understanding the processes of hybrid formation and the resultant behavior of hybrids requires much more explanation than given here. Sufficient to say that the terms sexual reproduction, apogamous reproduction, the number of chromosome sets (as triploid, tetraploid, etc.) are important factors in understanding the formation and behavior of hybrids. Several other factors may also be involved. The reader is referred to Moran (2004) pp. 55-61 for more information.

References

Matsumoto, Sadamu. 2003. *Species Ecological Study on Reproductive Systems and Speciation of Cyrtomium falcatum Complex (Dryopteridaceae) in Japanese Archipelago*. Annals of the Tsukuba Botanical Garden No. 22: 1-141, 2003.

In Japanese with many pages in English. Summary in English as well as captions to all illustration, maps, charts and tables. All of the appendix in English (containing localities of plants studied and herbarium specimens, cytological data, morphological data, statistics, and captions to photographs of cytotypes and hybrids).

Moran, R.C. 2004. *A Natural History of Ferns*. Timber Press, Portland, OR, pp. 301.

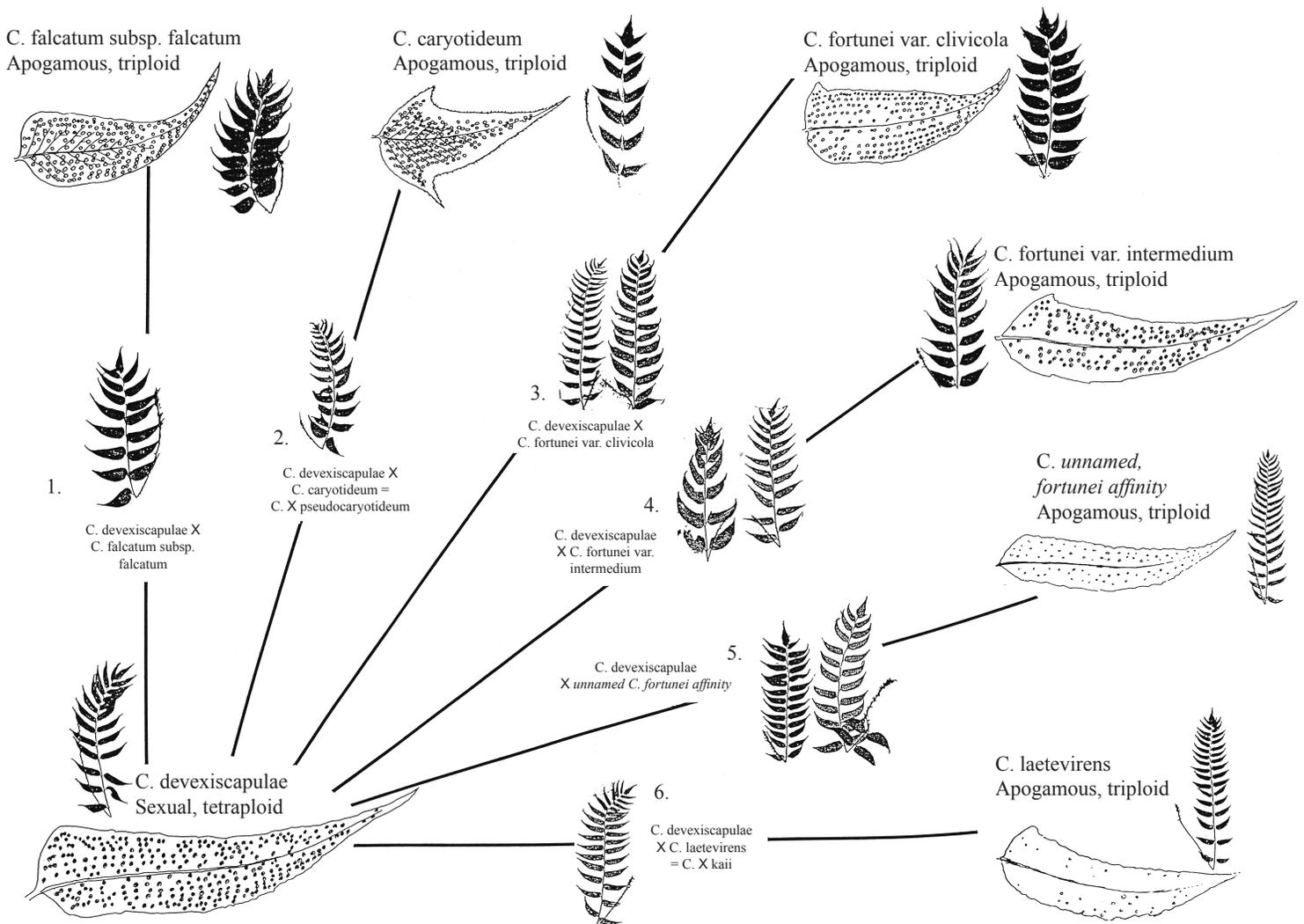


Figure 2. *Cyrtomium* hybrids (those with a × sign) and their parents (lines connecting to the hybrids).



An article of interest:

Taxon, 55 (3) • August 2006: 705–731

A Classification for Extant Ferns

Alan R. Smith¹, Kathleen M. Pryer², Eric Schuettpelz², Petra Korall^{2,3}, Harald Schneider⁴ & Paul G. Wolf⁵

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We present a revised classification for extant ferns, with emphasis on ordinal and familial ranks, and a synopsis of included genera. Our classification reflects recently published phylogenetic hypotheses based on both morphological and molecular data. Within our new classification, we recognize four monophyletic classes, 11 monophyletic orders, and 37 families, 32 of which are strongly supported as monophyletic. One new family, Cibotiaceae Korall, is described. The phylogenetic affinities of a few genera in the order Polypodiales are unclear and their familial placements are therefore tentative. Alphabetical lists of accepted genera (including common synonyms), families, orders, and taxa of higher rank are provided.

The entire article can be found at: www.pryerlab.net/publication/fichier749.pdf

Submitted by Guenther Machol