

BOOK REVIEW

DANIEL F. BRUNTON, JOHN T. KARTESZ, MISAKO NISHINO, PAUL C. SOKOLOFF. 15 Sep 2025. **A Conspectus of the North American Isoetaceae**. Sida, Bot. Misc. 66. (ISBN-13: 978-1-889878-80-5, hardcover). Botanical Research Institute of Texas Press, 1700 University Dr., Fort Worth, Texas 76107-3400, U.S.A. (Orders: shopbritpress.org, orders@brit.org, 817.546.1847). \$55 US, 120 pp., color, index, 7" × 10".

There is a growing interest in the genus *Isoetes*, and this book is an important contribution to that corpus of information. This volume draws heavily on the peripatetic efforts of Dan Brunton to search out and collect every species of *Isoetes* on the continent. As a result, he has discovered and named many new species. His work spans decades and has developed the largest single database of quillworts in North America. The book is an exhaustive survey of all the megaspores and microspores of North American *Isoetes*. A Conspectus of the North American Isoetaceae should be on a bookshelf of every quillwort researcher, and anyone interested in seedless vascular plants.

As noted, Brunton and co-workers studied every named species of *Isoetes* in Canada and the United States (including Hawaii). As a result, we know a lot more about the genus than we did 20 or 30 years ago. There are dozens of cryptic species and more being discovered. It may be that there are more unnamed species of *Isoetes* than named species.

This North American monograph is magisterial in its coverage. It consists mainly of images of the megaspores and microspores. Again, this is unusual as the microspores have been vastly understudied, and their biology is still largely unknown. There are only a few studies that use microspores for their taxonomic value (Musselman 2002). This volume now makes the ornamentation and microstructure of the microspores available for researchers.

After an introduction which reviews the biology of the quillworts treatments of the individual species are arranged alphabetically. This includes taxonomic history; review of relevant literature for that species, a map showing the distribution of the species; and a very helpful feature, a picture of the plant in its natural habitat. Since all quillworts look basically the same, it does little good to have a picture of a plant that looks just like a plant on the next page. The authors have done us a favor here by showing the plant in situ where field botanists will encounter them. Included with each species treatment is a section called Key Features, which gives details of the plant. Very brief. Very helpful.

The authors have made some taxonomic changes, and a few pages are devoted to formalizing these. I think they need further work to clarify their positions. After the introduction, which considers the biology of *Isoetes* and the methods used for the book and information on spores, the majority of the book is a treatment of each of the individual species of the continent. There is no index, just a list of species that are treated in the book.

As a classically trained plant morphologist, I would use a more precise term for the rootstock and the “leaves” of *Isoetes*. The rootstock is often referred to as a corm. Morphologically, a corm is much different because its food reserves are in modified stem tissue. The “leaves” of quillworts are actually sporophylls—each one could develop as either a megasporangium or a microsporangium. In a discussion of morphology, the leaves are referred to as being “round.” I’ve only seen round, i.e., terete and cross-section, leaves in South African plants yet in Figure 2, there is a section showing the typical shape of the sporophylls in cross-section, they are elliptical, not terete.

I am sorry that chromosome numbers are not included because they’re available for most of the described species. This is important because the genus is characterized by reticulate evolution with polyploidy and back-crossing.

Sexual reproduction is not mentioned. This is frequent through fragmentation of the rootstock that releases propagules into the water column from apical meristems on the rootstock. I've seen this phenomenon in Turkey, Syria, Lebanon, and South Africa as well as the United States. Another form of asexual reproduction is when the sporelings have one developing sporophyll and are buoyant and carried along by the water flow. Asexual reproduction may play a bigger role in population biology than we realize.

Also lacking in this book is any reference to scales. It is likely that every species of *Isoetes* has these tiny scales, although they're easily removed from the plant when it is rinsed or even when it is dried. They seem to be very tenuously attached to the rootstock. Scales may have taxonomic value (Bray et al. 2014).

Why the emphasis on spore morphology? The taxonomic utility of megaspores has been known for a long time. But in 1922, Norma E. Pfeiffer published her monograph emphasizing the distinct features of the megaspore (Pfeiffer 1922) for identification. Before the advent of scanning electron microscopy, microspores were seldom illustrated. Pfeiffer was the first modern monograph and has influenced *Isoetes* research for over a century. Brunton et al. will certainly have a similar impact on the study of *Isoetes* not only in North America but globally.

The present work continues this tradition. This compendium which will be of value to people working in floristics and other taxonomic studies. Scanning electron microscopy images are excellent. Having a resource like this raises the question of spore variation within a given taxon. What is the range of spore variation within a given taxon? It is enough trouble determining which taxon it is, and it would be helpful to know the variability in megaspore and microspore morphology in the group. For example, how much do the megaspores vary in a polyphyletic species like *Isoetes louisianensis* or *Isoetes hyemalis* "species" which have different genomes? To put it another way, in those taxa that are polyphyletic, what will the variation be in the megaspores that are produced with different parents?

The advertisement for the book says, "Field botanists, conservation managers, and scientists now can quickly and reliably identify virtually any North American quillwort population they may encounter." Unfortunately, this is not true. I've studied the genus for decades and have trouble identifying species even those with spores. A comprehensive key is included, though I wonder how much practical value it will have. Without experience, how can a first-time user of the key understand the differentiation between very similar looking spores of tetraploids?

Like colleagues, I get requests to determine sterile plants of quillworts from environmental consultants and other others. Unfortunately, there is no way at present to rapidly determine sterile specimens.

Color and clarity of the images is a feature of this well-produced book. Considering that it is print on demand, I'm surprised the color is much better than I've experienced with other print on demand books. The price is a bargain considering the scope of the work.

Appropriately, this volume is dedicated to Don Britton and Carl Taylor. Having worked with both in the field, I am very pleased that they are recognized for their work, which has helped us better understand this intriguing genus. They would be honored by this recognition.

REFERENCES CITED

- BRAY, R., P.W. SCHAFFRAN, AND L.J. MUSSELMAN. 2014. Interesting, provocative, an enigmatic: morphological observations on Southeastern quillworts (*Isoetes* Isoetaceae, Lycopodiophyta). *Castanea* 83 (2):263–269.
- MUSSELMAN, L.J. 2002. Ornamentation of *Isoetes* (Isoetaceae Lycopphyta) microspores. *Bot. Rev.* 68:474–487.
- PFEIFFER, N.E. 1922. Monograph of the Isoetaceae. *Annals Missouri Bot. Gard.* 9:29–233.

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