
A New Combination in the Fern Genus *Osmundastrum* (Osmundaceae)

William A. McAvoy

Delaware Natural Heritage and Endangered Species Program, Delaware Department of Natural Resources and Environmental Control, Division of Fish and Wildlife, 4876 Hay Point Landing Rd., Smyrna, Delaware 19977, U.S.A. william.mcavoy@state.de.us

ABSTRACT. From eastern North America, the glandular pubescent variety of *Osmunda cinnamomea* L. var. *glandulosa* Waters (Osmundaceae) is transferred as *Osmundastrum cinnamomeum* (L.) C. Presl var. *glandulosum* (Waters) McAvoy.

Key words: IUCN Red List, North America, *Osmunda*, Osmundaceae, *Osmundastrum*.

In studying the phylogenetic relationships among the infragenera in Osmundaceae, Metzgar et al. (2008) and Jud et al. (2008) confirmed the work of earlier studies (Tagawa, 1941; Hewitson, 1962; Bobrov, 1967; Miller, 1967, 1971; Yatabe et al., 1999, 2005) that the genus *Osmunda* L. is paraphyletic and that the taxon traditionally treated as *Osmunda cinnamomea* L. is sister to the rest of the family. The authors support the recognition of *Osmundastrum* C. Presl at the level of genus and recognize *Osmundastrum cinnamomeum* (L.) C. Presl as its only extant species.

In 1902, Campbell Easter Waters (1872–1955) described a variety of *Osmunda cinnamomea* distinguished by its densely glandular pubescent foliage as *O. cinnamomea* var. *glandulosa* Waters. Since this time, phylogenetic investigation and taxonomic placements assign the species to *Osmundastrum*, but Waters's variety has never been transferred. This oversight is corrected herein, in recognition of the distinctiveness of the taxon. The varietal name is further lectotypified.

***Osmundastrum cinnamomeum* (L.) C. Presl var. *glandulosum* (Waters) McAvoy, comb. nov.**
Basionym: *Osmunda cinnamomea* L. var. *glandulosa* Waters, Fern Bull. 10: 21–22. 1902.
TYPE: U.S.A. Maryland: Glen Burnie, low wet woods with the typical, 17 July 1901, C. E. Waters s.n. (lectotype, designated here, PH-079887).

Discussion. Specimens of the glandular variety were stated to be at the “National Museum, Gray Herbarium” (Waters, 1902: 22), and syntypes were confirmed and designated at both institutions. The

specimen at PH designated here as the lectotype was annotated by Waters as “type specimen.”

Osmunda cinnamomea var. *glandulosa* has been variously treated by different authors. Fernald (1942, 1950) recognized this variety, as did Reed (1953) and Montgomery and Fairbrothers (1992). Others treat it invalidly as a form (Broun, 1938; Weakley, 2010), while others simply include the variety under synonymy (Whetstone & Atkinson, 1993), or do not consider it (Gleason & Cronquist, 1991). Wagner (1991: 20) was intrigued with this taxon and stated: “there is a remarkable plant known as *O. cinnamomea* var. *glandulosa*, named by the noted Maryland fern expert C. E. Waters at the turn of the century, that appears not only to merit recognition, but may even constitute a distinct microspecies.” When Fernald (1942: 353) first encountered this species in Virginia, he noted that: “whenever we took hold of the abundant *Osmunda cinnamomea*, it stuck to our fingers. Search for ordinary *O. cinnamomea* failed to reveal it. The whole sphagnous wood was given over to the somewhat local var. *glandulosa*.”

Waters (1902: 21) recognized that both the glandular-pubescent variety and the typical variety of the species occurred together under the same ecological conditions and that both maintained their distinctiveness: “Both the variety and the typical form of the species grow in large numbers in low sphagnum woods.... It cannot be said that the variation is due to peculiarities of soil or to varying amounts of sunlight, for the two forms grow side by side all through the woods.” I have also observed both the glandular and nonglandular varieties growing together in populations in Delaware, Maryland, and New Jersey, and both varieties maintain their uniqueness in such settings.

Figure 1 illustrates the distinctiveness between *Osmundastrum cinnamomeum* var. *glandulosum* and *O. cinnamomeum* var. *cinnamomeum*. The underside of the leaf and the margins of variety *glandulosum* are covered with stiff, glandular hairs (< 1 mm long) that are regularly scattered throughout the lamina and on the midrib. The glandular hairs on the upper side of the leaf are sparse and tend to be confined to the veins. The rachis and petioles are also densely

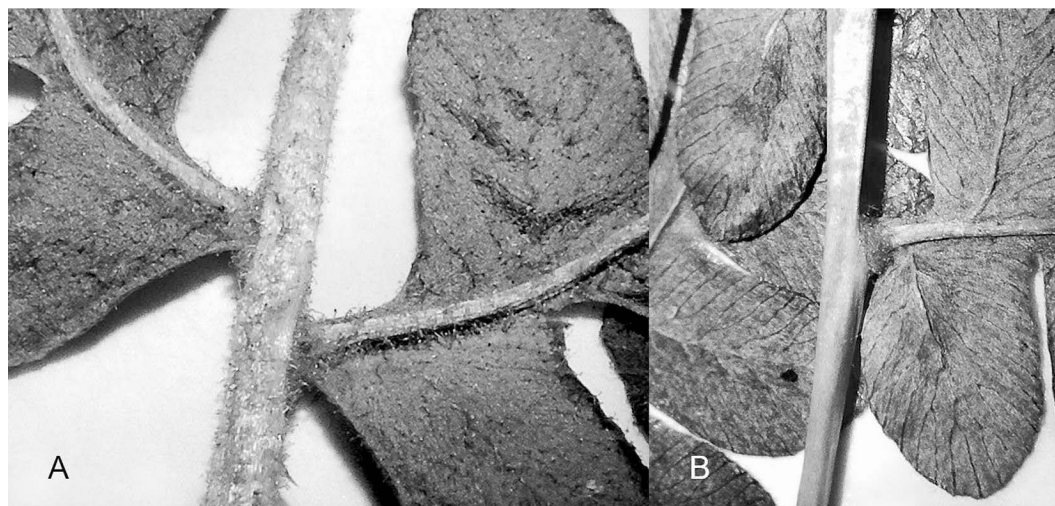


Figure 1. Comparison of *Osmundastrum cinnamomeum* var. *glandulosum* (A), with *O. cinnamomeum* var. *cinnamomeum* (B).

covered with glandular hairs, where they intermingle with the long, curly hairs typical of the species. The variety *cinnamomeum*, of course, lacks the glandular hairs just described.

Based on collection records (DOV, GH, NCU, PH, and US) and the literature (Fernald, 1942, 1950; Reed, 1953; Wagner, 1991; Montgomery & Fairbrothers, 1992; McAvoy, 2007; Virginia Botanical Associates, 2010), *Osmundastrum cinnamomeum* var. *glandulosum* appears to occur most frequently on the Atlantic coastal plain, where it forms rather large colonies in swampy woods and floodplains. Specimens of *O. cinnamomeum* var. *glandulosum* exist from the following states: New Jersey, Delaware, Maryland (supported by the type), Virginia, North Carolina, South Carolina, Georgia, and Alabama. *Osmundastrum cinnamomeum* var. *glandulosum* is reported in the literature from Mississippi (Fernald, 1950; Reed, 1953), Rhode Island (Fernald, 1950), and West Virginia (Wagner, 1991).

IUCN Red List category. The conservation status of *Osmundastrum cinnamomeum* var. *glandulosum* has not been evaluated against IUCN Red List criteria (IUCN, 2001); therefore, an assessment of Not Evaluated (NE) has been assigned.

Paratypes. U.S.A. **Alabama:** Baldwin Co., Perdido River, 2008, *W. Barger & B. Holt s.n.* (Anniston Mus. Nat. Hist., AUA, TROY, UNA). **Delaware:** Sussex Co., Concord, 2010, *W. McAvoy 6580* (DOV). **Georgia:** Colquitt Co., 1966, *W. Faircloth s.n.* (NCU). **New Jersey:** Burlington Co., Buddtown, 2010, *W. McAvoy & W. Knapp 6577* (DOV). **North Carolina:** Martin Co., Conoho Creek, 1958, *E. Radford et al. s.n.* (NCU). **South Carolina:** Richland Co., Ft. Jackson, 1993, *A. Pitman & A. McBee s.n.* (NCU).

Virginia: Fairfax Co., Potomac Bluffs, 1899, *W. Palmer 280* (US).

Acknowledgments. I am truly grateful to Robert Naczi for his guidance and advice in helping to bring this endeavor to fruition, and many thanks to Wesley Knapp for his encouragement and help with field studies. The efforts of Arthur Tucker (DOV) in helping to obtain loans of specimens are greatly appreciated, and I am thankful to the curators of GH, PH, and US for specimen loans and allowing access to collections.

Literature Cited

- Bobrov, A. E. 1967. The family Osmundaceae (R. Br.) Kaulf., its taxonomy and geography. *Bot. Zhurn. (Moscow & Leningrad)* 52: 1600–1610.
- Broun, M. 1938. Index to North American Ferns. Science Press Printing Co., Lancaster, Pennsylvania.
- Fernald, M. L. 1942. The seventh century of additions to the flora of Virginia. *Rhodora* 44: 341–405.
- Fernald, M. L. 1950. Gray's Manual of Botany, 8th (centennial) ed. [Corrected printing, 1970.] D. Van Nostrand Co., New York.
- Gleason, H. A. & A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada, 2nd ed. New York Botanical Garden, Bronx.
- Hewitson, W. 1962. Comparative morphology of the Osmundaceae. *Ann. Missouri Bot. Gard.* 49: 57–93.
- IUCN. 2001. IUCN Red List Categories and Criteria, Version 3.1. Prepared by the IUCN Species Survival Commission. IUCN, Gland, Switzerland, and Cambridge, United Kingdom.
- Jud, A. N., G. W. Rothwell & R. A. Stockey. 2008. *Todea* from the Lower Cretaceous of western North America: Implications for the phylogeny, systematics, and evolution of modern Osmundaceae. *Amer. J. Bot.* 95: 330–339.

- McAvoy, W. A. 2007. The lycophytes, monilophytes, and gymnosperms of the Delmarva Peninsula, an annotated checklist. *Maryland Naturalist* 48(1): 1–48. [Updates at <<http://www.dnrec.delaware.gov/fw/NHESP/information/Pages/Publications.aspx>>, accessed 20 May 2011.]
- Metzgar, J. S., J. E. Skog, E. A. Zimmer & K. M. Pryer. 2008. The paraphyly of *Osmunda* is confirmed by phylogenetic analyses of seven plastid loci. *Syst. Bot.* 33(1): 31–36.
- Miller, C. N., Jr. 1967. Evolution of the fern genus *Osmunda*. *Contr. Mus. Paleontol. Univ. Michigan* 21: 139–203.
- Miller, C. N., Jr. 1971. Evolution of the fern family Osmundaceae based on anatomical studies. *Contr. Mus. Paleontol. Univ. Michigan* 23: 105–169.
- Montgomery, J. D. & D. E. Fairbrothers. 1992. *New Jersey Ferns and Fern-allies*. Rutgers University Press, New Brunswick.
- Reed, C. F. 1953. *The Ferns and Fern Allies of Maryland and Delaware, Including the District of Columbia*. Reed Herbarium, Baltimore.
- Tagawa, M. 1941. Osmundaceae of Formosa. *J. Jap. Bot.* 17: 692–703.
- Virginia Botanical Associates. 2010. Digital Atlas of the Flora of Virginia. <http://www.biol.vt.edu/digital_atlas/>, accessed 20 May 2011.
- Wagner, W. H. 1991. The glandular cinnamon fern. *Fiddlehead Forum*, July 18(4–5): 20.
- Waters, C. E. 1902. A new form of *Osmunda cinnamomea*. *Fern Bull.* 10: 21–22.
- Weakley, A. S. 2010. *Flora of the Southern and Mid-Atlantic States*. University of North Carolina Herbarium (NCU), North Carolina Botanical Garden, University of North Carolina at Chapel Hill, Chapel Hill. <<http://herbarium.unc.edu/flora.htm>>, accessed 20 May 2011.
- Whetstone, R. D. & T. A. Atkinson. 1993. Osmundaceae. Pp. 107–109 in *Flora of North America* Editorial Committee (editors), *Flora of North America North of Mexico*, Vol. 2, Pteridophytes and Gymnosperms. Oxford University Press, New York.
- Yatabe, Y., H. Nishida & N. Murakami. 1999. Phylogeny of Osmundaceae inferred from *rbcL* nucleotide sequences and comparison to the fossil evidences. *J. Pl. Res.* 112: 397–404.
- Yatabe, Y., N. Muraakami & K. Iwatsuki. 2005. *Claytosmunda*, a new subgenus of *Osmunda* (Osmundaceae). *Acta Phytotax. Geobot.* 56: 127–128.