

The *Polypodium pectinatum-plumula* Complex in Florida¹

A. MURRAY EVANS

Although a treatment of the entire *Polypodium pectinatum-plumula* complex is in preparation for future publication, it seems appropriate, due to current efforts towards floras for the southeastern United States and southern Florida, to publish the portion of the study that applies to the representatives of the complex which occur within the continental United States.

Traditionally this complex has included only two species in Florida, *Polypodium plumula* Humb. and Bonpl. ex Willd. and *P. pectinatum* L. On the basis of a comprehensive study of the entire complex, it now appears that three taxa are present, *P. plumula*, *P. ptilodon* Kunze var. *caespitosum* (Jenm.) Evans, and *P. dispersum* Evans. *Polypodium dispersum* is a newly defined species, and one which has caused taxonomic confusion in the complex because it appears to be intermediate between the other two taxa. Wherry (1964, p. 62) treats it as a hybrid and indicates that its spores are aborted, which they are not; his illustration of *P. plumula* fits *P. dispersum* better than *P. plumula*, which he does not illustrate. *Polypodium ptilodon* represents what regional authors and collectors have construed as "*P. pectinatum*." *Polypodium pectinatum* L. has long been a source of confusion, particularly in the Caribbean area, and it has been treated as consisting of numerous and variable forms. A full treatment of this problem is deferred for later publication. In summary, however, the original material on which Linnaeus based his interpretation

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is from the Lesser Antilles (Martinique). Only one species in this complex occurs there; it is smaller and somewhat more delicate than our Florida material, is an epiphyte, and is similar to material from Jamaica that is diploid ($n = 37$). The plants in Florida are all tetraploids ($n = 74$), are terrestrial, and exhibit consistent morphological differences from the Lesser Antillean plants. The tetraploid "*P. pectinatum*" records from Jamaica reported by T. Walker (1966) I presume to be other taxa and not *P. pectinatum* L. *sensu stricto*. Unfortunately I have not been able to see his material, but my own field and cytological studies of Jamaican *Polypodium* support my findings.

In Central and South America *P. plumula* has been broadly construed to include what are really several species. In Florida it has been correctly identified, except for the confusion with its relative *P. dispersum*.

KEY TO THE POLYPODIUM PECTINATUM-PLUMULA COMPLEX IN FLORIDA

- Rachis paleae filiform and inconspicuous, deciduous; rachis dark brown; plants terrestrial or on rotten logs; veins 2- or 3-forked; spores 64 per sporangium.....1. *P. ptilodon* var. *caespitosum*
- Rachis paleae cordate or hastate, conspicuous, persistent; rachis black; plants epiphytic or epipetric; veins 1- or 2-forked; spores 32 or 64 per sporangium.
- Plants usually epiphytic and drooping; fronds narrow-ovate or linear; segments linear, the basal not deflexed, reduced to mere auricles; veins 1-forked; rachis paleae cordate and appearing bullate; spores 64 per sporangium.....2. *P. plumula*
- Plants usually epipetric and erect; fronds narrow-ovate; segments narrow-ovate, the basal shorter, deflexed, occasionally reduced to auricles; veins 2-forked; rachis paleae hastate, flat; spores 32 per sporangium.
3. *P. dispersum*

1. POLYPODIUM PTILODON [Kunze var. **caespitosum** (Jenman)
A. M. Evans, comb. nov.
P. pectinatum var. *caespitosum* Jenman, Bull. Bot. Dept.
Jamaica 4: 125. 1897. TYPE: Jamaica, Old England, 4,000
ft, G. S. Jenman (NY!).
"*P. pectinatum*" auctt., non L.

Plants terrestrial or on rotten logs; fronds 30–105 cm long; stipe and rachis dark red-brown, ctenoid (comb-like) hairs conspicuous; rachis paleae inconspicuous, filiform, the margins entire or inconspicuously fimbriate; blades narrow- to linear-ovate, 27–90 cm long, 6.5–18 cm wide, narrowly cuneate in outline at the base; segments straight or subfalcate, acute to rounded, entire to subcrenulate, the basal ones reduced to lobes or auricles; lamina herbaceous to coriaceous, with scattered silvery acicular hairs, more densely pilose in an oblong area around the sorus; veins 2–3 (4)-forked; sori round or oblong; sporangia with 1 or 2 capsular paraphyses; spores ca. 56μ long, reniform, monolete, 64 per sporangium; $n = 74$.

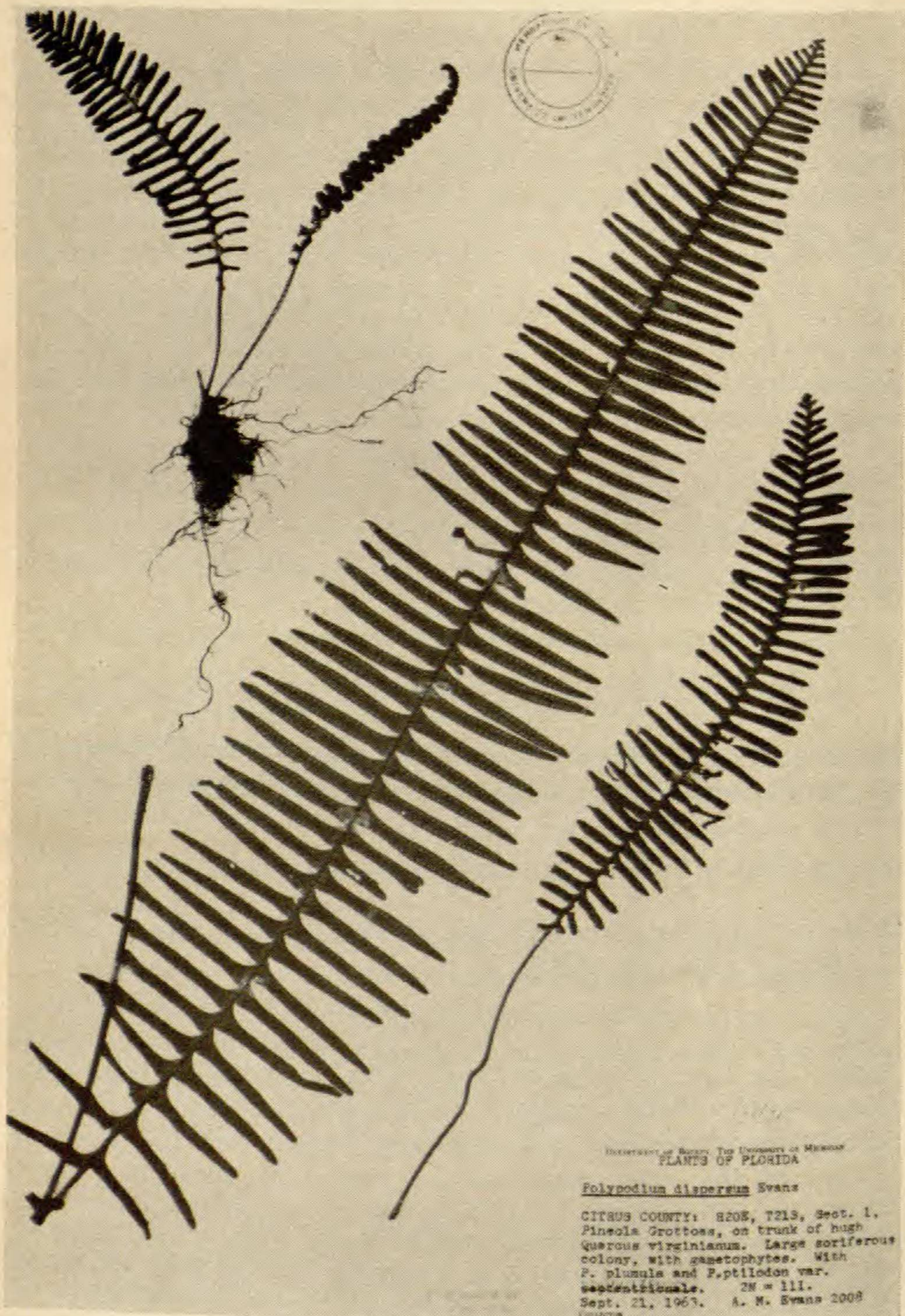
Distribution: FLORIDA: Brevard, Citrus, Collier, Dade, Hernando, Highlands, Hillsborough, Lake, Manatee, Marion, Orange, Pasco, Polk, Putnam, Seminole, Sumter, and Volusia Counties. West Indies, Mexico, Honduras.

This is the most northern of the four varieties of *P. ptilodon* Kunze which ranges widely over tropical America to northern Argentina. In Florida it is readily recognizable by its generally terrestrial habit, large size, blackish-brown rachis, which dries red-brown, and the very inconspicuous filiform rachis scales. The species is particularly distinct from other species in the complex because of the oblong patch of laminar hairs surrounding and exceeding the sorus.

2. POLYPODIUM PLUMULA Humb. & Bonpl. ex Willd. in L., Sp. Pl. ed. 4, 5: 178. 1810.

Plants epiphytic, occasionally epipetric; fronds 20–60 cm long; stipe and rachis black, without ctenoid (comb-like) hairs; rachis paleae conspicuous, broadly cordate with a short-acuminate apex, bullate (inflated), the margins fimbriate; blades narrow- to linear-elliptic, 15–52 cm long, 3–7.5 cm wide, cuneate or subtruncate in outline at the base; segments 2–3 mm wide, straight, obtuse, entire, reduced but not deflexed at blade base; lamina herbaceous to coriaceous with scattered acicular hairs; veins 1- or 2-forked; sori round; sporangia with 3 or 4 capsular paraphyses; spores ca. 50μ long, reniform, monolete, 64 per sporangium; $n = 74$.

Distribution: FLORIDA: Brevard, Citrus, Dade, Hernando, Hillsborough, Marion, Monroe, Orange, Polk, Seminole, St.



POLYPODIUM DISPERSUM A. M. EVANS, SP. NOV.
EVANS 2008 (ISOTYPE, TENN)

John's, Sumter, and Volusia Counties. Tropical America south to southern Brazil.

This species varies throughout its range, but it is quite consistent and readily recognizable in Florida. Although primarily epiphytic, plumose, and drooping, it is occasionally found on rocks; then it is smaller, more erect, and more similar to the following species.

3. **POLYPODIUM dispersum** A. M. Evans, sp. nov. Plate 27

P. molle H. B. K. Nov. Gen. and Sp. 1: 8. 1816, non Schreb., 1771. TYPE: Venezuela, Cumaná, *Humboldt & Bonpland* (P, fragment B!).

P. pectinatum var. *squamosum* Lindm. Ark. för Bot. 1: 238. 1903, non *P. squamatum* L. SYNTYPES: Jamaica, *Herb. Alstroemer* (S-PA!) and *Herb. Casstroem* (S-PA!); Bermuda, *Herb. Farlow* (GH!); Brazil, Mato Grosso, Fazenda São José, *Regnell A2671* (LECTOTYPE, S!); Rio de Janeiro, *Mosén 113* (B!, S!, S-PA!).

P. microsorum Lindm. Ark. för Bot. 1: 239. 1903, *pro parte*, as to Cuba, *Wright 1051*, but not as to the lectotype, which is *P. pectinatiforme* Lindm.

Rhizoma breviter repens, paleis anguste triangularibus rufo-brunneis acuminatis paullo comosis inconspicue dentatis; frondes approximatae, rhachibus quam stipitibus ca. triplo longioribus, nigris, parce pilosis, pilis acicularibus vel interdum ctenoideis, paleis conspicuis anguste triangularibus hastatis non bullatis atro-rufo-brunneis basi pallida excepta, inconspicue dentatis basi fimbriatis; lamina anguste triangularis basi subtruncata vel abrupte cuneata, segmentis horizontalibus, infimis interdum deflexis reductis, herbaceis, apice obtusis, basi symmetricis, integris, pilis clavatis et longe acicularibus parce praeditis; costae decurrentes, parce pilosae, pilis acicularibus, parce paleaceae; venae bifurcatae, liberae; sori mediales, rotundi vel interdum oblongi, paraphysibus paucis simplicibus clavatis; sporangia plerumque setosa; spores 32.

Plants epipetric, occasionally epiphytic; fronds 27–63 cm long; stipe and rachis black, occasionally with ctenoid hairs; rachis paleae conspicuous, narrow-triangular, hastate, acuminate, non-bullate, inconspicuously toothed, fimbriate at the base; blades narrow-ovate to narrow-triangular, 17–48 cm long, 4.5–9 cm wide, subtruncate to abruptly cuneate in outline at the base; segments 3–6 mm wide, straight, obtuse, entire, reduced (sometimes to

mere lobes) and occasionally deflexed at the blade base; lamina herbaceous, with scattered acicular hairs; veins 2-forked; sori round or occasionally oblong; sporangia mostly with 2 (1-4) capsular paraphyses; spores ca. 43μ long, globose to ovoid, with irregular, incomplete or interrupted, variable scar, 32 per sporangium; $n = 111$ (apogamous).

TYPE: Florida, Citrus Co., R20E, T21S, Sect. 1, Pineola Grottoes, Sept. 21, 1963, A. M. Evans 2008 (MICH; isotypes TENN, US).

Distribution: FLORIDA: Alachua, Brevard, Citrus, Hernando, Hillsborough, Marion, Martin, Monroe Counties. Tropical America south to southern Brazil.

The details of apogamy in this species vary from cases of apogamy known in other ferns (Evans, 1964b). One of the distinctive features is that all the sporangia have 32 viable spores per sporangium, contrary to most apogamous ferns which have either some sporangia with aborted spores or many spores aborted within any given sporangium. Gametophytes, both wild and cultured, mature quickly and may produce two or three apogamous sporophytic proliferations, but neither functional nor aborted sex organs occur.

Polypodium dispersum is commonly found in areas of exposed limestone outcrops, often in dense mats on the rocks. It is often found in a juvenile, non-soriferous state, and usually spreads extensively by new rhizomes budding from the roots of larger plants. This condition has been found in several other tropical American epipetric or epiphytic species of the *P. plumula* group (Evans, 1964a), as well as in various other members of the Polypodiaceae, Aspleniaceae, Grammitidaceae, and Vittariaceae. Root budding appears to be correlated with the exposure of the roots in these typically epiphytic or epipetric ferns. Two populations of *P. dispersum* growing in apparently marginal habitats in Florida suggest that root proliferations are a means of perpetuating a population in the absence of conditions suitable for production of fertile plants. One of these is at "Buzzard's Roost," in Alachua County, the northern limit of the range. Although there are moist grottoes in this area, the plants grow on limestone outcrops

scattered through open woods. The plants are non-soriferous and mostly under 10 cm tall, although the species is usually at least twice that tall. Dr. Ernest Ford, of the University of Florida, has observed these plants becoming smaller over the years, and recently he has seen no fertile plants. Living specimens collected from the area have been grown to maturity in the greenhouse.

Another marginal locality is Pumpkin Key, in Monroe County, a low coral island off the northwestern tip of Key Largo. This Key is only about 1,100 feet in diameter and has a maximum elevation of approximately 11 feet. It is unusual among the small keys because it does have a small mahogany (*Swietenia mahagoni*) and Gumbo Limbo (*Bursera simaruba*) hammock in the center of the island. Herbarium specimens of this *Polypodium* had been collected here by J. K. Small in 1915 and 1920. I have seen no collections made since, and I was assured that it probably no longer grew there. I visited this island in April, 1963, with Doctors C. E. Delchamps and S. M. Faber, of the University of Miami, and found many hundreds of tiny, juvenile plants growing in the hammock on exposed coral and particularly on large, fallen mahogany logs. The plants were all interconnected by long roots running over the surface of the logs; no fertile plants were seen. The collections by Small were similar. Presumably Small searched the small area well and also found no fertile material. Plants collected at this locality have also been brought to mature fruiting condition in the greenhouse. These observations suggest that this species has been able to exist many years in a juvenile, vegetative condition in this marginal locality.

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DEPARTMENT OF BOTANY, UNIV. OF TENNESSEE, KNOXVILLE,
TENN. 37916.