

**ZAMIA FLORIDANA (ZAMIACEAE),
THE CORRECT NAME OF THE FLORIDA CYCAD**

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ABSTRACT

The view is accepted that the *Zamia* native to the West Indies consists of several species, one of which is native also to Florida. The earliest available binomial for the Florida taxon is *Zamia floridana* A. DeCandolle (1868). An earlier binomial, *Zamia integrifolia* Linnaeus filius in Aiton (1789), by citation in synonymy of the prior *Zamia pumila* Linnaeus (1763), was superfluous when published and is thus illegitimate. *Phytologia* 91(1):95-104 (April, 2009).

KEY WORDS: *Zamia floridana*, Zamiaceae, nomenclature.

INTRODUCTION

The West Indian complex of cycads in the genus *Zamia* (Zamiaceae) has been treated by Eckenwalder (1980) as composed of a single species with populations that vary in leaflet width and vein number but are not appropriately divided into more than a single species, *Z. pumila* L. (1763). This interpretation has been accepted by some authors (e.g. Wunderlin, 1998; Wunderlin & Hansen, 2000), and *Z. pumila* is frequently used in Florida horticulture.

A subsequent review of the West Indian cycads by Stevenson (1987a; 1987b; 1991), which incorporated leaflet shape and denticulation and cone shape and color, was able to distinguish 6 species within that area, one of which (his *Zamia integrifolia*) ranges to Florida. Landry (1993) in the influential *Flora North America* followed Stevenson in recognizing the Florida plant as specifically distinct from

the all-inclusive *Z. pumila* of Eckenwalder; Landry too employed *Z. integrifolia*.

The present author has long been of the opinion that *Zamia integrifolia* L. f. in Ait. (1789) was nomenclaturally superfluous when published, in that Linnaeus filius (in Aiton) had erred (by modern rules) by citing in his synonymy a pre-existing name, *Zamia pumila* L. (1763). In this belief, the present author (1968; 1979; Burch et al., 1988) has consistently used a later available name, *Z. floridana* A. DC. (1868). In need of an infraspecific name for a non-typical Florida population, he made the combination, *Z. floridana* var. *umbrosa* (Small) D. B. Ward (2001). The authors of a recent, highly acclaimed systematics text (Judd et al., 1999: 151) have accepted this judgment, also using *Z. floridana*.

DISCUSSION

A circumstance has now arisen that compels presentation of a full defense of *Zamia floridana*. The recent proposal by a colleague to use this name in a floristic survey has by editorial review triggered an intense reconsideration of its nomenclatural underpinnings. To satisfy all parties that this name is correct calls for a full discussion of the background facts and provisions of the International Code of Botanical Nomenclature (McNeill et al., 2006) that justify this conclusion.

The facts of publication seem not in dispute. In 1763 Linnaeus published the name *Zamia pumila*. He accompanied the name with a 7-word Latin phrase: *Spadix more fructus Cupressi divisus in floscules* ("Infructescence [=cone] larger than [that of] *Cupressus*, divided into florets [=microsporophylls]"). He stated its source: *Habitat in America meridionali*. He then listed four earlier authors (P. Miller, J. Commelin ("Commelijn"), L. Plukenet, and C. J. Trew), with the phrase-names used by each. Two centuries later the illustration of one of these cited authors, that of Commelin (1697), was designated by Eckenwalder (1980: 715) as the lectotype for *Z. pumila*.

Linnaeus filius' treatment of *Zamia* was wholly independent of that of his father. He is known to have worked in London with William Aiton (Stafleu, 1971) and to have assisted in the writing of Aiton's *Hortus Kewensis* (1789); each of the five descriptions of *Zamia* in that publication was credited to him. In this endeavor he had access to living plants (he noted *Z. integrifolia* to have been introduced from "East Florida" by John Ellis in 1768). His description of *Z. integrifolia* (*foliolis subintegerrimis obtusiusculis muticis rectis nitidis, stipite inermi*) was original and appropriate to Florida plants. He cited only one reference, the *Z. pumila* of his father, but for this he stated "exclusis synonymis." This two-word Latin phrase is the genesis of all later nomenclatural uncertainty regarding the Florida *Zamia*.

The third name involved here is *Zamia floridana* A. DC. (1868). Its author reported it from "E. Florida" and its label data (Eckenwalder, 1980) further narrowed its source to "Fort Brooke," a Seminole War army encampment at the head of Tampa Bay on the west coast of peninsular Florida, as collected by "Hulse." (In the 18th and early 19th century, all of peninsular Florida was in the political district of "East Florida." Gilbert White Hulse, a correspondent of John Torrey in New York, was a physician known to have been stationed at Fort Brooke.) The legitimacy of *Z. floridana* has not been challenged; but it rises from synonymy only in the event of the illegitimacy of the prior *Z. integrifolia*.

On the surface, Linnaeus filius' inclusion of an available name would appear to trigger citation of I.C.B.N., Art. 52.1, which states that if an old name cited in synonymy could have been used for the new taxon, the new name is superfluous and illegitimate. Were *Zamia integrifolia* illegitimate, the later *Z. floridana* would succeed. Correspondents (largely via e-mail), however, have raised a number of questions and arguments directed toward invalidation of the apparent I.C.B.N. citation, in part by invocation of the related Art. 52.2, thus retaining *Z. integrifolia* as legitimate. These communications have been widely circulated within the taxonomic/nomenclatural community, and have come to form a "gray literature" suggesting the validity of

Zamia integrifolia is established. It is these questions and arguments that must here be detailed and refuted.

Since the written (e-mail) statements of correspondents had not been polished for publication, and at times perhaps exhibit whimsy over precision, their specific authorship is withheld. Unattributed statements, of course, are atypical within scientific discourse. To mitigate the conflicting goals of confidentiality and verifiability, a full copy of communications has been provided the editor. Where possible, statements of correspondents are cited exactly, as indicated by enclosure within quote marks.

The following eight arguments well summarize the range of views expressed by the correspondents. The associated responses attempt to relate these remarks with relevant provisions of the I.C.B.N.

Argument #1. That Linnaeus filius "meant to say just the opposite, i.e. 'excluding *Z. pumila* L. except the synonyms.' Perhaps a Latin scholar could refute my supposition that 'exclusis synonymis' can be read as 'including only the synonyms.'"

Response. No deep schooling in Latin is needed to know that "exclusis" cannot be interpreted to mean "including only." The logic and motive of Linnaeus filius in excluding his father's references is apparent, in that some addressed quite different plants (one became *Zamia furfuracea* L. f. in Ait.) and in any event were surely inferior to the far greater wealth of materials (living and dried) available to him in London.

Argument #2. That Eckenwalder's designation of the 1697 Commelin illustration as the lectotype of *Zamia pumila*, which Linnaeus filius had excluded from his treatment of *Z. integrifolia*, removes the critical element -- the type -- from the citation, thereby expunging any prior superfluity.

Response. Eckenwalder's lectotypification is irrelevant in determination of superfluity. If *Zamia integrifolia* were illegitimate prior to Eckenwalder's designation, barring certain circumstances it must remain so in perpetuity. Article 6.4 provides that: "A name which

according to this Code was illegitimate when published cannot become legitimate later" (unless conserved or sanctioned).

Argument #3. That Linnaeus filius had in effect created a *nomen nudum* by exclusion of his father's cited references. [First correspondent]: "When L. f. excluded all the synonyms of *Z. pumila*, he automatically excluded all the type elements that would otherwise cause the superfluity." [Second correspondent]: "Since Aiton clearly excludes the type of *Zamia pumila* of Linnaeus by excluding all the synonymy of *Z. pumila*, he created a new and valid name, *Zamia integrifolia* Aiton."

Response. This argument is in reference to Art. 52.2, the companion of Art. 52.1, where conditions are set under which citation of an old name in synonymy will cause the new name to become superfluous. Citation of the name itself is specifically stated to be sufficient to cause superfluity, "unless the type is at the same time excluded either explicitly or by implication."

But with *Zamia pumila* no type existed at publication. Nor was the legitimacy of that name impaired by its absence. Even without the synonyms, the citation of *Z. pumila* still encompassed a full circumscription: the name, the source, and the seven-word diagnosis. At that time, 1789, no "type element" was essential for valid publication; designation of a type was not required until 1958 (Art. 37.1). An abundance of early names, some by Linnaeus, many by Rafinesque and Thomas Walter among others, are based solely (if insecurely) on a name and its diagnosis.

Though there is a seductive logic in equating the references cited by Linnaeus -- from which a later type-equivalent may be chosen -- with a type itself, the provisions of Art. 52.2, read critically, do not support the argument.

Argument #4. That a party other than the original author has the power to cause the type of a name used in synonymy to be excluded. That is, the requirements of the I.C.B.N. for a superfluity-

causing synonym to be intentionally included are not met if a second party can cause the exclusion.

Response. This argument, also in reference to the companion Art. 52.2, though not expressly stated by any correspondent, is implicit if the act of lectotypification can assign the type to a component of the original material of *Zamia pumila* that Linnaeus filius had excluded. Yet Art. 52.2 clearly indicates otherwise. Though the language is passive -- "unless the type is at the same time excluded either explicitly or by implication" -- there is no provision for parties other than the original author to cause such exclusion. Nor, of course, can a later party act "at the same time" as the original author.

Argument #5. [First correspondent]: That "*Z. integrifolia* is not illegitimate because it did not include ALL the elements that might become the lectotype. In short, it was not superfluous at birth." [Second correspondent]: "Since Aiton's reference to *Z. pumila* excludes all the synonyms (and their type materials), *Z. integrifolia* may be treated as legitimate."

Response. Though differently worded, this argument is a variant of Argument #3. Again, there is no requirement before 1958 that elements suitable for lectotypification be present. Had Linnaeus (1763) published *Zamia pumila* as he did but without inclusion of any references, the name would still be legitimate. The removal of his references by Linnaeus filius (1789) creates no reduced state of legitimacy.

It is obvious that the failure of an author to designate a specimen that can serve as its type, or citation in his original materials of other publications in which such specimens may be referred, creates a significant uncertainty in assignment of the name to a definite taxon. The I.C.B.N. addresses this deficiency, by the process of neotypification (Art. 9.6). Where no specimen or suitable reference exists, the rules permit a specimen never seen by the author to be selected as a neotype. By this action a legitimate name that lacks clear meaning can be linked with a specimen and thereby be made precise.

Argument #6. "If the [lectotypic] element (Commelin's t. 58 in this case) were to be included in any taxon published between 1762 [sic?] and 1980 (*Z. integrifolia* in this case), such an inclusion does not cause illegitimacy (Art. 52, Note 2). ...L. f. did not include this element for *Z. integrifolia*; therefore, the question of illegitimacy never arises."

Response. The thrust of this argument is not entirely clear. The claim appears to be that by exclusion of the synonym the basis for the name was also excluded. This view was supported by reference to a rarely cited provision of the I.C.B.N., Art. 52.2, Note 2: "The inclusion, in a new taxon, of an element that was subsequently designated as the type of a name which, so typified, ought to have been adopted...does not in itself make the name of the new taxon illegitimate."

The cited reference is irrelevant. A note as employed by the I.C.B.N. does not create a rule or restriction; it merely clarifies the meaning of the relevant Article. Plain reading of Note 2 creates no new content; it says merely that a special stated circumstance does not make the name illegitimate, though the implication is left that other circumstances may still do so.

Argument #7. That the absence of known type material can be interpreted to mean there never was such material, in which event *Zamia pumila* would indeed be based on the cited references. "If there were evidence from the protologue of *Z. pumila* that there must have been original material, additional to that represented by the synonyms, then even if this material is no longer extant, I would agree that this situation would not meet the exclusionary requirements of Art. 52.2, and *Z. integrifolia* would be illegitimate. But...this has not been demonstrated."

Response. This argument is the most interesting and potentially destabilizing of all offered. Whether or not Linnaeus had seen living or dried materials of the West Indian cycad is not known. He did not include the plant in his earlier (1737) treatment of plants he had studied at Hartecamp, Holland (in which his solitary cycad, later named *Cycas circinalis*, was placed between the palms *Corypha* and *Phoenix*). And following his death, no specimen was present in his herbarium (LINN).

Linnaeus, however, did not employ a single word from the phrase-names which he cited; his brief diagnosis was fully original. Nor was his epithet, *pumila*, of prior use. And none would claim that he saw nothing at Hartecamp other than those entities he knew well enough to describe at that time. Even his herbarium, between his death in 1778 and its arrival into the hands of Sir James Smith in 1784, suffered losses of many damaged sheets (Stafleu, 1971: 113). It thus cannot be ruled out that he may have been guided in whole or in part by materials no longer extant.

Further, even if one were to assume the circumscription of *Zamia pumila* had been entirely fabricated, the I.C.B.N. does not provide for a distinction in treatment between such a baseless, illusory name and one whose type material had been lost. Nor does the I.C.B.N. require that evidence be provided that there had once been original material. Again, the logic is seductive that such a difference must call for different treatment. But in a real-world analysis it is impossible to document this distinction, and instability would be the only product of any effort to do so.

Argument #8. That it is best to retain *Zamia integrifolia* because that name has been employed by some of the correspondents in the past. "*Z. integrifolia* was accepted in *Flora of North America* vol. 2 (1993: 348). ...If the name is illegitimate, it needs to be conserved with a different type, for stability."

Response. This proposal, aside from its implied lack of confidence by the correspondent, must be left to the judgment of other parties.

CONCLUSION

No arguments have been put forward in support of *Zamia integrifolia* that are firmly based on specific language of the I.C.B.N. None, it would appear, can stand in contravention to the clear language of Arts. 52.1 and 52.2, that an author's name is to be rejected if it was nomenclaturally superfluous when published, and that superfluity is caused by citation in synonymy of an earlier available name whose type

was not excluded by the author. *Zamia integrifolia* L. f. in Ait. must be interpreted under modern rules as a name that was illegitimate when published and is unavailable for use either in Florida or in the West Indies.

But a cautionary note stands before unequivocal acceptance of *Zamia floridana* A. DC. as a replacement name for the Florida cycad. DeCandolle's name is preceded by a series of other binomials (Eckenwalder, 1980). Though none before *Z. floridana* is based on Florida materials, the taxon also occurs widely in the Bahamas and West Indies (Stevenson, 1987a). Should further investigation firmly assign one of these earlier names to Bahamian or West Indian materials of the Florida taxon, the Florida cycad may again require nomenclatural attention.

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