

Thismia americana, a Chicago Endemic or an Elaborate Hoax?

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Some have suggested that the iconic Chicago-endemic, *Thismia americana*, a plant discovered by Norma Pfeiffer at 119th Street and Torrence Avenue, in Chicago, is a legend based upon a hoax, along the line of Piltdown Man—promulgated at the same time Pfeiffer was describing *T. americana*—when the jaw bone of an ape was “discovered” associated with the cranium of a modern human. An attempt to present a “missing link” between man and ape, thus proving the evolutionary connection, this hoax was busted in 1952. Others have suggested that a closer analog is the hoax commonly known as the Rum Affair, where a professional botanist fraudulently reported plant species from an island in the Hebrides of Scotland, far removed from their natural range but selected to support a spurious biogeographic theory.

If one begins from the premise that the discovery of *Thismia americana* is a hoax, then there must be some forensic evidence with which to start—other than that the story seems improbable because of rather serious disjunction issues. There is none. Some have suggested that the preserved specimens may contain pollen that might link the collection to a region, which we do not think has been done but would be an interesting exercise. *Typha latifolia*, a species with wind-blown pollen, grew in the general area and its tetradic pollen would be quite distinct. One would also have to conclude that John M. Coulter, her principal committee member and mentor to Henry Chandler Cowles, colluded in the hoax along with her other committee members, Drs. Chamberlain and Land, of the University of Chicago. One would also need to discover a motive for a hoax. Some have suggested that the Chicago location, having been glaciated during the most recent ice age, exaggerates the improbable circumstance of its already antipodal disjunction from the region inhabited by its sister species. While compelling, the facts of its discovery and description suggest that the authenticity of its Chicago occurrence is even more so.

Pfeiffer’s initial and sustained interests in botany were not necessarily in the cryptogams or more cryptic phanerogams. She completed her bachelor’s degree at the University of Chicago in 1912 and went on to graduate school there. Having secured a position teaching at a college in North Dakota, she went with a colleague to a favorite place for students at the University of Chicago to study local flora. They were to collect liverworts to have on hand at her college (Masters 1995). Study specimens were not easily obtainable in those days. It was on that occasion that she discovered *Thismia americana*. Her companion, gathering in the same area, had not noticed *Thismia* until Norma had pointed it out. Neither she nor her colleague had

any clue as to what it was and her major professors could not identify it, so she took a deep dive into its morphology. This led to her dissertation research, which she published in the *Botanical Gazette* (Pfeiffer 1914).

Her description of *Thismia americana* is about as complete as one can imagine, with detailed descriptions of both the anatomy and morphology. Having discovered the plant in 1912, she visited the population each week for the rest of the summer and for at least two additional years gathering specimens in all stages of developmental phenology—although she expressed chagrin that she was unable to observe seed germination. She compared her specimens with the descriptions of all other *Thismiae* known at the time and concluded that its closest relatives occurred in the region of southeastern Asia rather than Africa and South America, which would have been perhaps more logical phytogeographically. The accompanying scan of Plate VII in her 1914 article shows photographs of the undisturbed perianths, *in situ*, buried to the lobes in a black sandy Mollisol, a soil that is characteristic of the moist prairie habitat in which the plant once occurred. She felt rather decidedly that no other known species described the Chicago plants, so she gave these plants the name *Thismia americana*. Her dissertation was careful to describe the morphology and anatomy in detail, but there was little discussion of its remarkable disjunction other than to note that it was indeed remarkable.

If she and her mentors had received specimens from elsewhere as part of a botanical caper, she would have to have received specimens in an array of developmental conditions in several seasonally staggered shipments, all of which survived the voyage from the western Pacific Ocean to Chicago. Even more unlikely, the transshipped specimens would have to have been themselves a new species, because *Thismia americana* remains morphologically and genetically distinct from all other species. There was a notable botanist, Elmer Drew Merrill, who was collecting actively in the Asia-Pacific region at the time, but it is likely that any



PFEIFFER on THISMIA

correspondence with the University of Chicago would have been through J. M. Coulter or one of his colleagues—not likely a callow, unknown, brand new graduate student. Merrill did send specimens of algae, lichens, bryophytes and vascular plants to the Field Museum during this period, but the few *Thismia* specimens at the Field Museum are all from the New World.

We presume that Pfeiffer spent the remainder of the growing season of 1912 trying to figure out the mystery plant's identity. The holotype, not collected until 1913, is housed at the Field Museum. There are three plants in a packet on the sheet, including a vial with other specimens preserved in formalin–acetic acid–alcohol (FAA). She made another collection in 1914. The specimens are not found in the regular collection, but locked in a cabinet with access available through the collections manager.

Norma graduated in 1914, the youngest Ph.D. ever, from the University of Chicago at that time—and a woman at that—but continued her studies sufficiently to produce another treatise on *Thismia americana*, also published in the *Botanical Gazette*, entitled "The Sporangia of *Thismia americana*" (Pfeiffer 1918). That is an awful lot of brilliant energy to put into a hoax considering everyone who must have been involved, including the editors of the well-reviewed *Botanical Gazette* and the supposed southeast Asian conspirator who, rather than do an expository study of the material himself, preferred to supply Norma—with whom somehow he had made a more than casual connection and who did not know a *Thismia* when she saw it—with such grist for research and only if the material was stated falsely to have been obtained from Chicago. Other than the one line in her 1914 article, Pfeiffer spent no energy on the biogeographical aspects of *Thismia americana*.

Unfortunately, the area at 119th Street and Torrence Avenue, where she gathered her material, has several feet of fill over it, and, now, all the ambient land and beyond has become largely industrial. Indeed, the loss of prairie habitat in which *T. americana* once occurred has been essentially destroyed, especially prairie within and on the margins of a major metropolitan area, the city of Chicago, and after World War II, when industrial-scale agriculture and great socio-economic and demographic changes became driving factors leading to its ultimate demise.

Several noted attempts have been made to discover additional populations. The first was in 1948, when Dr. Floyd Swink obtained from Pfeiffer a map through the mail detailing the location of the original study population. At that time, Dr. Pfeiffer was employed at the Boyce Thompson Institute for Plant Research in Yonkers, now part of Cornell University. Drs. Swink, Steyermark, and others failed to locate the plants. In 1985, four years before her passing—at the age of 96—in a letter to Dr. Robert H. Mohlenbrock, Pfeiffer wrote that she "looked for the plant beyond the first location, and once found a very few, about a third of a mile away, in the midst of *Typha* . . . between beach ridges."

In a telephone conversation with Bill N. McKnight that same year, she elaborated on some of the cryptogamic associates—all of which made sense for an interdunal lake plain

habitat in Cook County, Illinois, narrated 70 years after the fact. McKnight asked her if she had collected all the specimens she saw and she said no—her interest was not in sending out sets for exchange, but in discerning the identity, morphology, and life history of the plants. Having spent the remainder of her career in the study of lily hybrids, she confessed to McKnight that she regretted not having done more field work.

Several “*Thismia* hunts” have occurred since then in the Calumet region south of Chicago, but to no avail. It is worth mentioning that in 2017 *Thismia neptunis* was rediscovered in western Sarawak, Malaysia, not having been seen since the type collection was made in 1866 by an Italian botanist who, it is said, just “stumbled upon it” more or less the way Norma Pfeiffer did in 1912 (Sochor *et al.* 2018). Like *T. americana*, *T. neptunis* is also buried to near the perianth lobes and cryptic in hue, so it is difficult to spot. The new discoverers noted: “Its inconspicuous appearance may potentially contribute to our limited knowledge on its distribution as it may be easily overlooked in the field....” The same easily can be said for *T. americana*.

Had *Thismia americana* been simply a species from Tasmania, say, then one would have imagined that Merckx & Smets (2014), would have given us some more insight in the matter. In their studies, based upon nuclear 18S rDNA and mitochondrial *atp1* and *nad1 b-c* data, while inconclusive with regard to the phylogeny, the authors have no problem with *T. americana* being considered a distinct taxonomic entity and describe its differences from *T. huangii* and *T. rodwayii*. They agree with Pfeiffer that *T. americana* has its closest relatives in the subgenus *Thismia*. Jonker (1938), who monographed the Burmanniaceae, had suggested that *T. americana* might be conspecific with *T. rodwayi*, but Merckx & Smet, while they posit that they each belong in the same clade, emphasize that *T. americana* and *T. rodwayi* are specifically different morphologically. They also point out that the fungal taxon found in the roots of *T. rodwayi* has thus far been detected in Argentina, Finland, and on a prairie in Kansas, which shows a potential for wide dispersal of mycoheterotrophic plants. They suggest the Beringia land bridge theory with regard to its ties with its southeast Asian relatives.

This amphi-Pacific origin was discussed at length by Merckx *et al.* (2017). They write that “...the deepest diversification events within the *Thismia* clade are estimated to precede these glaciations, while the more recent evolutionary splits [including *T. americana*] may have been influenced by global cooling events. The dispersal and subsequent spread of *Thismia* into Tasmania and New Zealand occurred in the Pleistocene or Holocene. During the Pleistocene, Tasmania was repeatedly glaciated and linked to mainland Australia. ...”

They go on to say that the “...most comprehensive and detailed plant and fungal dataset for any mycoheterotrophic system so far, shows that *Thismia*, despite highly specific and phylogenetically conserved AM interactions which persist over evolutionary time, was able to diversify and radiate recently due to the wide geographical distribution of the host fungi...[A]lthough the mycorrhizal interactions of these mycoheterotrophs are strictly bound to

a fungal lineage, host switches remain possible. This process may lead to new ecological opportunities for the plants, and demonstrate that taxa that are dependent on highly specific biotic interactions have ample opportunities to radiate and diversify over the geographical range of their hosts.”

In 1912, Norma Pfeiffer was a very young woman who found herself in an intimidating arena of some of botany’s more renowned luminaries, all of whom were men. It would have been quite bold of her, almost unbelievable, for her somehow to have plotted to secure *Thismia* specimens from the far and distant lands of Tasmania or New Zealand and conceived a deceit that would require a lifetime of intense secrecy and dissembling—even from her older sister, Wanda May, who would marry in 1916 the phytogeographer Arthur G. Vestal, student of H. C. Cowles. Generally, neither then nor now were graduate students in desperate need of thesis studies. Certainly, Pfeiffer had no novel theories to promulgate or defend—she had wanted a teaching job. Professors are usually happy to engage their students in subjects about which they themselves already have scholarly interests. The University of Chicago, esteemed institution that it was, had no faculty of which we are aware that could provide mentorship in the Burmanniaceae.

Also, the site along the railroad at 119th Street and Torrence Avenue was a favored spot for students of the local flora, so it likely was much visited by students of Cowles and Coulter as well as themselves and probably Norma’s sister and her husband-to-be. She had pointed out the plants to her colleague during her liverwort foray in 1912, but neither nascent botanist knew what they were looking at at the time. We doubt that she was even aware of the Burmanniaceae, much less *Thismia*, which had no known North American representatives. Her professors did not know what the plants were either.

Some who believe the legend a hoax have stressed that she never went back to look for it after she left the region or that she never reported having looked for it anywhere else: an obvious reason for suspicion in their minds. We are not daunted by that, since it really was not until the post-World War II era that botanists began to develop a strong interest in biosystematics and species threatened with extinction. Not appreciating the factors that one day would redound to her discovery, she would feel no need to record a chain of custody on her harvests and observations, and likely did not feel the need to keep a journal of all who looked for it and did or did not see it. Although we cannot imagine that her committee, by 1914, had demurred on taking the train to see the plants in the field.

Comparisons between Pfeiffer’s discovery and the dissembling assertions about plant disjunctions at Rum Island in the Hebrides of Scotland are inevitable—a history recounted recently in the book “A Rum Affair” (Sabbagh 1999). A noted and admired professor, John Heslop Harrison, of Newcastle University, proposed the theory that vegetation on the islands of the west coast of Scotland had survived through the Pleistocene. His fraudulent reports of the presence of key species on the island were designed to support his theory—there being no

actual evidence. While it is hard for many of us to get into the mind of someone who would do such a thing, Harrison was a full professor with a doctrine to defend and went to Byzantine lengths to support his theory. Sabbagh's account of the fraud draws the character of a man and his mission so completely unlike Norma Pfeiffer's that it scarcely warrants ink to compare them. Sabbagh details the collegiate environment within which Harrison operated and the investigation into the authenticity of his assertions. Because the deceit was obvious to those who looked into it, Harrison's rather shoddy fraud came apart.

If the *Thismia americana* legend is based upon a hoax, then it is a very elaborate, well thought through one, one also dependent on the fortuitous fact that the Asian co-conspirator provided specimens that represented a new species. The Piltdown Man hoax was largely the effort of a single doctrinally driven individual, as was the Rum Affair fraud. There were, at the time Norma Pfeiffer discovered *T. americana*, no doctrinal theories concerning evolution that the *Thismia* find in Chicago would enhance or disprove, certainly none of her own. Also, in 1912 such disjunctions of plants from around the world were not altogether to be unexpected, particularly in a genus such as *Thismia* where many of the species are rather rare and specialized in their habitats. Moreover, the loss of prairie habitat, locally, and the photographs of the perianths, *in situ*, in a Mollisol characteristic of the type still occurring in the area just ambient to the site where *Thismia americana* once occurred should not be ignored. As improbable as the discovery of *Thismia americana* in Chicago might be, we would suggest that a hoax that has survived critical thinking and examination this long is even more improbable—given that one could quantify improbability.

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