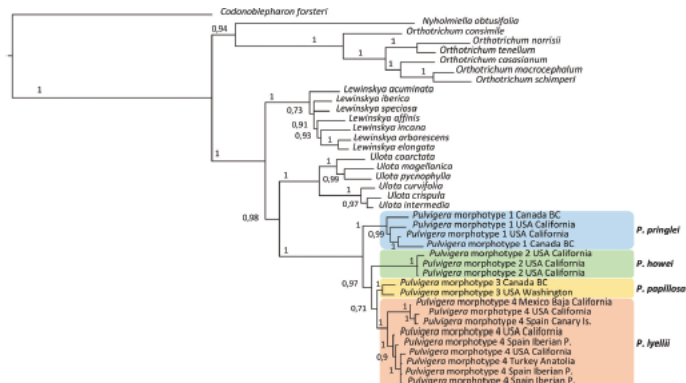


# Let's make *Pulviger* great again: re-circumscription of a misunderstood group of Orthotrichaceae that diversified in North America

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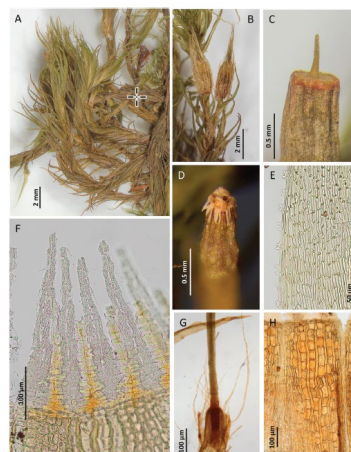
*Orthotrichum lyellii* was described in 1878 based on the crisped leaves with plane margins on its elongated and branched stems, and on the presence of brood-bodies. In Europe, these characters remain constant, but in North America several similar forms lacking propagules have been described either at the specific or infraspecific level. These were all reduced to synonyms of *O. lyellii*. In 2015, *Orthotrichum* was divided, and *O. lyellii* was transferred to *Pulviger*, a genus thus far considered to be monospecific. In this study, the variability of *P. lyellii* is analysed in an integrative taxonomic framework. Morphological studies on > 200 specimens, including the nomenclatural types of the taxa previously described, were combined with biogeographical and ecological evidence and with a phylogenetic reconstruction of 39 terminals based on five molecular loci. All the sources of evidence suggest the existence of four different taxa in North America, one also present on the Marquesas Islands. The study of type materials led to their identification as *P. lyellii* and three other taxa previously described from North America, *Orthotrichum papillosum*, *O. lyellii* var. *howei* and *O. pringlei*. These taxa differ from each other in taxonomically significant morphological characters of the gametophyte and sporophyte. The morphological diversity has led us to reinterpret *Pulviger*, and to amend its description. Nomenclatural changes for the reinstated taxa are proposed, and full descriptions and an identification key for *Pulviger* spp. in North America are provided.



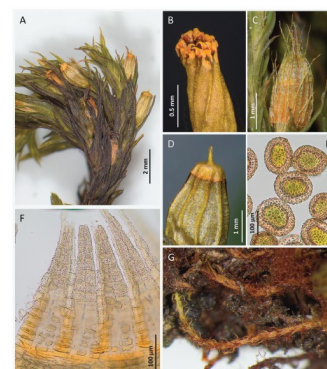
**Figure 1.** Majority-rule consensus tree of the Bayesian analysis obtained from the concatenated DNA matrix including three plastid (*rps4*, *trnL-F*, *trnG*) and two nuclear (ITS2, *gen5552* anonymous region) loci, including indels. Numbers above branches indicate Bayesian posterior probabilities.



**Figure 2.** *Pulviger lyellii*. A, Habit of a female plant. B, Detail of a shoot. C, propagule on a leaf, note the venation of the leaf caused by the presence of propagules. D, capsule. E, detail of an opercular capsule. F, mature capsule after operculum. G, detail of the opercular capsule. H, peristome. Source of material: A, C, MAJAM Herb. 2015; B, MAJAM Herb. 2015; D, Garilleti 2010-0464; E, MAJAM Herb. 2009; F, MAJAM Herb. 0719; G, Val. Herb. 1987; and H, MAJAM Herb. 0760.



**Figure 4.** *Pulviger pringlei*. A, Habit of a female plant. B, two twin sporophytes showing the long-haired calyptrae and vegetative. C, detail of the opercular capsule. D, mature capsule after operculum. E, leaf base, showing the long rectangular



**Figure 5.** *Pulviger papillosum*. A, Habit of a female plant. B, mature capsule after operculum. C, capsule. D, detail of an opercular capsule. E, operculum. F, peristome and G, Engelmian branches. Source of material: A, B, G, MAJAM Herb. 2477; C, D, MAJAM Herb. 2481; E, F, G, MAJAM Herb. 0765.