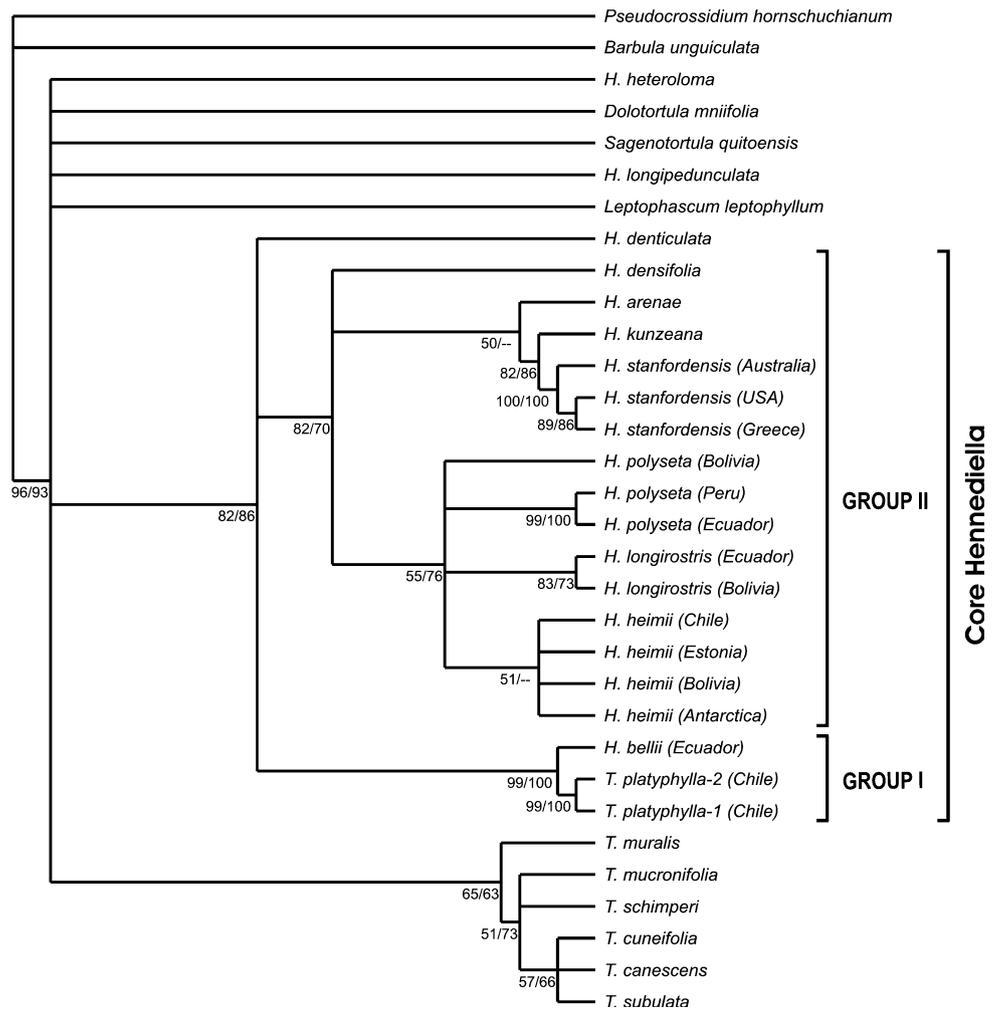


**Fig. 1** Strict consensus of 133 most parsimonious trees with tree length of 1,224 steps (RI = 0.509, CI = 0.53, considering only parsimony-informative sites), based on ITS sequences. Bootstrap values above 50% are given below the clades using maximum parsimony/maximum likelihood. The tree was rooted with *Pseudocrossidium hornsuschianum* as outgroup



## Discussion

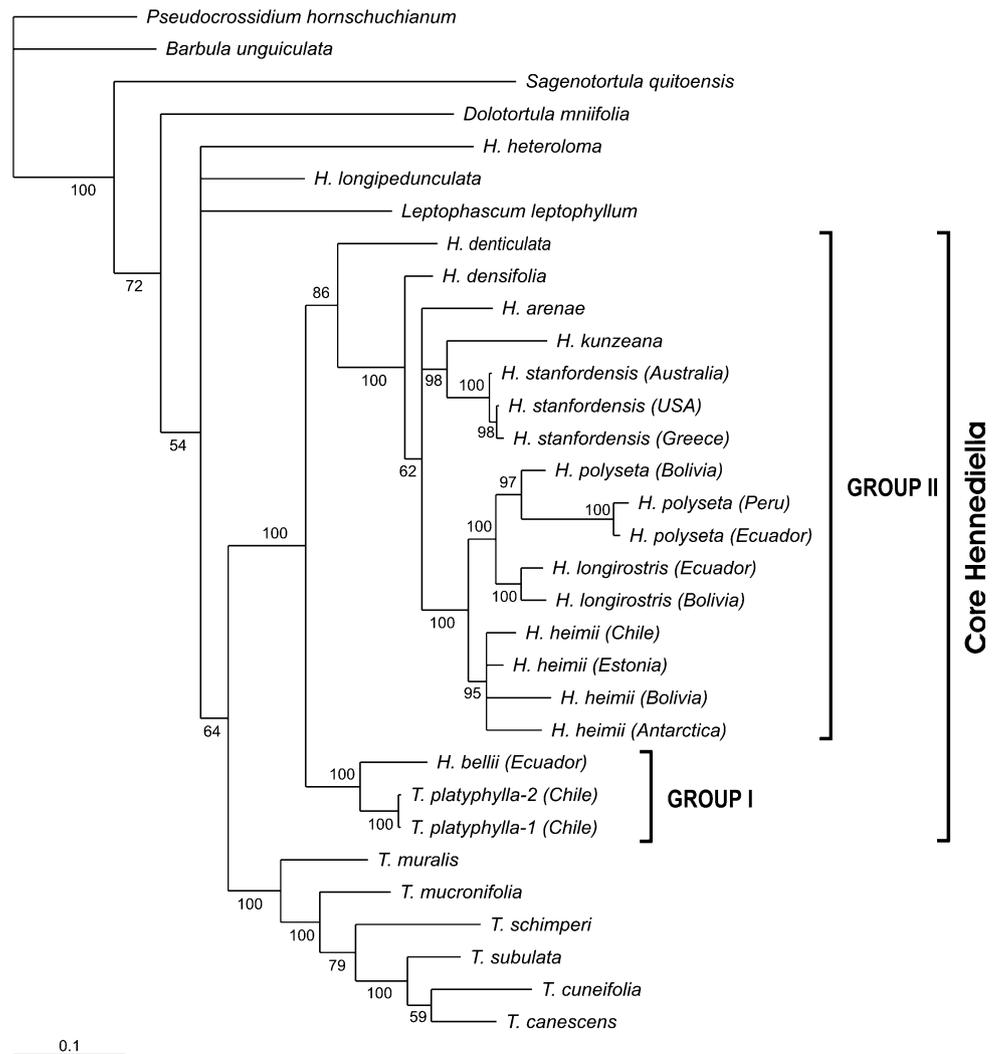
The ITS sequences support the recognition of the core *Hennediella* (including *Tortula platyphylla*), as monophyletic involving two clades, marked as group I and II in Figs. 1 and 2. Group I includes *H. bellii* and *T. platyphylla*. Group II is formed by *H. heimii*, *H. longirostris*, *H. polyseta*, *H. stanfordensis*, *H. kunzeana*, *H. arenae*, and *H. densifolia*. All these species share a red KOH reaction, a differentiated leaf border, and, usually, dentate margins.

Group I, which includes the South American *T. platyphylla* and *H. bellii* is supported by a number of morphological characteristics, for example intramarginal leaf border and absence of teeth in the leaf margins. Its morphological similarity has already been observed in previous taxonomic revisions of the team (Cano 2008; Cano and Gallego 2008); the generic affinities of both species were uncertain, however. Our molecular data suggest that *T. platyphylla* is included in *Hennediella*.

All the species included in group II exhibit marginal border and dentate leaf margins, although their relative

affinities are less clear. The affinities of *H. denticulata* remain ambiguous in the core *Hennediella*. The diagnostic characteristics of *H. denticulata* are its smooth (rarely with low papillae) and broad upper and middle laminal cells. The rest of *Hennediella* species has papillose laminal cells, except, generally, *H. heimii*. The position of *H. arenae* and *H. densifolia* within group II are not resolved in our analysis. *Hennediella arenae* is sister of the *H. kunzeana*–*H. stanfordensis* clade with MP and sister of the remaining species of the group II with Bayesian inference. That *Hennediella polyseta*, *H. longirostris*, and *H. heimii* form a group is well supported. A characteristic that defines this subclade is the absence of peristome teeth. *Hennediella kunzeana* and *H. stanfordensis* are resolved into a subclade with good support. According to Cano (2008) both species exhibit the same gametophytic morphologic characteristics and only they can be separated by sporophytic characteristics that in *H. stanfordensis* are based on immature capsules, which resemble those of *H. macrophylla*. The inference based on ITS data is congruent with the hypothesis that these taxa could be conspecific.

**Fig. 2** Phylogram based on the Bayesian approach with ITS sequence data. Numbers indicate the clade credibility values of the nodes. Values above 50% are shown. The tree was rooted with *Pseudocrossidium hornschuchianum* as outgroup



The affinities among *Henediella heteroloma*, and *H. longipedunculata* and *Henediella* core and the *Tortula* clade are ambiguous. *Henediella heteroloma* is only known from some localities of Mexico. It is characterized by its intramarginal unistratose leaf border of elongate smooth cells in several rows edged by a usually single row of shorter cells with many minute papillae, obovate to lingulate leaves, with the costa generally ending before the apex and upper and middle laminal cells with (7)10–24(30) papillae. The intramarginal border and the absence of dentate margins relate this species with *H. bellii* or *Tortula platyphylla*, but these species have bistratose leaf margins and smaller leaves and middle laminal cells.

*Henediella longipedunculata* is endemic in Namibia and South Africa. It is characterized by lingulate to ovate leaves, not dentate leaf margins, a circular and prominent cross-section of the costa, small upper and middle laminal cells, outer middle marginal cells usually oblate (ratio length/width (0.3)0.4–1), and the inner marginal cells

quadrate or short-rectangular (ratio length/width (0.4)1–2(2.6)), and by a peristome of 32 slightly spirally twisted teeth, with a short basal membrane (22.5–62.5  $\mu\text{m}$  long). This species has plane leaf margins, orange leaf KOH reaction, and marginal border of differentiated cells (in some cases not very conspicuous), which supports its inclusion in the genus *Henediella*. However, the circular and prominent cross-section of the costa was not found in any other species of *Henediella*. In addition, it lacks dentate leaf margins, the cells of the outer rows of the leaf margins are oblate and the inner cells quadrate or short-rectangular (instead of long-rectangular or linear as most of the species of the genus), which supports its inclusion in *Tortula*. Further sampling of *Henediella* or *Tortula* or the inclusion of sequences of other members of Pottiaceae related with *Tortula* could clarify the phylogenetic position of both species.

*Henediella marginata* could not be included in the study. According to Cano (2008), it has deviant characteristics of the genus, for example the prorate and mitrate