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although the support is generally low too. *Pentacalia trianae* from Colombia and *P. arborea* from Colombia and Ecuador are strongly related to each other, and found in a subclade along with species of *Monticalia* and *Scrobicaria* Cass. This latter genus contains three species restricted to Colombia and Venezuela and mainly differs from *Pentacalia* in having opposite leaves. The accession of *P. desiderabilis*, a species endemic to Brazil, is nested among species of *Dendrophorbium* and *Graphistylis* B. Nord. also from Brazil. These results, though weakly supported, suggest that *Pentacalia* as currently circumscribed is not monophyletic. Additional studies based on an exhaustive sampling including species of *Pentacalia* that represent the entire distribution area of the genus, as well as species of the aforementioned allied genera, are essential for drawing the evolutionary relationships of these plant groups and, if needed, make the taxonomic adjustments accordingly.

## Material and methods

The present contribution is the result of an exhaustive review of the published bibliography, fieldwork in Ecuador carried out in 2017, 2018, and 2023, and the examination of 369 herbarium specimens (duplicates excluded) kept at the following herbaria: AAU, G, HA, HUTPL, LOJA, MA, P, Q, QAP, QCA, QCNE, QPLS, US, and USM. Additionally, digital images of specimens from B, COL, E, F, GH, HAL, K, LD, LP, MO, MT, NY, P, PR, PRC, S, UC, US, VALLE, and VEN were studied. The loans of specimens received from AAU, MA, P, and US were essential to achieve this revision.

The types of all accepted names and synonyms were studied, except for *Pentacalia pailasensis* H. Rob. & Cuatrec., the holotype of which appears to be lost after having been loaned by F to another institution (K. Hansen, pers. comm.). It is therefore treated as doubtful. The qualitative characters provided in the descriptions were studied, when needed, with the aid of the stereo microscope Leica M60, whereas quantitative characters were recorded using a Mitutoyo digital caliper, CD-15DC. The maps were generated using QGIS 3.16 Hannover. Information concerning the habitat, elevation, and flowering period of each species was obtained from the herbarium specimen labels and the information compiled in the field. Nineteen (19) out of the 27 accepted species were observed in Ecuador during the field trips.

Accepted species are presented in alphabetical order and are listed in Appendix 1. All studied exsiccatae can be found in Appendix 2. An index to all scientific names is provided at the end of this publication. The list of specimens examined given for each species includes only the Ecuadorian material, except for the species that citing the collections from the neighboring countries is relevant for completeness sake. If herbarium specimens from a province were not studied but the presence of the species is expected there, the name of that province is included in the distribution and followed by a question mark.

The leaf descriptions and measurements provided in this treatment correspond to the leaf lamina. General botanical terms largely follow BEENTJE (2012), whereas specific terms concerning the family *Compositae* are in line with those used by ROBINSON & CUATRECASAS (1993).

## Taxonomic treatment

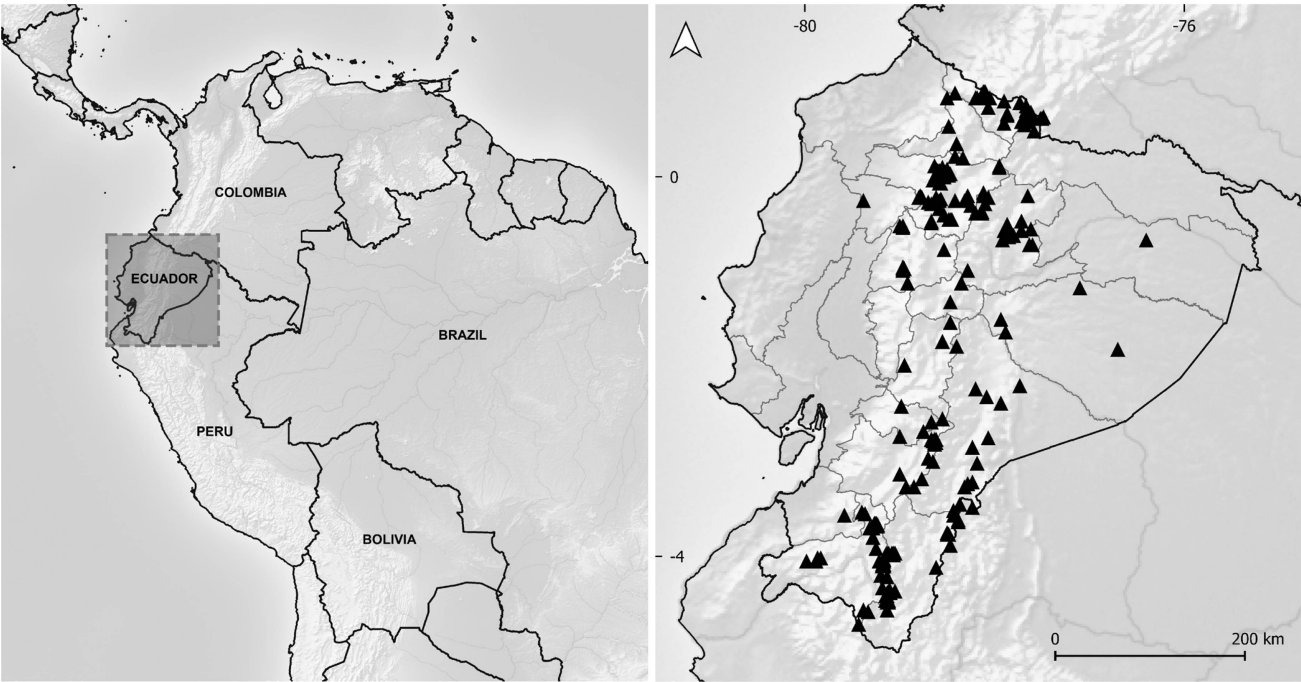
*Pentacalia* Cass. in Cuvier F., Dict. Sci. Nat., ed. 2, 48: 461. 1827.

**Typus:** *Cacalia arborea* Kunth [= *Pentacalia arborea* (Kunth) Cass.].

= *Senecio* sect. *Triana* Cuatrec. in Fieldiana, Bot. 27(2): 71. 1951. = *Pentacalia* Cass. subg. *Pentacalia*.

= *Senecio* sect. *Streptothamni* Greenm. in Bot. Jahrb. Syst. 32: 19. 1902. **Typus:** *Senecio streptothamnus* Greenm. [= *Pentacalia streptothamna* (Greenm.) H. Rob. & Cuatrec.].

*Plants* scandent, woody, with long dangling branches, sometimes rather suberect with branches leaning over adjacent vegetation; stems terete, often furrowed, glabrous or with indumentum, solid or fistulose. *Leaves* alternate (opposite in 3 Peruvian species), simple, petiolate; laminas lanceolate, oblanceolate, elliptic, ovate, or obovate, apex rounded to acuminate, base attenuate to cordate, margin entire to dentate (usually remotely mucronate-denticulate), glabrous to covered by different types of indumentum (trichomes usually simple, multicellular, eglandular, rarely T-shaped in few non-Ecuadorian species), chartaceous, coriaceous, or fleshy, concolorous or slightly discolored, secondary and tertiary veins conspicuous or inconspicuous. *Synflorescences* terminal or lateral (axillary), corymbiform, thyrsoide-paniculiform, or racemiform. *Capitula* radiate, disciform, or discoid, sessile to pedunculate; involucre cylindrical to campanulate, glabrous or covered by indumentum; receptacles epaleaceous, rather flat, smooth or somewhat irregularly alveolate; involucre bracts 1-seriate, usually 8–13, linear-oblong; supplementary bracts (calycle) (1–)3–5(–7), linear-subulate to ovate. *Ray florets* pistillate; corollas with reduced or well-developed limbs, patent or curved downward, subentire to 3-toothed at apex, yellow or white (becoming red burgundy as florets mature in few species). *Peripheral florets* of disciform capitula pistillate; corollas tubular, usually shorter than disc florets, deeply (2–)4–5-lobed, yellow or whitish. *Disc florets* hermaphroditic; corollas tubular, 5-lobed, yellow or whitish (becoming red burgundy as florets mature in few species); filament collars balustriform; anther bases caudate (sometimes only very shortly caudate), anther appendages 2–3 times longer than wide; style branches truncate with crown of sweeping trichomes. *Achenes* cylindrical, 5–10-ribbed, usually glabrous (pubescent in few non-Ecuadorian species); pappus usually 1-seriate, bristles capillary, barbellate, whitish.



Map 1. – Distribution of the genus *Pentacalia* Cass. in Ecuador.

Chromosome number:  $n = 17$  or  $20$  (ROBINSON et al., 1997; based on *Pentacalia phanerandra* (Cufod.) H. Rob. & Cuatrec. from Costa Rica);  $n = 20$  (POWELL & CUATRECASAS, 1970; based on *P. silvascandens* (Cuatrec.) Cuatrec. from Colombia;  $n = 45-50$  (JEFFREY et al., 1977; based on *P. desiderabilis* from Brazil);  $n = 50$  (TURNER et al., 1967; based on *P. jalcana* (Cuatrec.) Cuatrec. from N Peru).

*Etymology.* – The name *Pentacalia* refers to the 5-ribbed achenes of the type of the genus.

*Distribution and ecology.* – *Pentacalia* occurs from southern Mexico to northwestern Argentina, plus two disjunct species in the Atlantic Forest of Brazil. Most species thrive in the montane forest within an elevational gradient of 2000–3000 m, but some species reach higher elevations and are found in the paramo ecosystem while others occur at sea level. In Ecuador, all the species are found at elevations of (230–)1000–3800 m (Map 1).

*Notes.* – The publication of *Pentacalia* subg. *Microchaete* by CUATRECASAS (1981) automatically established the autonym *Pentacalia* Cass. subg. *Pentacalia* (TURLAND et al., 2018: ICN Art. 22.1). The citation of *Pentacalia* subg. *Pentacalia* Cuatrec. by CUATRECASAS (1981), DÍAZ-PIEDRAHITA & CUATRECASAS (1999), and CALVO (2021) is an error. For details on the original description of *Pentacalia* by Cassini see CALVO (2021).

**Key to the species of *Pentacalia* in Ecuador**

[modified and updated from ROBINSON & CUATRECASAS (1993)]

- 1. Capitula radiate ..... 2
- 1a. Capitula discoid or disciform (rarely subradiate) ..... 16
- 2. Leaves glabrous ..... 3
- 2a. Leaves with indumentum ..... 11
- 3. Involucral bracts 10–10.5 mm long ..... **4. *P. atrovinosa***
- 3a. Involucral bracts 4.2–8.4 mm long ..... 4
- 4. Ray florets white ..... 5
- 4a. Ray florets yellow ..... 6
- 5. Leaves oblong-elliptic, 12–16.5 × 3.8–5.9 cm, margin denticulate to serrulate, secondary and tertiary veins conspicuous; ray floret limbs curved downward .... **5. *P. celicana***
- 5a. Leaves lanceolate to narrowly elliptic, 5.3–8 × 2.1–3.5 cm, margin entire, secondary veins barely conspicuous, tertiary veins inconspicuous; ray floret limbs patent ..... **13a. *P. luteynorum* subsp. *luteynorum***
- 6. Synflorescences mostly lateral, axillary ..... 7
- 6a. Synflorescences mostly terminal ..... 8
- 7. Leaves 5–10.5 × 3–6 cm; involucral bracts 7–8 ..... **22. *P. riotintis***
- 7a. Leaves 11.5–16.2 × 6.3–10.2 cm; involucral bracts 11–13 ..... **26. *P. todziae***
- 8. Leaves obovate to oblanceolate (rarely ovate), apex obtuse ..... **8. *P. dorrii***