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On the identity and typification of Raimondi's names *Culcitium discolor* and *Cryptochaete andicola* (Compositae)

Joel Calvo, Guillermo Benítez, Arturo Granda & Hamilton Beltrán

Abstract

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The invaluable labor of Antonio Raimondi (1824–1890) to study and record the natural history of Peru is well known, however, his contribution to the plant taxonomy has not been so well documented. Raimondi described five new species, which mostly were wrongly ascribed to other botanists or just overlooked. A recent contribution has been addressed to bring into light this issue, however, the adopted taxonomic decisions regarding the *Compositae* names require some amendments. Herein, we discuss the taxonomic identity of the names *Cryptochaete andicola* Raimondi and *Culcitium discolor* Raimondi. Both names are neotypified in order to remove any uncertainty surrounding their application. *Culcitium discolor* is proposed as a new synonym for *Senecio rhizomatus* Rusby.

Keywords

ASTERACEAE – *Senecio* – Peru – Antonio Raimondi – History of botany – Nomenclature – Taxonomy – Vernacular names

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Introduction

The Italian Antonio Raimondi (1824–1890) was a great explorer and naturalist who devoted most of his lifetime to the scientific labors in Peru. The extent and completeness of his explorations undertaken along the Peruvian territory during a period of nearly twenty years makes Raimondi one of the most relevant scientific figures of the nineteenth century in this country (MARKHAM, 1890; STAFLEU & COWAN, 1983). The vast information gathered during the mentioned journeys, which covered subjects as diverse as geography, zoology, and ethnology, was meant to be compiled in the magnificent work “El Perú” (1874–1913). The first three volumes were diligently published, however, the outbreak of the War of the Pacific in 1879 interrupted and marred the project (MARKHAM, 1890). The consequences of the war (1879–1884) had such an impact on Peru that the fourth volume did not appear until 1902, twelve years after Raimondi's death.

With regard to the botanical discipline, his foremost work was *Elementos de botánica aplicada a la medicina y a la industria en los cuales se trata especialmente de las plantas del Perú* [*Elementos de botánica*] (RAIMONDI, 1857). This contribution was devoted to teach the various branches of this science to the students of the School of Medicine of Lima. It was divided in two parts; the first one is focused on plant anatomy, physiology, and pathology, whereas the second part is dedicated to the study of the taxonomy and phytogeography. Although Raimondi's work is aimed at treating the general concepts of plant taxonomy, it harbors the description of five new species in four different plant families: *Bignoniaceae* (*Jacaranda punctata* Raimondi), *Caricaceae* (*Carica integrifolia* Raimondi), *Compositae* (*Cryptochaete andicola* Raimondi, *Culcitium discolor* Raimondi), and *Orchidaceae* (*Chloraea undulata* Raimondi), as well as two new combinations in ferns (i.e. *Niphobolus calaguuala* (Ruiz) Raimondi and *Notholaena flava* (Sw.) Raimondi). These taxa were briefly discussed by HERRERA (1935) but otherwise mostly neglected afterwards until the recent contributions by TRUJILLO & PAREDES-BURNEO (2020) and MOLINARI-NOVOA (2021). It is feasible to think that *Elementos de botánica* was barely distributed among the scientific community because of the fundamentally teaching aim of the work. The fact that it was written in Spanish probably did not help it either to have an impact abroad. On the other side, the omission of the publication in Taxonomic literature (STAFLEU & COWAN, 1983) might explain the little attention that this work received in the last decades. Raimondi's descriptions of the new species fulfil the requirements for valid publication. Aside from including a Latin description, the protologues provide detailed information related to the ecology, vernacular names, and plant uses, if applicable. Such a point denotes again the pedagogical nature of the treatment and highlights Raimondi's interest in the indigenous cultural heritage.

With regard to the *Compositae* names, MOLINARI-NOVOA (2021) proposed a placement for *Cryptochaete andicola* and *Culcitium discolor* barely supported by a taxonomic discussion, which is quite striking considering that these species belong to a taxonomically complex assembly of taxa within the large genus *Senecio* L. For that reason we here present an in-depth analysis of each name that addresses matters of morphology, vernacular names, and medicinal properties. Besides proposing *Culcitium discolor* as a new synonym for *Senecio rhizomatus* Rusby, we neotypify both names because the original material has not been located in USM (see STAFLEU & COWAN, 1983). This action is also meant to remove any uncertainty surrounding the application of these names.

Taxonomy

Cryptochaete andicola

RAIMONDI (1857: 187) specified that *Cryptochaete andicola* grew in the coldest places of the Peruvian Andes and that it was known as “Huamanripa” by the native, who used it to treat pulmonary hemorrhages and diseases. Four names are known by this vernacular name in central Peru: *Senecio arachnolomus* Wedd., *S. calvus* Cuatrec., *S. tephrosioides* Turcz., and *S. violifolius* Cabrera (SOUKUP, 1987; BLANCO-OLANO et al., 2020). A fifth species, *S. praeruptorum* Sch. Bip. ex Klatt, whose vernacular name is unknown should also be treated as a morphological allied taxa.

Three unnumbered specimens collected by Raimondi are deposited in USM but none of them can be considered as original material of *Cryptochaete andicola*. The first specimen [USM Raimondi n° 374] bears a Raimondi handwritten label with the name “*Senecio arachnolomus* (Wedd.)”, which we identify as *Senecio calvus*. The second specimen [USM Raimondi n° 2738] shows a label with the name “*Senecio chinogeton* [sic] Wedd.” transcribed by A. Weberbauer and another label whose origin is uncertain showing the name “*Senecio arachnolosum* [sic]”. This specimen is also identified as *S. calvus*. The last specimen [USM Raimondi n° 2740] has a label transcribed by Weberbauer with the annotation “*Senecio arachnolomus?*” and the vernacular name “Huamanripa” and is identified as *S. violifolius*. If Weberbauer retrieved the information from Raimondi's original labels or some parts were added afterwards by him remains uncertain and it is difficult to disentangle, if not impossible.

According to the protologue, we agree with MOLINARI-NOVOA (2021) in treating *Cryptochaete andicola* as a synonym of *Senecio violifolius*. The key to support our decision can be found in the original description: (1) “*Glabra, [...] caulibus herbaceis, erectis seu adscendentibus*” denotes that the plant lacks indumentum and has a delicate stem that can be erect or somewhat decumbent; (2) “*foliis inferioribus longe petiolatis*” highlights that the petioles are long but also well differentiated from the

leaf lamina; (3) “corymbo laxo oligocephalo” remarks the low number of capitula. All the mentioned characters are useful to discriminate *S. violifolius* from the similar species. *Senecio calvus* is usually a plant more robust, with the stem erect and the basal leaves attenuate into a long pseudopetiole that makes the lamina/petiole distinction difficult; moreover, this latter character is quite variable and plants with short-pseudopetiole leaves are also found. *Senecio tephrosioides* (= *S. chionogeton* Wedd. = *S. subdecurrens* Sch. Bip. ex Wedd.) does not match the original description because the basal leaves are attenuate into a pseudopetiole and the stem usually has arachnoid indumentum. Lastly, *S. arachnolomus* and *S. praeurptorum* are species characterized by having the abaxial leaf surface slightly arachnoid. For all these reasons, the name *Cryptochaete andicola* [1857] is well placed under *Senecio violifolius* [1954], the latter one being the priority name because the previous and validly published name *S. andicola* Turcz. [1851] blocks the use of this epithet in *Senecio*.

Senecio violifolius Cabrera in Darwiniana 10: 577. 1954.

Holotypus: PERU. **Dept. Lima:** Yauyos, Huacrachocha a 17 km de Tupe, 4400 m, 22.I.1952, *Cerrate & Tovar 1222* (LP [LP000707] image!; iso-: USM [USM000198!]).

= *Cryptochaete andicola* Raimondi, Elem. Bot. 2: 187. 1857 [non *Senecio andicola* Turcz., 1851]. **Neotypus** (designated here): PERU: **Dept. Lima:** Yauyos, Laraos, Carhuanisho, [12°22'52"S 75°38'22"W], 4957 m, 4.VI.2017, *Beltrán 8085* (USM-302354!). Fig. 1.

Vernacular names. – In Peru, this species is known under the name “Huamanripa” or “Huamanlipa” (HERRERA, 1919; SOUKUP, 1987).

Distribution and ecology. – This species is known from central Peru to northern Bolivia (CABRERA, 1985).

Senecio violifolius is a floristic element of the puna vegetation that grows in rocky places at elevations of 4000–5100 m (CABRERA, 1985; BELTRÁN & ROQUE, 2015).

Notes. – The neotype designated here for *Cryptochaete andicola* was collected nearby Laraos (Yauyos Province), not far from the type locality in the southeastern Lima Department.

HERRERA (1921) oddly synonymized *Cryptochaete andicola* with *Laccopetalum giganteum* (Raimondi ex Wedd.) Ulbr., a very distinct plant belonging to the family *Ranunculaceae* (in the original description Raimondi explicitly indicated that the new species corresponds to the *Compositae*). The explanation of such confusion can be found in ULBRICH (1906). According to a Weberbauer personal communication, Ulbrich explained that *L. giganteum* is also called “Huamanripa” in some parts of Peru, owing its popular name to a *Compositae* also known as “Huamanripa” that is used medicinally for the same diseases.

It is also striking that, a few years later, the same author stated that *Cryptochaete andicola* was the same species than *Saxifraga magellanica* var. *peruviana* (Sternb.) J.F. Macbr. (HERRERA, 1935). Once again, the confusion likely responds to the coincidence in the vernacular names (see MACBRIDE, 1938).

On a nomenclatural note, it is also worth mentioning that the name *Cryptochaete* had previously been described as *Microchaete* sect. *Cryptochaete* Benth. [1845]. Although no reference to a basionym was given by Raimondi, the description of *C. andicola* is acceptable as a descriptio generico-specifica according to Art. 38.5 (TURLAND et al., 2018), and thereby, he fulfilled the requirements for valid publication of *Cryptochaete* as the name of a new monotypic genus. Under Art. 41.4, *Cryptochaete* is therefore to be treated as a name at new rank, i.e. *Cryptochaete* (Benth.) Raimondi, which corresponds to a synonym of *Senecio*. The reason that motivated Raimondi to propose a new genus to describe a plant so similar to *Senecio* is a matter that remains unresolved.

Senecio violifolius can be confused with *S. calvus*. They mainly differ in leaf lamina shape (elliptic to suborbicular in *S. violifolius* vs. narrowly lanceolate to narrowly oblanceolate in *S. calvus*), leaf margin (dentate, plane in *S. violifolius* vs. denticulate, revolute [at least in dried specimens]), and petiole (clearly differentiated from the leaf lamina in *S. violifolius* vs. lamina attenuate into a pseudopetiole). Moreover, *S. calvus* is a species remarkably more robust. Some authors also misidentified *S. violifolius* with *S. rhizomatus*, a species well differentiated by the glandular-pubescent indumentum covering most parts of the plant.

Culcitium discolor

Culcitium species are nowadays widely accepted as belonging to *Senecio*. As circumscribed by CUATRECASAS (1950), the section *Culcitium* (Bonpl.) Cuatrec. includes scapiform perennial herbs with basal leaves in rosette or pseudorosette characterized by having discoid and nodding capitula with usually numerous supplementary bracts that confer an appearance of multiseriate involucre. *Culcitium discolor* was described as a simple-stemmed plant covered by glandular-pubescent indumentum. RAIMONDI (1857: 186) stated that his new species thrived in the summits of the Peruvian Andes, and could be distinguished from the other species of the genus by its discolorous leaves, which are green above and purple beneath.

The name *Culcitium discolor* has recently been synonymized with *Senecio tephrosioides* (MOLINARI-NOVOA, 2021), a species glabrous or sparsely pubescent (sometimes with arachnoid indumentum on the stem) characterized by displaying basal leaves attenuate into a pseudopetiole and synflorescences with several capitula (not solitary); it is known under the vernacular name “Huamanripa” (SOUKUP, 1987; BLANCO-OLANO et al., 2020). These characters are in conflict with the original description, which describes the plant as glandular-pubescent,

having long-petiolate, subcordate basal leaves, and one to several capitula. Indeed, among the Peruvian species belonging to the scapiform culcitoid species, only *S. rhizomatus* is characterized by displaying the combination of characters provided in the protologue. Moreover, it can be readily separated from its allied species by the glandular-pubescent indumentum covering most parts of the plant (see CABRERA, 1985; SALOMÓN et al., 2018).

Raimondi specified that *Culcitium discolor* was known under the vernacular names “Janca-huasa” or “Ticlla-huasa” and gave further information on its medicinal properties. HERRERA (1919, 1921) treated *C. discolor* as an accepted species and cited it from the Paucartambo Province, providing the vernacular name “Tticllai-huarmi” besides “Ticlla-huasa” (previously compiled by Raimondi and by Herrera himself in minor notes). HERRERA (1935) subsequently stated that *C. discolor* corresponded to *Senecio rhizomatus* although no specimen was cited; it should be considered as an informal synonymy. Raimondi noticed that the natives attributed vulnerary properties to *Culcitium discolor*. Although we are aware that this medicinal virtue is scarcely specific, it would agree with the properties currently granted to *Senecio rhizomatus*; it is used in Peru mainly as wound healing to treat dog bites, acne, and furuncles (SOUKUP, 1987; DELGADO SÚMAR, 1988), but also to heal internal wounds and to increase biliary secretion (HAMMOND et al., 1998; BLANCO-OLANO et al., 2020). This species has been studied for its antimicrobial properties (in vitro, ethanolic extract; SOTO MONTOYA, 2015), but lacks of comprehensive and in-depth pharmacological or toxicological studies. ARELLANO (1992) mentioned that many precautions should be taken with this plant because it is toxic and produces serious liver disorders.

Therefore, the aforementioned morphological reasons for associating the name *Culcitium discolor* with *Senecio rhizomatus* are also supported by the additional information provided by Raimondi in the protologue. On this basis, both names are considered as synonyms, *S. rhizomatus* being the priority name.

Senecio rhizomatus Rusby in Mem. Torrey Bot. Club 6: 66. 1896.

Lectotypus (first-step designated by GREENMAN, 1938: 816; second-step designated by SALOMÓN et al., 2018: 27): **BOLIVIA. Prov. Cochabamba:** near snow-line, Mt. Tunari, 1891, *Bang 1050* (NY [NY00259378] image!; isolecto-: BM [BM001024050] image!, E [E00417024] image!, G [G00356103]!, GH [GH00012192] image!, K [K000634156] image!, MO [MO714703] image!, NDG [NDG62982] image!, NY [NY00259377] image!, PH [PH00023550] image!, US [US00123460] image!, US [US00123461] image!).

= *Culcitium discolor* Raimondi, Elem. Bot. 2: 186. 1857 [non *Senecio discolor* (Sw.) DC., 1838]. = *Senecio discoloratus* Cuatrec. in Fieldiana, Bot. 27: 43. 1950 [nom. nov.], **syn. nov. Neotypus** (designated here): **PERU. Dept. Huancavelica:** Llaccta-ccolloy, 5 km W de Conaica, 4150–4200 m, 18.III.1951, *Tovar 236* (US [US01838266]!; isoneo-: USM-280820!). Fig. 2.

Vernacular names. – According to literature, “Janca-huasa” or its spelling variants (see, e.g. SOUKUP, 1987; PUELLES GALLO et al., 2010) and “Ticlla-huasa” are the most commonly used and widespread names. The name “Ticlla-huasa” (from “ticlla”, painted, and “huasa”, back) refers to the color of the abaxial leaf surface, which is usually purple-colored (RAIMONDI, 1874).

Distribution and ecology. – This species is distributed from La Libertad Department in Peru to Cochabamba Department in Bolivia (CABRERA, 1985; BECK & IBÁÑEZ, 2014).

Senecio rhizomatus is a floristic element of the puna vegetation that grows in exposed rocky places or grasslands at elevations of 3500–5000 m, usually in places temporarily covered by snow (CABRERA, 1985; BELTRÁN & ROQUE, 2015).

Notes. – RUSBY (1896) cited two syntypes in the protologue of *Senecio rhizomatus*, i.e. *Bang 1050* and *Bang 1046*. Regarding the latter, the author specified that it was apparently the same as *1050* and that it came from the same locality. GREENMAN (1938) selected the collection *Bang 1050* as the type of the name *S. rhizomatus* and excluded the collection *Bang 1046* (identified as *S. klattii* Greenm. by him). This action should be accepted as the first-step lectotype of the name *S. rhizomatus* because the collection consists of more than a single specimen. CABRERA (1985) later designated the *Bang* material in NY as the lectotype, however, two specimens of this gathering are kept at NY. The second-step lectotype was finally fulfilled by SALOMÓN et al. (2018), who narrowed the typification to a single specimen. On the other hand, there is no consensus on the identity of *Bang 1046*. CABRERA (1985) identified it as *S. rhizomatus*, whereas GREENMAN (1938) indicated that it corresponded to *S. klattii*. This collection is not fully developed, what hinders its identification, but the basal leaves, stems, and involucre do not have the typical glandular-pubescent indumentum that *S. rhizomatus* displays. With regard to *S. klattii*, the available picture of the original material (most likely destroyed in B) shows a coarse stem base covered of leaf base remnants, which does not match the delicate stem base of *Bang 1046*. Moreover, *S. klattii* is a species that seems to be restricted in the Peruvian department of Ancash (see, e.g. SMITH et al. 12335) that has never been recorded in Bolivia (BECK & IBÁÑEZ, 2014). Therefore, we believe that further collections from Tunari (Cochabamba, Bolivia) are needed to resolve this issue.



Fig. 1. – Neotype of *Cryptochaete andicola* Raimondi.

[USM-302354; © Museo de Historia Natural, Universidad Nacional Mayor de San Marcos]



Fig. 2. – Neotype of *Culcitium discolor* Raimondi.
 [US01838266; © United States National Herbarium]

A neotype is designated for *Culcitium discolor* in order to remove any uncertainty surrounding the application of this name. The selected specimen is a Tovar collection from northern Huancavelica Department, in central Peru. This is a suitable specimen because all the diagnostic characters can be easily studied, but also because the label contains information about the vernacular name (“Llanga-huasa” [spelling variant of Raimondi’s “Janca-huasa”]) and the vulnerary properties of the plant (“Utilizan para curar heridas” [used to heal wounds]).

As originally circumscribed (RUSBY, 1896; CABRERA, 1985), *Senecio rhizomatus* is a scapiform perennial herb that reaches 0.4 m tall and is characterized, among other characters, by having persistent, long-petiolate basal leaves arranged in pseudorosette; see CABRERA (1985) for further details on the complete synonymy of the name. SALOMÓN et al. (2018) also treated the Ecuadorian species *S. eliseae* J. Calvo as a new synonym. This is a suffrutescent herb up to 1.5 m that is leaved only on the upper half. Among other characters, these species also differ in synflorescence type (cymose, lax, composed of 1–5 capitula in *S. rhizomatus* vs. pseudocorymbose, rather widespread, composed of (3–)7–10(–20) capitula in *S. eliseae*), synflorescence bracts (linear-lanceolate, reduced in *S. rhizomatus* vs. foliose, similar to the upper cauline leaves in *S. eliseae*), cauline leaves (decrease in size upward in *S. rhizomatus* vs. rather uniform in size in *S. eliseae*), and leaf color (usually discolorous, purple-colored beneath in *S. rhizomatus* vs. concolorous, green on both surfaces in *S. eliseae*). In addition, *S. eliseae* thrives in very humid shrubby paramos at elevations of 3200–3550 m (CALVO, 2015), which does not match the aforementioned habitat and ecology of *S. rhizomatus*. Against this background, no reason supports their synonymy.

According to the herbarium identifications, we realized that *Senecio rhizomatus* has been confused with *S. hyoseridifolius* Wedd., a taxon known only from Peru. Both species display most parts of the plant covered by a glandular-pubescent indumentum and they have a similar synflorescence architecture and capitulum type. However, *S. hyoseridifolius* has runcinate to pinnatipartite leaves with rather distantly dentate lobes. The cauline leaves are large (especially the lower ones) and do not abruptly decrease in size upward as in *S. rhizomatus*. The basal leaves are shortly petiolate and usually wither early.

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