Notes on Peruvian Ribes cuneifolium and Ribes ovalifolium (Grossulariaceae)

Maximilian Weigend* 1
https://orcid.org/0000-0003-0813-6650
mweigend@uni-bonn.de

Ana Andrade-Galán 1
https://orcid.org/0000-0001-7181-7948
aandrade@uni-bonn.de

*Corresponding author
1 Universität Bonn, Nees-Institut für Biodiversität der Pflanzen, Meckenheimer Allee 170, 53115 Bonn, Germany.

Abstract
The genus Ribes (Grossulariaceae) is widespread across the northern hemisphere, but also species-rich in the tropical Andes. In the Peruvian Andes the genus is mostly found in at least seasonally moist cloud and scrub forests, subparamo habitats and hedges. However, some taxa are from more extreme habitats in semi-arid habitats of the western slope of the Andes (Andean scrub, Ribes ovalifolium) respectively high Andean puna and paramo habitats at elevations of up to 5100 m asl (Ribes cuneifolium and some doubtful segregates). These species share small, weakly divided leaves, making them quite atypical for the genus, usually with large, deeply three- to five-lobed leaves. Both the geographical ranges and the species delimitation for both taxa are poorly understood. We here propose the recognition of only two, well-differentiated species. Ribes ovalifolium can be shown to be wide-ranging from northern Ancash to Tacna, covering nearly the entire western flank of the Peruvian Andes. Similarly, Ribes cuneifolium can be shown to represent a single, wide-ranging species from high elevations of San Martín/La Libertad to Cuzco. There is considerable diversity on details of indument, flower color and leaf shape, but no clear dividing lines permitting the recognition of segregates such as Ribes incertum J.F.Macbr. The only exception are cloud-forest populations of Ribes cuneifolium in Pasco, which we propose to segregate as a new subspecies Ribes cuneifolium subsp. pascoense based on their considerably larger leaves and inflorescences.

Resumen
El género Ribes (Grossulariaceae) es principalmente distribuido en el hemisferio norte, pero también presente con muchas especies en los Andes tropicales. En los Andes del Perú el género principalmente se encuentra en bosque nublado, el subparamo, cercos vivos y matorrales de zonas por lo menos estacionalmente húmedos. Sin embargo, algunas especies son presentes en hábitats más extremos, así como matorrales del flanco occidental de los Andes (matorral Andino, Ribes ovalifolium) respectivamente la puna y el páramo altoandino hasta los 5100 m de altitud. (Ribes cuneifolium y algunos segregados dudosos). Estas especies tienen hojas pequeñas, poco divisas, muy atípicas para el género, normalmente provisto de hojas largas, con tres ó cinco lobos profundos. Tanto la distribución como la delimitación de las especies son poco entendidas. El presente estudio presenta una revisión taxonómica de las especies, proponiendo el reconocimiento de solamente dos especies bien diferenciadas. Ribes cuneifolium tiene un rango amplio desde el Norte de Ancash hasta Tacna a lo largo del flanco occidental de los Andes del Perú. Igualmente, demostramos que Ribes cuneifolium representa una sola especie de amplia distribución de grandes alturas desde San Martín/La Libertad hasta Cuzco. Ribes cuneifolium demuestra una diversidad morfológica considerable en detalles del indumento, color de las flores y morfología foliar, pero no encontramos morfotipos claramente delineados justificando la segregación de especies adicionales, como el Ribes incertum J.F.Macbr. Las únicas excepciones son las poblaciones de Ribes cuneifolium del bosque nublado de Pasco. Proponemos el reconocimiento de este material como subespecie Ribes cuneifolium subsp. pascoense basado en sus hojas e inflorescencias mucho más grandes.

Keywords:
Andes; biodiversidad; paramo; superparamo; Grossulariaceae; new subspecies.

Palabras clave:
Andes; biodiversidad; páramo; superpáramo; Grossulariaceae; nueva subespecie.

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Introduction
The genus *Ribes* is highly diverse in the northern hemisphere, especially Eastern Asia and western North America, but also has a considerable number of species in South America (Janczewski 1907). The most recent revision of the genus on a global basis was provided by Janczewski (1907) and the most recent revision for Peru was published by Macbride (1941). Recent studies have yielded a considerable number of new species from Peru, especially from northern Peru and adjacent Ecuador (Weigend & Rodriguez 2006; Weigend et al. 2005, 2010). The genus is most diverse in Andean cloud forest and sub-paramo and sub-puna habitats, but a small handful of species are also found at higher elevations or - at least seasonally - very dry habitats on the western slope of the Andes. These species have unusually small and - atypical for *Ribes* – virtually undivided leaves and are here informally assigned to the *Ribes cuneifolium* group. *Ribes cuneifolium* Ruiz & Pav. was originally described from high elevations of Junín, but has since been recorded along much of the Peruvian cordillera at elevations of 3500 to over 5000 m. A doubly distinct species, *Ribes incertum* J.F. Macbr., was described from Ancash (Macbride 1930). Additionally, field and herbarium studies have yielded material similar to, but differing from “typical” *Ribes cuneifolium* from both southern Peru (Ayacucho and Cuzco) and lower elevations of Pasco. Species limits therefore need to be critically reexamined. Similarly, *Ribes ovalifolium* Jancz. was described from the southernmost part of the Department Ancash (Janczewsky 1905) and was considered as a narrow endemic of Ancash and Lima until recently (Mendoza & Monsalve 2007), but recent field studies yielded more material of the species, further expanding its range. The present study aims at providing a critical examination of species limits and updated distribution data plus a detailed morphological characterization of the species involved.

Material and methods
Specimens of *Ribes cuneifolium* group from BONN, USM as well as the specimens available online from F, MO, G, MA and OXF were analyzed. Additionally, field studies were carried out in all Andean departments of Peru between 1997 and 2019, adding field observations and additional specimens for the study. For morphological analysis, bud scales, leaves, inflorescences, flowers, bracts, bracteoles and fruits of the specimens were measured. The indument and presence or absence of glands was evaluated in all available specimens. The structures such as glands and trichomes in the leaves, petioles, bark, and the details of the flowers were investigated under the stereoscopic microscope (ZEISS, Germany) in the specimens available at the BONN Herbarium.

The micromorphology of leaf surfaces and flowers was additionally studied in liquid preserved material of *Ribes cuneifolium* from Weigend 8805 (BONN), Weigend 8820 (BONN), and Weigend et al. 5043 (BONN) under the scanning electron microscope (SEM, CAMBRIDGE INSTRUMENTS, England). Material was dehydrated in a graded alcohol series and then critical point dried in a CPD 020 (BALZERS UNION, Switzerland). For viewing the samples were sputter coated with an ultra-thin coating of gold (Au) for 45-60 seconds in the sputtering device SCD 040 (BALZERS UNION, Liechtenstein).

All specimens seen of the *Ribes cuneifolium* group were mapped by georeferencing localities, unless coordinates were given on the vouchers. Collection localities for vouchers without coordinates were identified with the help of GeoNames respectively Google Earth Pro. Each specimen analyzed was plotted using the package “maps” (Brownrigg 2017) for the R software (R Core team, 2018).

The present study uses a morphological species concept as previous studies on South American *Ribes* (Weigend & Rodriguez 2005; Weigend et al. 2005, 2010). Species are recognized as distinct if at least two discrete morphological characters differentiate groups of specimens or populations. Infraspecific taxa are recognized where one or several populations differ consistently in individual character states or quantitative characters only.

Results
The results of the morphological investigation show some taxonomic informative characters for the *Ribes cuneifolium* group, mainly in leaf morphology, and trichome distribution and morphology. We found the *Ribes cuneifolium* group to be highly conserved in flower morphology, as previously demonstrated for Bolivian species of the genus (compare Weigend & Binder, 2001, Figs. 9, 10, 11). Both *Ribes cuneifolium* and *Ribes ovalifolium* have superficially similar leaves, atypically small for *Ribes* and with poorly developed – if any – lateral lobes, but the two species are easy to distinguish. *Ribes ovalifolium* has petioles up to 10 mm long with only long stalked trichome glands (Fig. 13), whereas petioles in *R. cuneifolium* are absent or very short (rarely up to 6 mm) with up to three different types of glands (sessile, minute stalked, long stalked). The lamina of *R. ovalifolium* (up to 26 × 23 mm) is larger than in *R. cuneifolium* (up to 15 × 12 mm). Moreover, *R. ovalifolium* has leaves with a central lobe slightly longer than the lateral lobes, distinctly serrate margins all around, and the leaf base rounded to truncate. Leaves of *R. cuneifolium* are obscurely three-lobed, with lateral margins entire, and the leaf base cuneate. Finally, adaxial surfaces of *R. ovalifolium* are eglandular and densely pubescent in contrast to *R. cuneifolium* with glabrous and glandular (sessile glands) adaxial surfaces. The abaxial surface of *R. ovalifolium* leaves is pubescent and eglandular to sparsely glandular (with a few sessile glands) while it is glabrous to subglabrous and glandular (sessile glands) in *R. cuneifolium*.

The leaves of *R. cuneifolium* are typically obovate with the lateral lobes – if present – in the distal half of the lamina (Figs. 4–5). The microphyllous leaves are 3–15 (–20) mm long and 3–9 (–12) mm wide and range from subsessile to shortly petiolate, the lamina is flabellate, obovate, or sub-elliptical (Fig. 4). Bud scales are narrowly to widely ovate, and the apex narrowly acute or acuminate (Fig. 1). There is some degree of variability between different po-
populations of *R. cuneifolium* with regards to leaf shape and indument (Fig. 4), but also flower color (Fig. 8). This continuous range is also evident in the presence of different types of glands on bud scales and petioles. Typically, sessile, minutely stalked, and distinctly stalked glands are present (Fig. 2–3), all three types or only one or two of them may be present in any given individual, with no indication of a clear geographical pattern or correlation with, e.g., leaf morphology. Some specimens differ marginally from the typical condition, e.g., those from San Martín (Tab. 1; Fig. 1E, 2D), Cuzco (Tab. 1; Fig. 1F, 2E), and what has been described as *“Ribes incertum”* (Tab. 1; Fig. 1C, D, 2C). Despite obvious differences in details of leaf morphology or trichome types, we failed to identify any clear dividing lines between groups of populations. Macbride (1930) described the segregate species *Ribes incertum* J.F. Macbr. from the Cordillera Blanca in Ancash. Our copious collections from the Cordillera Blanca showed no consistent morphological differences whatsoever to material from Junín (where the type of *Ribes cuneifolium* comes from), apart possibly from the prevalence of yellow versus greenish-red flowers. The southern collections of *R. cuneifolium* tend to have slightly longer, more elliptical leaves (Fig. 4 H), but there is no clear distinction to other populations of the species. We color-coded the – poorly differentiated – collections in Fig. 7: All over, there is neither morphological nor ecogeographical evidence (Fig. 7) to support the recognition of separate taxa in *R. cuneifolium* or maintaining the segregate *R. incertum*. The only clear exception are the low-elevation collections from Pasco, with considerably larger, flabellate leaves (Fig. 12) and larger inflorescences (see below).

**Key to the species of the *Ribes cuneifolium* group:**

1. Leaves obovate, elliptical or subcircular, unlobed and only deeply, irregularly serrate and sometimes obscurely lobed in the distal part (1/3 or 2/3rd) of the lamina; leaf margin serrate only distally, lamina densely covered with sessile glands, sometimes with very few scattered simple trichomes.
   1. *Ribes cuneifolium*

1’. Leaves widely ovate, unlobed or with one lateral lobe on each side in the proximal half of the lamina; leaf margin serrate along the entire margin, lamina densely pubescent adaxially and abaxially and with scattered sessile glands.

2. *Ribes ovalifolium*
Figure 2. Morphological variation in the petiole of *Ribes cuneifolium*. A-B. Petiole displaying all the different types of glands (long stalked with trichomes, minutely stalked and sessile) (A: Weigend et al. 7676, B: Weigend & Schwarzer 8035). C. Reduced flattened petiole of “*Ribes incertum*” with one type gland (Cano et al. 13715, 13652). D. San Martín specimens with reduced petiole expanded towards the base and two type of glands (Quipuscoa & Vilchez 2614). E. Petioles with two type of glands (minute stalked and sessile glands, Cusco, Galiano et al. 6020).
Figure 3. Different types of glands of *Ribes cuneifolium* petiole. A. Free petiole with long stalked with trichomes gland and minutely stalked glands (*Weigend 8820*). B. Petiole attached to the branchlets with all types of glands known from *Ribes cuneifolium*: long stalked glandular trichomes, minutely stalked glandular trichomes and sessile glands. C. Long stalked glandular trichomes on *Ribes cuneifolium* petiole (*Weigend et al. 5043*). Scale bars A, B: 500 µm; C: 50 µm.
Figure 4. Morphological variation of *Ribes cuneifolium* leaves. A-B. Flabellate and obovate leaves both with cuneate leaf base (A: Weigend et al. 7676, B Weigend & Schwarzer 8035). C. Subglabrous abaxial surface with sessile glands (Weigend et al. 7676). D. Obovate leaf observed in the formerly “*R. incertum*” with cuneate leaf base (Cano et al. 13715). E. Subglabrous abaxial surface with sessile glands which are also present in the margin (Cano et al. 13715, 13652). F-G. Specimens from San Martin with cuneate leaf bases and abaxial surfaces with sessile glands restricted to the veins (Quipuscoa & Vilchez 2614). H-I. Flabellate and subelliptical leaves with cuneate leaf bases, from Cusco. J. Abaxial surface with sessile glands (Cusco, Galiano et al. 6020).
Figure 5. Microstructures of the leaf surfaces of *Ribes cuneifolium*. A. Adaxial surface with sessile glands (*Weigend 8805*). B-C. Leaf margin with unicellular trichomes. D. Abaxial surface with many sessile glands (*Weigend et al. 5043*). E. Abaxial surface with the presence of unicellular trichomes mainly on the vein (*Weigend et al. 5043*). Scale bars A, D: 700 µm, B,C: 200 µm, E: 50 µm.
Figure 6. Habit and Habitat of *Ribes cuneifolium* Ruiz & Pav. A-B. Tall shrubs in Polylepis thicket, Huallanca, Dep. Ancash (Weigend 8805). C-D. Isolated patches at the base of the rocks in Páramo, Pamparomas, Dep. Ancash (Weigend s.n.). E-F. Free standing shrubs in Puna vegetation, Prov. Huaylas, Dept. Ancash (Weigend, s.n.).
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Figure 7. Distribution map of Ribes cuneifolium. Morphotypes and the new subspecies are color-coded, based on herbarium specimens analyzed.

Table 1. Morphological variability across the different regional and morphotypes of Ribes cuneifolium.

<table>
<thead>
<tr>
<th>Structure</th>
<th>R. cuneifolium</th>
<th>&quot;R. incertum&quot;</th>
<th>“San Martin”</th>
<th>“Cuzco”</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>bud scale</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>outline</td>
<td>narrowly ovate to ovate</td>
<td>widely ovate to ovate</td>
<td>narrowly ovate to ovate</td>
<td>Ovate to elliptical</td>
</tr>
<tr>
<td>apex</td>
<td>acute to acute</td>
<td>acute</td>
<td>acuminate</td>
<td>acute</td>
</tr>
<tr>
<td>vestiture</td>
<td>shortly pubescent</td>
<td>shortly pubescent</td>
<td>glabrous</td>
<td>shortly pubescent to glabrous</td>
</tr>
<tr>
<td>glands</td>
<td>short or long stalked, sessile, sometimes all three</td>
<td>sessile and minutely stalked</td>
<td>sessile</td>
<td>sessile</td>
</tr>
<tr>
<td><strong>petiole</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>shape</td>
<td>expanded towards the base or flattened</td>
<td>subsessile leaves or petiole very reduced and flattened</td>
<td>flattened</td>
<td>expanded towards the base</td>
</tr>
<tr>
<td>vestiture</td>
<td>glandular</td>
<td>glandular</td>
<td>eglandular to glandular</td>
<td>glandular</td>
</tr>
<tr>
<td>glands</td>
<td>long stalked with trichomes, minutely stalked and sessile</td>
<td>minutely stalked</td>
<td>stalked and sessile</td>
<td>minutely stalked and sessile</td>
</tr>
<tr>
<td><strong>lamina</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>outline</td>
<td>flabellate or flabellate -obovate</td>
<td>obovate</td>
<td>narrowly obovate</td>
<td>flabellate to subelliptical</td>
</tr>
<tr>
<td>apex</td>
<td>obscurely three-lobed or three-lobed</td>
<td>unlobed to three-lobed</td>
<td>unlobed or obscurely three-lobed</td>
<td>unlobed to three-lobed</td>
</tr>
<tr>
<td>vestiture</td>
<td>individual trichomes on margins</td>
<td>individual trichomes and sessile glands on margins</td>
<td>individual trichomes and stalked glands near base</td>
<td>individual trichomes on margins</td>
</tr>
<tr>
<td><strong>abaxial surface</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>simple trichomes</td>
<td>few on veins</td>
<td>few on veins</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>gland type</td>
<td>sessile glands</td>
<td>sessile</td>
<td>sessile glands on veins only</td>
<td>sessile glands</td>
</tr>
</tbody>
</table>
Figure 8. Inflorescences and flowers of *Ribes cuneifolium* A-B. Flowering branch with and individual inflorescences with pale yellow flower, west side of Abra Carpish, Dep. Ancash (*Weigend et al.* 8891). C-D. Typical red-flowering form, note the five large sepals and five tiny petals, Huallanca, Prov. Bolognesi, Dep. Ancash (*Weigend* 8805).

**Taxonomic treatment**

*Ribes cuneifolium* Ruiz & Pav.

*Flora Peruviana, et Chilensis* III (1802:13, tab. 233 c).

Shrub 0.3–4 m high, very densely branched with numerous short shoots; branches narrowly spaced, lateral branches typically 3–5 mm long. Bark matt brown to gray, not or weakly exfoliating later; on young branches shortly pubescent with simple individual hairs, with minutely stalked or subsessile glands. Bud scales ovate, apex acute, rarely acuminate, 1–5 × 1–3 mm; abaxially finely pubescent with a few simple hairs, minutely stalked glands on margin, sometimes also with sessile glands, rarely also with subsessile glands. Leaves evergreen or semi-deciduous, coriaceous; subsessile to shortly petiolate, petiole 1–3.5(–7) mm long, flattened and expanded especially towards the base, shortly pubescent with unicellular hairs and, sessile, minutely stalked and/or stalked glands. Lamina flabellate, obovate or sub-elliptical, 3–15(–20) × 3–9(–13) mm; three-veined; entire, obscurely or distinctly three-lobed, incision between lobes less than ¼ of leaf length, free portion of the central lobe up to 3 × 6 mm; lateral margin entire, distal margin serrate with (2–)3–6(–10) serrations per lobe; margin with few small unicellular trichomes and in some cases sessile or stalked glands restricted to the base of the leaf margin; leaf base cuneate; adaxial surface glabrous with sessile glands; abaxial surface glabrous to subglabrous with very few simple trichomes and sessile glands. Inflorescence terminal racemes on brachyblasts, usually deflexed, (5–)8–13(–26) mm long; with 3–14 flowers; peduncle 1.5–5 mm long, variously pubescent with simple unicellular trichomes, eglandular or with few sessile glands; pedicels 0–2 mm long, ca. 1 mm apart in open...
flowers, pubescent from simple trichomes; bracts ovate-acuminate, 1–3 mm long, pubescent from simple small trichomes and with scattered sessile glands; bracteoles narrowly ovate-acuminate, ca. 1 mm long, with scattered unicellular trichomes and some sessile glands. Flowers rotate, 2–5 mm long, 2.5–5 wide, pale yellow, cream-coloured, green or dark red; hypanthium 1–2 mm long, largely glabrous, externally pilose especially at base and with many sessile to sub sessile glands on the inferior ovary; calyx lobes ovate-acuminate, 1–2.5 × 1–1.5 mm, (sub-)glabrous, eglandular; petals narrowly oblanceolate, rounded to truncate, margin entire, ca. 0.6–0.8 × 0.3–0.5 mm, glabrous, five stamens, filaments ca. 0.6–0.9 mm long, anthers basifixed, ca. 0.2–0.4 mm, nectarial glands absent; style deeply bifid; ovary inferior, fused with hypanthium, bicarpellate, unilocular, with several anatropous ovules. Fruit a spherical berry, 1–5 per raceme, pale red or green, ca. 5–8 mm in diameter; glabrous, with a few sessile glands; perianth remnants ca. 1–2 mm.

Notes: Ribes cuneifolium is a very widespread and often common high-elevation species. We propose the recognition of two subspecies – the very common and widespread typical subspecies cuneifolium and the newly described subspecies pascoense.

Key to the subspecies of Ribes cuneifolium:

1. Lamina flabellate to elliptical, 5–15(–20) × 3–9(–12) mm, base cuneate; inflorescence with 3–8 flowers; peduncle 1.5–4.5 mm long.

1.1 Ribes cuneifolium subsp. cuneifolium

1. Lamina (flabellate to) subcircular, 6–16 × 7–13 mm, base cuneate to obtuse; inflorescence with 8–14 flowers; peduncle 4–5 mm long.

1.2. Ribes ovalifolium subsp. pascoense

1. Ribes cuneifolium Ruiz & Pav. subsp. cuneifolium

Type: PERU. [Junín, Diezmo], s.d., H. Ruiz & J. Pávón, s.n. (holotype MA MA811943); paratypes: MA MA811942 [photo!], G barcode G00388802 [photo!], F V0066659F [frag. MA811942], F! Neg. No. 27343, OXF 00059252[photo!].


Bark on young branches shortly pubescent with simple individual hairs, and glandular with sessile, minute stalked (rarely present), or sub sessile glands. Bud scales ovate, apex acuminate, 1–3 mm long, 1.2–2.5 mm wide. Petiole 1–3.5(–6) mm long. Lamina flabellate, obovate, ob lance-ovate or elliptical, 5–15(–20) mm long, 3–9(–12) mm wide; three veined; unlobed, obscurely or distinctly three-lobed, incision between lobes less than ½ of leaf length, free portion of the central lobe up to 3 × 6 mm; base cuneate; abaxial surface glabrous to subglabrous with very few simple individual small trichomes (especially on veins) and glandular with sessile glands sometimes restricted to the veins. Inflorescence (5)–8–13(–26) mm long in flower; with 3–8 flowers; peduncle 1.5–4.5 mm long, pedicels 0–1–2 mm long. Flowers 2–3.5 mm long, 2.5–5 wide, hypanthium 1–1.5 mm long.

Distribution and Habitat: This subspecies is widely distributed in Peru. There are collections of this species from Ancash, Apurímac, Ayacucho, Cuzco, Huancavelica, Huánuco, Junín, La Libertad, Lima, Pasco, and San Martín. It is mainly found in isolated patches at the base of rocks and in small valleys in páramo and puna vegetation. Thespecies is found at elevations from 2900 m to 5100 m. At the upper limit of its distribution it is often the only sizeable woody plant and associated with superparamo vegetation (Lysipomia, Phyllactis, Chuquiragua) and reaches sizes of barely 50 cm. At lower elevations it may be the dominant species of dwarf forests ca. 4 m tall or it may be associated with rock-falls and tall stands of Polylepis spp. Where heavily browsed, it may form a dense, cushion-shaped topiary, especially in drier formations (Fig. 6).

Phenology: Flowering appears to be concentrated in May and June, but there are also flowering specimens from January, February, March, August, October, and November, indicating that the species flowers more or less opportunistically throughout the year. Unlike all other species of Ribes, this species may also pass into flower a second time with individual plants bearing flowers and fruits at the same time.

Notes: Ribes cuneifolium subsp. cuneifolium as here re-defined ranges from San Martín in the North to Cuzco in the South. Across the geographical range there is some degree of clinal variation in morphology which can be roughly grouped into four variants (compare Table 1). These include "Ribes incertum", originally differentiated from R. cuneifolium based on putatively elliptical leaves and yellow flowers, two characters that turn up independently from each other in different populations of the species across most of its range (see Fig. 14). The northern populations and most of the southern collections (esp. from Cuzco) are marginally different in habit and leaf shape, but there is no clear dividing line nor complete ecogeographical segregation from typical R. cuneifolium. We therefore advocate defining the subspecies broadly.

Additional specimens examined: PERU. Ancash: Villcaminán, near Huaraz, 3640 m, 24 March 1983, Q. Tovar et al. 9931 (USM); Prov. Antonio Raimondi, Distric of Chingas, Yanachaccha Lagoon and surroundings, 4200–4300 m, 9° 10' 50'' S, 77° 4' 31, 1'' W, 22 – VIII – 2003, A. Cano et al. 13715 (BSB, USM); Prov. Bolognesi, road from Abra Janashalla down to Huallanca, bellow Huansalá, 3390 m, 9° 52,083' S, 76° 59,443' 08 W, X – 2007, M. Weigend et al. 8805 (BONN); Road from Huallanca to San Marcos via Lago Canrash, 4230 m, 09 – X – 2007, M. Weigend et al. 8820 (BONN); 3900 m, VIII – 1972, A. Cerrate 4 (USM); Jahuacocha, surroundings of the lagoon sustained by the Jerupaja, 5100 m, 27 – V – 1954, E. Cerrate 2274 (USM); 3800 m, 24 – X – 1981, E. Cerrate et al. 8358 (USM); Prov. Corongo, road Sihuas to Corongo/

1.1. **Ribes cuneifolium** Ruiz & Pav. (1802:13, tab. 233 c) subsp. **pascoense** Weigend, subsp. nov. Fig. 12

**Type:** PERU. Pasco, Prov. Pasco, La Quinua, 3540 m, 01 – XII – 1986, S. Rivas, O. Tovar, J. Loidi, P. Canto, s.n. (holotype USM, **USM 295711**).
Ribes cuneifolium subsp. pascoense differs from subsp. cuneifolium in widely flabellate to subcircular leaves (vs. obovate to elliptical) and inflorescences 12–17 mm long with 8–14 flowers (vs. 8–13 mm with 3–8 flowers).

Bark brown and with sessile glands only. Bud scales ovate-acuminate, 3–5 × 2–3 mm. Petiole 3–7 mm long. Lamina (flabellate to) subcircular; 6–16 × 7–13 mm; three veined; entire or very obviously three-lobed, incision between lobes less than 1/8 of leaf length, free portion of the central lobe up to 1.5–5 × 2–3.5 mm; base cuneate to obtuse; abaxial surface glabrous and glandular with sessile glands. Inflorescence 12–17 mm long in flower; with 8–14 flowers; peduncle 4–5 mm long, pedicels up to 1 cm. Flowers subsessile, 4–5 mm long, 3–4 wide; hypanthium 1.5–2 mm long.

**Distribution:** This subspecies is only known from Dept. Pasco, Prov. Pasco. It was found at elevations of 3540–3780 m in cloud-forest remnants.

**Phenology:** The type specimen was collected flowering in December.

**Etymology:** The epithet “pascoense” is derived from Pasco, the name of the Peruvian department where the type collection came from.

**Notes:** Ribes cuneifolium subsp. pascoense is only known from a handful of collections from a small area in Pasco and may well be more widespread on the eastern Andean slope in Junin, Pasco and San Martin. Additional collections would be clearly desirable to improve our understanding of this species.

**Additional specimens examined: PERU. Pasco:**

**2. Ribes ovalifolium Jancz.**


**Type:** PERU. [Ancash], 5 August 1903, A. Weberbauer 2771 (B † Fl: Neg, No. 4159).

Shrub 0.9–2 m tall; bark matt brown to bright gray, not or weakly exfoliating, moderately pubescent with simple trichomes, eglandular. Bud scales ovate-acuminate, 1.5–3 × 1.5–2.5 mm, densely pubescent with simple trichomes, eglandular or glandular with minutely stalked and stalked glands esp. along the margins. Leaves deciduous; petiole 2–5 (10) mm, densely pubescent, eglandular to glandular with long stalked glands which along the margins. Lamina ovate to subelliptical, 7–19 (26) × 5–15 (23) mm; three veined; obscurely to distinctly three-lobed, central lobe slightly longer (1.5 ×) than the two lateral lobes, incisions between lobes ¼ of leaf length; free portion of central lobe 3–11 × 4–9 mm; leaf margins all serrate, distal margins with 3–7 (13) serrations per lobe; leaf base rounded to truncate; adaxial and abaxial surface densely pubescent with simple trichomes, adaxially eglandular, abaxially eglandular or with numerous sessile glands. Inflorescence terminal racemes on brachyblasts, pendulous, 8 mm long in flower; with 2–3 flowers; peduncle 2.5–3 mm long, pubescent with simple unicellular hairs; bracts ovate-acuminate, 2.5–3 × 1.5–2 mm, pubescent, glandular with minute stalked glands along margins; bracteoles lanceolate, apex narrowly acute, 1–1.5 × 1 mm, pubescent with unicellular trichomes. Flowers subsessile, rotate, 5.5–6 × 4–5 mm, reddish brown; hypanthium 2.5–3 mm, densely pubescent with simple unicellular hairs, glandular with minutely stalked glands towards the ovary; calyx lobes ovate, apex acute, 1.5–2.5 × 1–2 mm, abaxial pubescent with simple unicellular hairs; petals oblong, apex rounded, entire, 1 × 0.5–1 mm; five stamens, filaments 0.7 mm, anthers basifixed, 0.5 mm; style bifid; ovary inferior, fused with hypanthium, bicarpellate, unicellular; with several anatropous ovules. Fruit spherical berries, ca. 5–7 mm in diameter, sparsely pubescent with simple individual hairs, glandular with minutely stalked glands; perianth remnants ca. 1 mm long.

**Distribution and Habitat:** The species is present in Ancash, Arequipa, Ayacucho, Lima, Moquegua, Tacna where it is restricted to the arid western slopes of the Andes. It is mainly found in rocky slopes, on rock surfaces and in stabilized scree slopes at elevations of 2400–4000 m.

**Phenology:** Based on the rare flowering specimens in herbaria, the plant appears to flower in November.

**Notes:** Ribes ovalifolium is a superficially similar to Ribes cuneifolium, but is easily distinguished by its densely pubescent leaves (vs. glabrous to subglabrous in R. cuneifolium) with a rounded or truncate bases (vs. cuneate), leaf base and serrate leaf margins all around (vs. only distally). The species is heavily browsed by sheep, cattle and presumably both wild and domestic camels. Therefore, across most of its range, only individual plants are found, typically on inaccessible rockfaces and between boulders. The only larger population with fully developed plants observed in the field by one of the authors was found in northern part of the Cordillera Negra on a rockslide (M. Weigend & Ch. Schwarzer 8065). This is, at the same time, the northernmost population of the species so far reported.

**Additional specimens examined: PERU. Ancash:**
- Cordillera Negra, road (Caraz to) Huaylas to Jimbe across the Cordillera Negra, after passing through Huamanyaco, 4095 m, 8° 51’ 3” S, 77° 57’ 5” W, 29 – IV – 2004, M. Weigend & Ch. Schwarzer 8065 (USM, HUSA, HUT, BONN); Prov. Bolognesi, near Acas, 3600 m, 16 June 1979, E. Cerrate 7628 (USM); Road to Cochpunt, 3579 m, 19– 181, E. Cerrate 8130 (USM); Cunuc ravine, between Ocros and Chonta, 3600 m, 10 – VII – 1974, E. Cerrate 6245 (USM); Prov. Huaylas, Caraz, 2418 m, 9° 2’ 48.1194” S, 77° 48’ 41.04” W, 11 – VIII – 2010, Xue-Jun Ge et al. 206 (USM).
- Ayacucho: Above the Port Toro Muerto, Km 77–78, highway Nazca-Puquio, 3500–3520 m, 14° 41’ 23.8” S, 74° 30’ 36.1” W, 23 – II – 2002, A. Cano et al. 11867 (USM).
- Arequipa: Surroundings of La Union above Puyca, 3800
m, VI – 2000, T. Hofreiter s.n. (M, USM, BONN); Lima: Prov. Cajatambo, Road from Cajatambo a Ocros, pass height after Rajan towards Ocros, 4145 m, S 10.37185, W 77.31637, 04 – III – 2018, M. Weigend & K. A. Peña Ramos 9802 (BONN, USM, HUT). 10 km NE of Suchi, ca. 61 road km NE of Chosica on road to Huanza, 3900–4000 m, 06 – V – 1978, A. Gentry 21637 (USM); Above Huarochirí, 4000 m, June 1953, E. Cerrate 2052 (USM); Prov. Canta, Lachaqi, Pedrales de Arquircancha, 3650 m, 29 – III – 1991, G. Vilcapoma 831 (USM); Lachaqi, roqueades de Parianhuasi, between rocks, 22 – V – 2004, G. Vilcapoma 7121 (USM); District of Huaraz, Huaraz, 3500 m, 11° 24’ 48.62” S, 76° 34’ 40.92” W, 07 – VI – 2008, P. González 230 (USM); Prov. Huarochirí, in front of the cave Mortero, District of Maritana, 3850 m, 14 – IV – 1968, E. Cerrate et al. 4799 (USM); Pacomanta, Km 120 highway Lima-Huarochirí, in the ravine between big stones, 3800 m, 01 – XII – 1987, S. Baldeón 705 (USM); Caigola, District of Maritana, 3250 m, 10 – IV – 1968, E. Cerrate et al. 4664 (USM); San Pedro de Casta, citadel of Marcahuasi, 3850 m, 10 – VI – 1993, G. Yarupaitán & J. Albán 731 (USM); Prov. Yauyos, District of Laraos, Peshcohayo, between Peshco and Trespuquios. 4096 m, 12° 21,61’ S, 75° 48,93’ W, 03 – II – 2000, H. Beltrán 3375 (USM, B, BONN); Cochapunco, above Tupinacocha, 3600 m, 18 – I – 1952, E. Cerrate 1209 (USM); Moquegua: Prov. General Sanchez Cerno, between Arequipa and Pocsi (after highest point in road), dry scrub formation, 3300–3400 m, 16° 35’ 23” S, 71° 25’ 52” W, 21 – V – 2003, M. Weigend et al. 7756 (BSB, USM, BONN); Tacna: Candarave, Yucamani volcano, 3100–3400 m, 09 – XII – 1997, M.I. La Torre 1962 (USM).

Figure 9. Flower and fruit of Ribes cuneifolium. A. Flower with sessile glands toward the ovarian portion. B. Bract with sessile glands restricted to the margin. C. Bracteole. D. Pentamerous flower. E. Fruit with few sessile glands. (Huallanca, Prov. Bolognesi, Dep. Ancash (Weigend 8805).
Figure 10. Details of the inflorescence of *Ribes cuneifolium*, SEM. A. Inflorescence displaying one flower as well as bracts and bracteoles. B. Pentamerous flower of *Ribes cuneifolium* with its petals and stamens inserted ca.1 ml from the base of the hypanthium. C. Glandular hypanthium (sessile glands). D. Ovate bract pubescent from unicellular trichomes and glandular with sessile glands mainly on the margin. E. Rachis with ovate bracts and lance-ovate bracteoles (*Weigend 8805*). Scale bars A, E: 700 µm; B, C: 500 µm; D: 300 µm.
Figure 11. Details of the flower of *Ribes cuneifolium*. A. Pentamerous flower (*Weigend 8805*). B. Many sessile glands present in the hypanthium of *R. cuneifolium* (*Weigend 8820*). C. Longitudinal section of *Ribes cuneifolium* flower showing the inferior ovary. D. Stamen. E. Longitudinal section of *Ribes cuneifolium* showing the presence of ovules. F. Deeply bifid style surrounded by stamens with basifixed anthers (*Weigend 8805*). Scale bars A: 700 µm; B: 300 µm; C, E, F: 500 µm; D: 200 µm.
Figure 13. *Ribes ovalifolium*. A. Flowering branch. B. Leaf. C. Abaxial surface with simple individual hairs mainly located on veins, and sessile glands. D. Petiole with long stalked glandular trichomes. E. Flower with minutely stalked glands towards the ovarian portion. F. Bract with minutely stalked glands. G. Bracteole. H. Pentamerous flower. I. Flower longitudinal section displaying the oblong petals and the ovary fused with the hypanthium. J. Fruit with few minutely stalked glands (*Weigend et al.* 7756).
Notes on Peruvian Ribes cuneifolium and Ribes ovalifolium

Literature cited


Figure 14. Distribution map of Ribes ovalifolium based on the herbarium specimens analyzed.


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