

Taxonomical and distributional notes on *Polylepis* (Rosaceae)

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Abstract

Polylepis pacensis M. Kessler & Schmidt-Leb. spec. nov. is described; *P. flavipila* (Bitter) M. Kessler & Schmidt-Leb., *P. incarum* (Bitter) M. Kessler & Schmidt-Leb., *P. lanata* (Kuntze) M. Kessler & Schmidt-Leb., and *P. subtusalbida* (Bitter) M. Kessler & Schmidt-Leb. are elevated from subspecies or varietal to species rank; *P. triacontandra* Bitter is reinstated as a species. Extensions to the known distribution ranges of three additional species of *Polylepis* are reported. An updated key to species in the genus is provided.

Keywords: *Polylepis*; Rosaceae; Taxonomy; Andes

Introduction

The genus *Polylepis* Ruiz & Pav. (Rosaceae, Sanguisorbeae) comprises species of trees inhabiting the high Andes from Venezuela to central Argentina. The number of species included by different authors varies between 15 and 33 (Bitter 1911; Simpson 1979; Kessler 1995a, b). The circumscription of taxa in the genus is difficult due to extensive morphological variability within populations, limited variability between many of the recognized species, and apparently extensive hybridization (Simpson 1979, 1986; Kessler 1995a; Romoleroux 1996; A.N. Schmidt-Lebuhn, M. Kessler & M. Kumar unpubl. data). Similar problems are found in a number of other genera of Rosaceae, e.g., the subfamily Maloideae (Campbell & Dickinson 1990) and the genus *Acaena* (Dawson 1960), which is closely related to *Polylepis*.

The first taxonomic revision of *Polylepis* was prepared by Bitter (1911) who applied a typological species concept and recognized 33 species, 9 subspecies, and 18 varieties, placing a different name on almost every single herbarium specimen available to him.

In the second revision of the genus, Simpson (1979), working with much more extensive herbarium material than available to Bitter, and based on personal field experience with several species of *Polylepis*, realized that many of the taxa recognized by Bitter represented variants of morphologically variable species. She therefore reduced the number of species to 15, but later (Simpson 1986) treated *P. tarapacana* Phil. as distinct from *P. tomentella* Wedd. and mentioned that *P. besseri* Hieron. as defined by her in 1979 probably represented a species complex. In a taxonomic revision of the Bolivian species of the genus, Kessler (1995a) attempted to disentangle the taxa within this complex, recognizing two species, *P. besseri* and *P. racemosa* Ruiz & Pav., with three and two subspecies, respectively. The category of subspecies was used for morphologically and geographically distinct taxa that were linked by intermediate populations suggesting hybridogenic introgression. Within *P. tomentella*, Kessler (1995a) also recognized three subspecies, in this case corresponding to geographically separate entities differing primarily in size. A further member of the *P. besseri* complex

from southwestern Peru and northwestern Chile, *P. rugulosa* Bitter, was also recognized as distinct (Kessler 1995b).

In the ten years that have passed since Kessler's (1995a, b) study, much additional information on *Polylepis* has come to light, based especially on extensive collections mainly in Peru and Bolivia, and on molecular analyses of most taxa within the genus (Kerr 2003; A.N. Schmidt-Lebuhn, M. Kessler & M. Kumar unpubl. data). These data suggest that hybridization takes place between probably all species of the genus as long as they grow in geographical proximity to each other. This applies even to morphologically clearly distinct species that were placed in different species groups by Simpson (1979, 1986). Kerr (2003) also found evidence for hybridization between *Polylepis* and the sister genus *Acaena*. These findings have prompted us to reassess the taxonomic implications of hybridization in the genus. Based on a biological species concept (Mayr 1942), Kessler (1995a) placed morphologically distinct populations in a single species when they were linked by intermediate „hybrid“ populations, but our molecular data shows that such „subspecies“ are genetically not closer to each other than species that have been unambiguously recognized as distinct species by all researchers working on the genus (Bitter 1911; Simpson 1979; Kessler 1995a; Romoleroux 1996). Rigorous application of the biological species concept within *Polylepis* would result in the recognition of probably only a single species, an unsatisfactory course of action that would not account for the conspicuous morphological differences between many populations and clear biogeographic patterns. An alternative approach, and the one we favour, is to recognize morphologically, biogeographically, and ecologically distinct populations at species rank, even if there is evidence for hybridization with other species. Such a phylogenetic species concept (Nixon and Wheeler 1990) recognizes populations as species as long as genetic exchange with other populations does not inhibit the independent evolutionary development of these populations (Luckow 1995).

As a result of this reappraisal of species limits in *Polylepis*, we here describe one new species, and raise five taxa to species rank that were previously treated as subspecies or varieties or placed in synonymy with other species. This increases the number of species in *Polylepis* to 26. Taking into account three new country records also reported here, the number of species recorded per country now is 1 in Venezuela, 3 in Colombia (1 endemic), 7 in Ecuador (2 endemics), 14 in Peru (3 endemics), 13 in Bolivia (4 endemics), 2 in Chile, and 4 in Argentina (1 endemic). Two further populations from Peru may also merit species rank, but we do not yet have sufficient herbarium material and field expe-

rience to adequately judge their status. These include (A) a population in the Urubamba Valley of Cuzco that was placed in *P. besseri* by Simpson (1979), and (B) large stands on limestone hills north of Lake Titicaca. The name *P. pallidistigma* Bitter may apply to this latter taxon, but we have only seen a photograph of the type material and no recent collections from the type locality.

Because the taxonomic changes proposed by Kessler (1995a, b) and by us imply that Simpson's (1979) key to *Polylepis* is outdated, we here provide a key to the species recognized by us. Identification of specimens of *Polylepis* is difficult due to the variability of the taxa and should best be attempted with several specimens from a given population. Ideally, young but mature branches should be studied, because older branches often lose the hairs on stipular sheaths and leaves. Hybrids are frequent and may be recognizable only in extensive collection series also including the parent species. The two populations of uncertain taxonomic status mentioned above (*P. aff. besseri*, *P. pallidistigma*) were not included in the key because insufficient material was available to us.

Key to the species of *Polylepis*

1. Lower leaflet surfaces with sericeous indument, rarely almost glabrous with a few silky hairs restricted to veins 2
- Lower leaflet surfaces with woolly, pannose, villous, strigose, or small, matted, glandular indument, or glabrous (some species with sericeous hairs on leaflet margins) 6
2. Hairs of lower leaflet surfaces dense, evenly covering the surface 3
- Hairs of lower leaflet surface confined to, or most prominent on, the veins 4
3. Lower leaflet surfaces often with a layer of small, lanose hairs below the silky hairs; leaflet apices emarginate; 2–3(–4) pairs of leaflets *P. lanuginosa* Kunth
- Lower leaflet surfaces lacking a lower layer of small hairs; leaflet apices obtuse to acute; (2–)5–7 pairs of leaflets *P. sericea* Wedd.
4. Leaflet apices acute; 4–9 pairs of leaflets *P. pauta* Hieron.
- Leaflet apices emarginate; 1–3 pairs of leaflets ... 5
5. Leaflets 0.6–1.3 cm long; fruits with irregular protuberances or blunt spines *P. pepeii* B.B. Simpson
- Leaflets 1.7–2.3 cm long; fruits with irregular flattened ridges *P. subsericans* J.F. Macbr.
6. Lower leaflet surfaces glabrous or with very short pannose, matted, glandular hairs that are not recognizable as individual hairs with the unaided eye,

- hairs shorter than the height of the leaf veins; leaf veins glabrous or puberulous, easily visible 7
- Lower leaflet surfaces woolly, pannose, villous, lanose, or strigose, individual hairs recognizable with the unaided eye; leaf veins with similar hairs, often completely obscured by them 13
7. Leaflets 1–4 pairs, membranaceous, sharply serrate; fruits with 2–3 thin wings 8
- Leaflets 1 pair, coriaceous, entire to crenate; fruits with 3–5 hard, irregular ridges 9
8. 2–12 flowers per inflorescence; 1–3 pairs of leaflets; stipular sheaths glandular or hispid; Argentina *P. australis* Bitter
- 14–27 flowers per inflorescence; 2–4 pairs of leaflets; stipular sheaths glabrous or hispid; Bolivia *P. neglecta* M. Kessler
9. Upper leaflet surfaces glabrous, covered by a yellow, glassy resin; leaflets 0.7–1.3 cm long, entire to very slightly crenate; western Cordillera of S Peru, N Chile, and W Bolivia *P. tarapacana* Phil.
- Upper leaflet surfaces without resin, glabrous to slightly pilose; leaflets 0.7–4.0 cm long, crenate; Ecuador to E Bolivia and NW Argentina 10
10. Leaflet apices emarginate; leaflets 1.2–4.0 cm long; Ecuador and Peru *P. incana* Kunth
- Leaflet apices obtuse to acute; leaflets 0.7–2.4 cm long; Bolivia and Argentina 11
11. Plants shrubs, up to 1.5 m tall; leaflets 0.7–1.2 cm long, with 5–6 teeth per side; inflorescences up to 1.8 cm long, lacking glandular hairs; Prov. Arani, Dep. Cochabamba, Bolivia *P. tomentella* Wedd. subsp. *nana* M. Kessler
- Plants shrubs or trees, up to 9 m tall; leaflets 0.8–2.4 cm long, with 5–24 teeth per side; inflorescences up to over 1.2 cm long, with or without glandular hairs; widespread in E Bolivia and NW Argentina 12
12. Leaflets 0.9–2.4 cm long, with 7–24 teeth per side; leaflet apices obtuse to slightly acute; lower leaflet surfaces with or without yellow glandular hairs; upper leaflet surfaces glabrous, rarely very slightly pilose; 4–8 flowers per inflorescence; Dep. Cochabamba, Bolivia *P. tomentella* Wedd. subsp. *incanoides* M. Kessler
- Leaflets 0.8–1.9 cm long, with 5–10 teeth per side; leaflet apices slightly to strongly acute; lower leaflet surfaces always with yellow glandular hairs; upper leaflet surfaces glabrous to pilose; 2–6 flowers per inflorescence; Deps. Potosí, Oruro, Chuquisaca, Tarija in Bolivia, NW Argentina *P. tomentella* Wedd. subsp. *tomentella*
13. Fruits with mostly 3–8 narrow spines; lower leaflet surfaces densely pannose or lanose, lacking yellow glandular hairs; leaflet apices emarginate; Colombia to NW Argentina 14
- Fruits with 3–5 irregularly knobby or spiny ridges; lower leaflet surfaces woolly, pannose, villous, or strigose, often with yellow glandular hairs; leaflet apices emarginate to acute; Peru and Bolivia 19
14. 6–8 pairs of leaflets; inflorescences 15–35 cm long, with >20 flowers per inflorescence; N Peru *P. multijuga* Pilg.
- 2–6 pairs of leaflets; inflorescences 3–12 cm long, with <20(–24) flowers per inflorescence; Colombia to NW Argentina 15
15. Stipular sheaths and leaflet margins with sericeous hairs contrasting with the pannose hairs of the lower leaflet surfaces; 2–3 pairs of leaflets; Ecuador *P. reticulata* Hieron.
- Stipular sheaths and leaflet margins with pannose or villous hairs resembling the hairs of the lower leaflet surfaces; 3–6 pairs of leaflets; Colombia to NW Argentina 16
16. Outer surfaces of stipular sheaths with long, sericeous hairs; C Bolivia to NW Argentina *P. hieronymi* Pilg.
- Outer surfaces of stipular sheaths glabrous or with lanose hairs, sometime sericeous hairs emerging from the inner surfaces of the sheaths; Colombia to C Peru 17
17. Upper leaflet surfaces rugose, occasionally with scattered long hairs; stipular sheaths apically obtuse; inflorescences 2.0–5.5 cm long, with 3–7 flowers; fruits with thin, terete spines; Colombia *P. quadrijuga* Bitter
- Upper leaflet surfaces nitid, when young with long, shaggy hairs; stipular sheaths apically with acute spurs; inflorescences 5.5–14.0 cm long, with 8–18 flowers; fruits with flattened spines; Ecuador and Peru 18
18. Lower leaflet surfaces and stipular sheaths villous intermixed with short, matted, dark red multicellular hairs; leaflets 0.4–0.9 cm long, in 4–6 pairs *P. microphylla* (Wedd.) Bitter
- Lower leaflet surfaces and stipular sheaths pannose, lacking red hairs; leaflets 0.7–1.6 cm long, in 2–4 pairs *P. weberbaueri* Pilg.
19. Lower leaflet surfaces with shaggy, lanose, long hairs restricted to the veins or much longer there than on the remaining surface; fruits usually with a large distal spine on each ridge 20
- Lower leaflet surfaces with homogeneously distributed, short to long, pannose to villous hairs; fruits usually with several spines 22
20. Leaflets 2–3 pairs, apically obtuse to emarginate, marginally entire or with 4–8 teeth per side; inflorescence rachises loosely to

- densely villous; Dep. Cochabamba, Bolivia *P. lanata* (Kuntze) M. Kessler & Schmidt-Leb.
- Leaflets 1–3 pairs, apically obtuse to acute, marginally with 8–14 teeth per side; inflorescence rachises with scattered, shaggy hairs; Peru to Dep. La Paz, Bolivia 21
21. Inflorescences 4–11 cm long, with 3–11 flowers; leaf rachises with villous hairs, lacking yellowish glandular hairs; Deps. Cajamarca to Cuzco, Peru *P. racemosa* Ruiz & Pav.
- Inflorescences 8–18 cm long, with 8–18 flowers; leaf rachises with villous and scattered yellowish glandular hairs; Dep. Puno, Peru, to Dep. La Paz, Bolivia *P. triacontandra* Bitter
22. Leaflets 2–4 pairs, round, ovate or obovate, apically obtuse to emarginate; lower leaflet surfaces with dense, white, pannose hairs; inflorescences, flowers and fruits with dense, white, pannose hairs 23
- Leaflets 1–3 pairs, oblong to elliptic, apically obtuse to acute; lower leaflet surfaces with loose to dense, white, yellowish or grayish hairs; inflorescences, flowers and fruits with loose to dense villous hairs 26
23. Leaflets 2.0–3.4 cm long, obovate, apically obtuse to emarginate; fruits usually with a large distal spine on each ridge; Dep. Cochabamba, Bolivia *P. lanata* (Kuntze) M. Kessler & Schmidt-Leb.
- Leaflets 1.1–2.3 cm long, round to ovate; fruits usually with several spines; SW Peru, NW Chile, Deps. La Paz and Cochabamba, Bolivia 24
24. Upper leaflet surfaces strongly rugose; leaves and inflorescences virtually lacking yellow glandular hairs; SW Peru, NW Chile *P. rugulosa* Bitter
- Upper leaflet surfaces slightly to moderately rugose; yellow glandular hairs present on inflorescences, leaf rachises and/or lower leaflet surfaces; Bolivia 25
25. Leaflets 1–3 pairs; stipular sheaths lacking spurs or with weak spurs up to 1 mm long; leaf rachises with dense, white pannose hairs and yellow, glandular hairs; lower leaflet surfaces with dense, white, pannose hairs, lacking yellow, glandular hairs; Dep. Cochabamba, Bolivia *P. besseri* Hieron.
- Leaflets 2–3 pairs; stipular sheaths with weak spurs 1–2 mm long; leaf rachises with dense, white pannose hairs, lacking yellow, glandular hairs; lower leaflet surfaces with dense, white, pannose hairs and with yellow, glandular hairs, especially along the veins; Dep. La Paz, Bolivia *P. pacensis* M. Kessler & Schmidt-Leb.
26. Leaflets lanceolate to obovate, 1.9–4.9 cm long; lower leaflet surfaces with villous, shaggy, white hairs; inflorescences branched or unbranched, with 8–18 flowers *P. triacontandra* Bitter
- Leaflets elliptic, ovate or obovate, 0.9–3.2 cm long; lower leaflet surfaces with pannose, short to long, white, yellowish or grayish hairs; inflorescences unbranched, with 3–12 flowers 27
27. Leaflets with yellowish hairs; upper leaflet surfaces usually with fairly dense, appressed hairs; stipular sheaths with strigose to lanose hairs 28
- Leaflets with whitish or grayish hairs; upper leaflet surfaces usually glabrous or nearly so; stipular sheaths subglabrous or with sparse to dense pannose hairs 29
28. Stipular sheaths with lanose hairs; leaflets 1–2 pairs; around Lake Titicaca *P. incarum* (Bitter) M. Kessler & Schmidt-Leb.
- Stipular sheaths with strigose hairs; leaflets 1 pair, rarely 2 pairs; W Peru *P. flavipila* (Bitter) M. Kessler & Schmidt-Leb.
29. Leaflets 1–2 pairs, 1.3–3.2 cm long, obovate to rhombic; 4–12 flowers per inflorescence; fruits 0.6–1.6 x 0.9–1.3 cm, with coarsely indented ridges, green, brown or red; Deps. Potosí (SE), Chuquisaca and Tarija in Bolivia, Prov. Salta in Argentina *P. crista-galli* Bitter
- Leaflets 1–3 pairs, 0.9–2.9 cm long, elliptic, lanceolate, ovate or obovate; 3–7 flowers per inflorescence; fruits 0.3–0.7 x 0.3–0.7 cm, with finely indented ridges, green or brown; Deps. Cochabamba and NW Potosí, Bolivia *P. subtusalbida* (Bitter) M. Kessler & Schmidt-Leb.

New species

Polylepis pacensis M. Kessler & Schmidt-Leb. spec. nov.

(Fig. 1)

Etymology. The species is named after after the Bolivian department of La Paz that includes the type location.

Type. Bolivia, Dep. La Paz, Prov. Murillo, sobre el camino de herradura entre Cohoni y Jalancha, 16.69°S 67.84°W, 3853 m, 13 November 2003, Mendez & Arcienega 18. Holotype GOET, isotype LPB.

Differt a *P. triacontandra* apicibus foliolorum rotundis ad emarginatis (versus acutis ad anguste rotundis), marginibus foliolorum saepe integerrimis (versus semper crenatis), bracteis 4–7 mm longis (versus 6–10 mm), inflorescentiis simplicibus (versus saepe compositis) atque imprimis indumento foliolorum abaxiale densiter pannoso, et a *P. lanata* foliolis minoribus

et indumento foliolorum abaxiale pallidore, densiore, brevior ac aequabile.

Evergreen tree up to 8 m tall; bark of trunk and larger branches reddish brown, thick, flaking off in small pieces. Leaves mostly congested at tips of branches, imparipinnate with 2–3 pairs of leaflets, obtrullate in outline, 2.5–4.0 cm wide and (2.0–)3.0–4.5 cm long; rachises densely to weakly pannose; stipular sheaths weakly spurred at apex, incised beyond middle, densely villous. Leaflets obovate in outline, the apical pair larger, one of this pair 0.5–1.0(–1.2) cm wide and 1.5–2.0 cm long; margins crenate in apical half, conspicuously revolute; apices emarginate (to rounded); bases acute; terminal leaflets with 1–4 mm long petiolule; upper surfaces sparsely pilose and balding, dark green; lower surfaces white to greyish from an evenly distributed, densely pannose indumentum, with additional yellowish glandular hairs especially on the central veins; inflorescences pendant, unbranched, (4–)6–9(–10) cm long, bearing 6–10 flowers; floral bracts 4–7 mm long, brown; inflorescence rachises moderately to densely pannose. Flowers perfect, 0.6–1.0 cm in diameter; sepals 3–4, obovate to almost rounded, yellowish to reddish, outer surfaces pannose especially near tips, inner surfaces pilose near tips; stamens ca. 24, anthers with curly white trichomes along whole length but more densely in upper half, style base glabrous. Fruits turbinate with 3–4 irregular, flattened ridges with 1–4 teeth each, body of fruit densely pannose, 0.4–0.5 cm wide including protuberances, 0.7–0.8 cm long.

Distribution. Southern La Paz and western Cochabamba departments of Bolivia.

Remarks. This species was treated by Kessler (1995a) as a group of specimens intermediate between *Polylepis racemosa* subsp. *triacontandra* and *P. racemosa* subsp. *lanata*, but also with a number of traits of its own. Recent collections by J. Mendez and M. Arcienega in the department of La Paz have shown that this taxon forms large populations that can be distinguished morphologically, ecologically, and geographically. *Polylepis pacensis* differs from *P. triacontandra* by the rounded to emarginate leaflet apices (vs. acute to narrowly rounded), often entire leaflet margins (vs. always crenate), 4–7 mm long bracts (vs. 6–10 mm long), undivided inflorescences (vs. often divided), and especially by the dense, pannose indument abaxially on the leaflets. *Polylepis pacensis* differs from *P. lanata* by the smaller size of the leaflets, and the paler, denser, shorter, evenly distributed indument abaxially on the leaflets. All three species have been found at 3200–4100 m, but whereas *P. triacontandra* and *P. lanata* grow in humid habitats around timberline on the eastern Andean slope, *P. pacensis* is found in considerably drier inter-andine valleys. Geographically, *P. pacensis*

occurs between the ranges of *P. triacontandra* and *P. lanata*, but there is some overlap on Cerro Illimani, with *P. triacontandra* growing on the eastern slopes and *P. pacensis* growing only a few kilometers away on the western slopes of the same mountain.

Additional specimens examined. Bolivia, Dep. Cochabamba, Prov. Ayopaya, 10 km al NW de Independencia, alrededor de la Cima de la Loma, 3250 m, Beck & Seidel 14528 (GOET, LPB); Piusilla, 3300 m, 30 March 1991, Hensen 2134 (GOET, LPB); Dep. La Paz, Prov. Inquisivi, Quime 7 kms hacia Caxata, 3420 m, 19 February 1981, Beck 4378 (LPB); 10 km W from Quime on road to Caxata, 3400 m, 17°00'S 67°12'W, 3400 m, Brandbyge 769 (AAU, LPB); 8 km W Quime on road to Caxata, 17°03'S 67°17'W, 3350 m, 24 August 1991, Kessler 3028 (GOET), 3029 (AAU, GOET), 3030 (AAU, GOET), 3031 (GOET), 3032 (AAU, GOET); Prov. Murillo, Palca 28,5 km hacia Cohoni, 3440 m, 14 October 1990, Beck 17832 (GOET, LPB); subcuenca de Cohoni, camino de herradura Cohoni - Jalancha, 16.66°S 67.82°W, 4989 (?) m, 5 January 2003, Mendez & Arcienega 1 (LPB); same general locality, 16.67°S 67.82°W, 4130 m, 5 January 2003, Mendez & Arcienega 2 (LPB); same general locality, 16.67°S 67.82°W, 4016 m, 6 January 2003, Mendez & Arcienega 3 (GOET, LPB), 16.68°S 67.83°W, 3911 m, 6 January 2003, Mendez & Arcienega 4 (LPB), 16.68°S 67.83°W, 3882 m, 6 January 2003, Mendez & Arcienega 5 (LPB), 16.68°S 67.84°W, 3437 m, 6 January 2003, Mendez & Arcienega 6 (GOET, LPB), 16.68°S 67.84°W, 3456 m, 6 January 2003, Mendez & Arcienega 7 (LPB), 16.68°S 67.84°W, 3465 m, 6 January 2003, Mendez & Arcienega 8 (LPB), 16.68°S 67.84°W, 3470 m, 6 January 2003, Mendez & Arcienega 9 (LPB), 16.68°S 67.84°W, 3482 m, 6 January 2003, Mendez & Arcienega 10 (LPB), 16.67°S 67.82°W, 6 January 2003, Mendez & Arcienega 11 (LPB), 16.67°S 67.82°W, 4109 m, 6 January 2003, Mendez & Arcienega 12 (LPB), 16.67°S 67.83°W, 3921 m, 6 January 2003, Mendez & Arcienega 13 (LPB), 16.68°S 67.83°W, 3908 m, 6 January 2003, Mendez & Arcienega 14 (GOET, LPB), 16.68°S 67.84°W, 3429 m, 6 January 2003, Mendez & Arcienega 15 (LPB); sobre el camino carretero a 6 km de Cohoni hacia Palca, 16.68°S 67.85°W, 3457 m, 13 November 2003, Mendez & Arcienega 16 (GOET, LPB); sobre el camino de herradura entre Cohoni y Jalancha, 16.68°S 67.83°W, 3856 m, 13 November 2003, Mendez & Arcienega 17 (GOET, LPB); same general locality, 16.68°S 67.83°W, 3899 m, 13 November 2003, Mendez & Arcienega 19 (GOET, LPB), 16.67°S 67.83°W, 3879 m, 13 November 2003, Mendez & Arcienega 20 (GOET, LPB); subcuenca de Cohoni, Cohoni, lado de la Jalancha (caída de agua), 16.66°S 67.82°W, 4173 m, 12 November

2003, Mendez & Arcienega 21 (GOET, LPB); Catagna, au pied S de l'Illimani, 16°45'S, 14,800 pies, Pentland 47 (GOET); Prov. Saavedra, 2 kms arriba de Chajaya, 3740 m, 4 August 1985, Beck 11350 (GOET, LPB).

Taxa elevated to species rank

Polylepis flavipila (Bitter) M. Kessler & Schmidt-Leb. comb. et stat. nov.

(Fig. 2)

≡ *Polylepis incana* var. *flavipila* Bitter, Bot. Jahrb. Syst. 45: 630. 1911. (Basionym). Type. Peru, Dep. Huancavelica, western slopes of the Andes above Pisco, Castro-Virreyna, 3900–4000 m, May 1910, Weberbauer 5433. Holotype B destroyed, isotypes F, GH, US.

Evergreen tree up to 8 m tall; bark of trunk and larger branches reddish brown, thick, flaking off in small pieces. Leaves congested at tips of branches, imparipinnate with 1, rarely 2 pairs of leaflets, obtusulate in outline, 2–3 cm wide and 2.5–6.0 cm long; rachises moderately villous; stipular sheaths not spurred, incised beyond the middle, densely villous. Leaflets obovate in outline, if two present the apical pair larger, one of this pair 0.4–0.9 cm wide and (1.5–)2.0–2.5 cm long; margins entirely crenate, conspicuously revolute; apices acute; bases acute; terminal leaflets with 2–4 mm long petiolule; upper surfaces sparsely pilose to moderately villous and balding, with brown glandular hairs on the central vein, dark green; lower surfaces grey-yellowish, with a moderately dense villous hair layer above a dense pannose layer, with additional yellowish glandular hairs; inflorescences pendant, unbranched, ca. 3–8 cm long, bearing 5–8 flowers; floral bracts 4–10 mm long, brown; inflorescence rachises sparsely to moderately villous. Flowers perfect, 0.8–1.2 cm in diameter; sepals 3–4, ovate, green to reddish, outer surfaces pannose with some villous hairs especially near apices, inner surfaces minutely pilose near tips; stamens ca. 18, anthers with curly white trichomes along whole length, style bases hairy. Fruits turbinate with 3–4 irregular ridges protruding into usually two spikes each, body of fruits moderately and unequally pilose, 0.4–0.8 cm wide including protuberances, 0.6–0.8 cm long.

Distribution. Western Andean slope of central Peru in the departments of Lima, Ica, and Huancavelica.

Remarks. This species was described by Bitter (1911), but was placed in synonymy with *Polylepis subsericans* J.F. Macbr. by Simpson (1979), presumably due to a superficial similarity in leaflet number, size, and shape, and the long, yellowish vestiture of the leaflets. However, the two species differ in numerous characters, most notably the sericeous vestiture, narrowly emarginate leaflet tips, and the narrower fruit spines of *P. subsericans*. As suggested by Simpson (1979, 1986),

these characters point to a relationship of *P. subsericans* with *P. sericea* and allies. In contrast, *P. flavipila* has a shaggy, pannose to villous vestiture, acute leaflet apices, and broadly winged fruits, showing a relationship to the species group around *P. racemosa*, of which *P. flavipila* appears to be the geographical representative in central western Peru. Because there is no previous full description of this species, we here provide a new description and illustration.

Additional specimens examined. Peru, Dep. Lima, Sta Eulalia Valley, ca. 15 km NE Huansa, 11°37'S 76°26'W, 3800 m, 6 September 1991, Kessler 3063, 3064, 3426 (all GOET), 3427 (AAU, GOET), 3428 (AAU, GOET), 3588, 3589, 3590, 3591, 3592, 3593, 3653 (all GOET); Prov. Yauyos, entre Pallca y Huacra-cocha ca. 14 km de Tupe, 4000 m, 22 January 1952, Cerrate & Tovar 1265 (GOET, USM).

Polylepis incarum (Bitter) M. Kessler & Schmidt-Leb. comb. et stat. nov.

≡ *Polylepis incana* Kunth subsp. *incarum* Bitter, Bot. Jahrb. Syst. 45: 643. 1911. (Basionym) ≡ *Polylepis besseri* Hieron. subsp. *incarum* (Bitter) M. Kessler, Candollea 50: 157–159. 1995. Type. Bolivia, Lago Titicaca, Isla del Sol, near Challa, Seler 148. Holotype B destroyed.—Bolivia, Dep. La Paz, Prov. Manco Capac, Isla del Sol, Yumani, 16°2'S 69°8'W, 3980 m, 19 February 2005, Jiménez 2716. Neotype LPB (designated here), isoneotypes AAU, GOET, NY.

Synonym. *Polylepis incana* Kunth subsp. *brachypoda* Bitter, Bot. Jahrb. Syst. 45: 644. 1911. Type. Bolivia, Lago Titicaca, Isla del Sol, near Challa, Seler 148a. Holotype B destroyed.

Remarks. This taxon was placed in synonymy with *P. besseri* by Simpson (1979), later treated as a subspecies of the latter by Kessler (1995a). Based on the distinctive combination of characters (discussed by Kessler 1995a) and the geographical distribution around southern Lake Titicaca, we now elevate it to species rank.

The South American collections by Seler, including the types of both *Polylepis incana* subsp. *incarum* and subsp. *brachypoda*, were only deposited at B (Vegter 1986) where they were destroyed during WWII (R. Vogt, pers. comm.). Bitter (1911) did not cite any additional specimens of these taxa. Consequently, no type or other original material is preserved, which prompts us to select a neotype. Because the type locality, an island in Lake Titicaca where only one species of *Polylepis* currently occurs (Kessler 1995a), is unambiguous and the type description provided by Bitter (1911) is quite detailed, we are confident that the neotype chosen is representative of Bitter's taxon. Additional specimens are listed in Kessler (1995a).

***Polylepis lanata* (Kuntze) M. Kessler & Schmidt-Leb. comb. et stat. nov.**

≡ *Polylepis racemosa* Ruiz & Pav. var. *lanata* Kuntze, Revisio Generum Plantarum, Pars III: 77. 1898. (Basionym) ≡ *Polylepis racemosa* Ruiz & Pav. subsp. *lanata* (Kuntze) M. Kessler, Candollea 50: 147. 1995. Type. Bolivia, Cochabamba, Tunari, 3000–4000 m, Kuntze s. n. Holotype B destroyed, isotype NY.

Remarks. This taxon was originally described as a variety of *P. racemosa*, later placed in *P. besseri* by Simpson (1979) because of specimens intermediate towards that species, then reinstated as a subspecies of *P. racemosa* by Kessler (1995a). This taxonomic history reflects the difficulty of placing many of the Bolivian populations of *Polylepis* in either *P. besseri* or *P. racemosa*. Simpson (1979) distinguished the two species mainly by the density and type of the vestiture of the leaflet undersides, whereas Kessler (1995c) also mentioned the smaller leaflets, always unbranched inflorescences, and more densely hairy anthers of *P. besseri*. However, distinction between the two species based on these characters implies that some populations of *P. besseri* are morphologically more similar to some placed in *P. racemosa* than either are to other populations of their ‘species’. Molecular data (Kerr 2003; A.N. Schmidt-Lebuhn, M. Kessler & M. Kumar unpubl. data) also shows that *P. besseri* and *P. racemosa* as delimited by either Simpson (1979) or Kessler (1995a) do not form genetically cohesive entities. As a result, one may either lump both to obtain a highly variable species, or separate all morphologically and biogeographically distinct populations as individual species, the latter being the course of action followed here.

***Polylepis subtusalbida* (Bitter) M. Kessler & Schmidt-Leb. comb. et stat. nov.**

≡ *Polylepis incana* Kunth subsp. *subtusalbida* Bitter, Bot. Jahrb. Syst. 45: 640. 1911. (Basionym) ≡ *Polylepis besseri* Hieron. subsp. *subtusalbida* (Bitter) M. Kessler, Candollea 50: 154. 1995. Type. Bolivia, Cuesta de Duraznillos, 2400–2600 m, December 1907, Herzog 712. Holotype Z.

Synonyms. *Polylepis racemosa* Ruiz & Pav. var. *tomentosa* Kuntze, Revisio Generum Plantarum, Pars III: 77. 1898. Type. Bolivia, Cochabamba, between Challa and Tapacari, 3600–4000 m, 18 March 1892, Lorentz & Hieronymus s. n. Holotype B destroyed, isotypes NY, UC, US.

Polylepis besseri Hieron. var. *abbreviata* Bitter, Bot. Jahrb. Syst. 45: 628. 1911. Nom. illeg. (based on type of *P. racemosa* Ruiz & Pav. var. *tomentosa* Kuntze)

Remarks. This species is found surrounding the Cochabamba Basin of central Bolivia. It was treated as a subspecies of *P. besseri*—which differs in numerous

characters—by Kessler (1995a), due to the presence of intermediate specimens suggesting hybridogenic introgression. As detailed in the introduction, we now consider this criterion to be unsuitable for species delimitation in *Polylepis*.

Simpson (1979) and Kessler (1995a) mistakenly cited the type as deposited in WRSB, but Bitter (1911) gave „herb. Turic.“, i.e. Zürich, as the location. R. Nyffeler (pers. comm.) confirmed the presence of the specimen in question at Z, where it was not labeled as type material.

Reinstated species***Polylepis triacontandra* Bitter, Bot. Jahrb. Syst. 45: 630. 1911.**

≡ *Polylepis racemosa* Ruiz & Pav. subsp. *triacontandra* (Bitter) M. Kessler, Candollea 50: 144. 1995. Type. Bolivia, La Paz, Larecaja near Sorata, Cochipata, 3300 m, 9 October 1818, Mandon 674. Lectotype (selected in Simpson 1979: 42) G, isoelectotypes GOET, NY, P, S, US.

Synonym. *Polylepis subquinquefolia* Bitter, Bot. Jahrb. Syst. 45: 636. 1911. Type. Peru, Puno, Sandia above Coyoeno, 3600 m, Weberbauer 931. Holotype B destroyed, Field Museum negative #3391 of holotype at B, isotypes GH, NY.

Remarks. This is yet another species placed under *P. besseri* by Simpson (1979) but under *P. racemosa* by Kessler (1995a). See under *P. lanata* for reasons for treating it as a distinct species. Specimens are cited by Kessler (1995a).

New country records***Polylepis crista-galli* Bitter**

This species was treated as endemic to Bolivia by Kessler (1995a), with the southernmost records only about 20 km north of the Argentine border. Therefore, the recent discovery of this species in northernmost Argentina is not surprising.

Specimens examined. Argentina, Prov. Salta, Quebrada Grande, ca. Alto Calilegua, ca. 23°35'S 64°54'W, 2650 m, 28 August 1997, Nicolossi & Guzmán s. n. (GOET); Prov. Salta, Abra Cortaderas, 23°33'S 64°54'W, 2658 m, 3 September 1998, Nicolossi & Guzmán s. n. (GOET); Prov. Salta, Quebrada Honda, 23°35'S 64°54'W, 2649 m, 2 September 1998, Nicolossi & Guzmán s. n. (GOET).

***Polylepis pauta* Hieron.**

Kessler (1995a) predicted the occurrence of this widespread species in Bolivia, based on records from adjacent southern Peru. Recently, *P. pauta* has indeed been found in the northern Bolivian Andes.

Specimen examined. Bolivia, Dep. La Paz, Prov. Franz Tamayo, municipio de Pelechuco, 3500-3550 m, 16 October 2001, Nuñez s.n. (LPB).

***Polylepis microphylla* (Wedd.) Bitter**

This species was originally known only from the slopes of Volcán Chimborazo in Ecuador (Romoleroux 1996), but recently small populations have been found at five sites near Cuzco, Peru (W. Galiano S. & A. Tupayachi H. pers. comm.). At all sites, the species grows in the immediate vicinity of Inca ruins. As part of their colonial policy, the Incas translocated entire villages to other regions of the Andes (Earls 1976), and this, together with the importance the Inca rulers placed on forest conservation and agroforestry (Chepstov-Lusty et al. 1998), makes it likely that *P. microphylla* was actively planted near the Incan capital city. Today, at least at one site (Chacán near Cuzco city), *P. microphylla* is found with several hundred individuals, including abundant young plants, spread over approx. 400 m along a small valley, indicating that it forms a persistent naturalized population (M. Kessler pers. obs.).

Specimen examined. Peru, Dep. Cuzco, Prov. Cuzco, Chacán, 3600 m, 15 August 1995, Galiano S. 1999 (CUZ, GOET).

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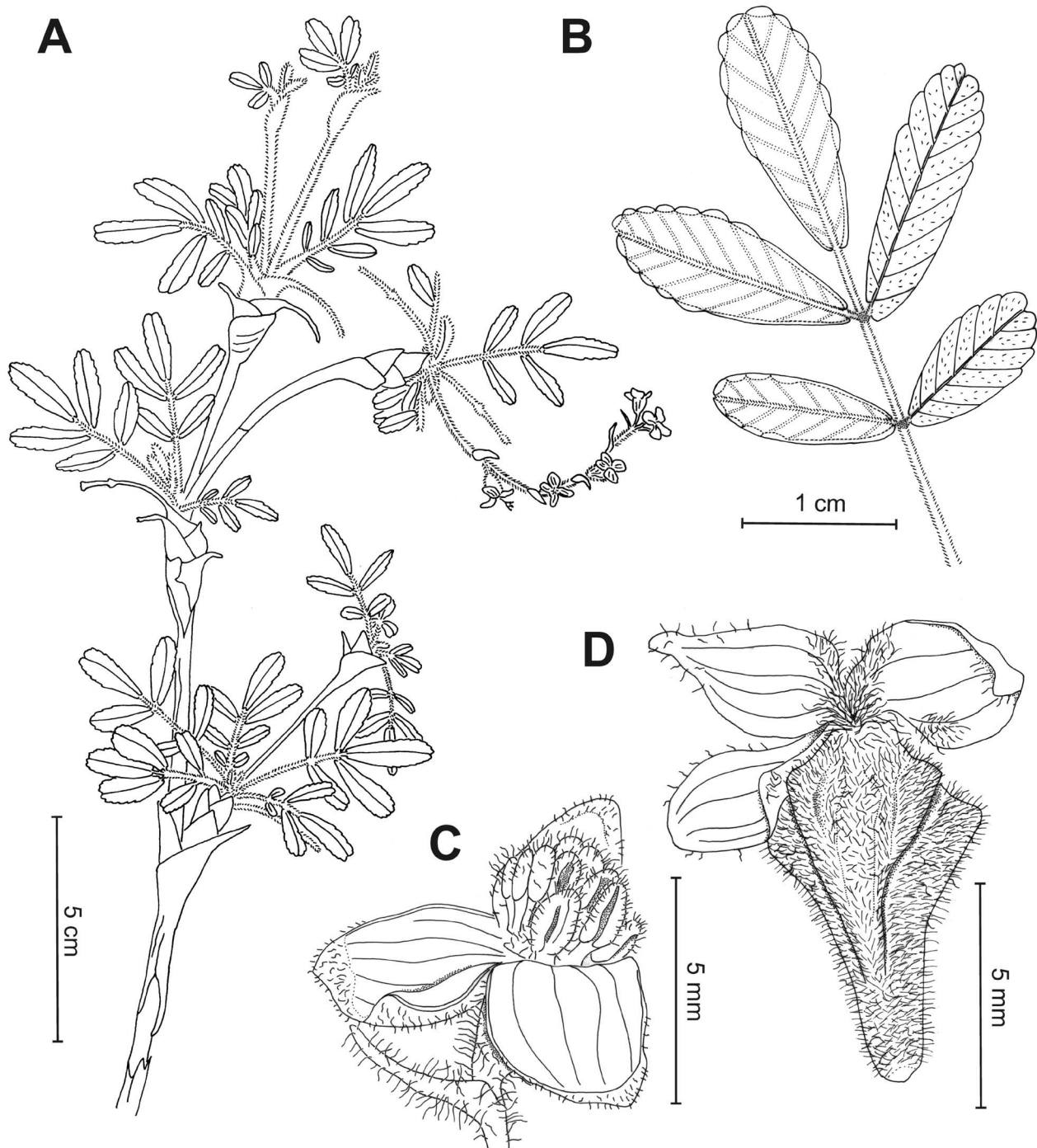


Fig. 1: *Polylepis pacensis* spec. nov. (A) Habit (Mendez & Arcienega 13). (B) Leaf; left and apical leaflets show lower surface, right leaflets show upper surface (Mendez & Arcienega 13). (C) Flower (Mendez & Arcienega 9). (D) Fruit (Mendez & Arcienega 18).

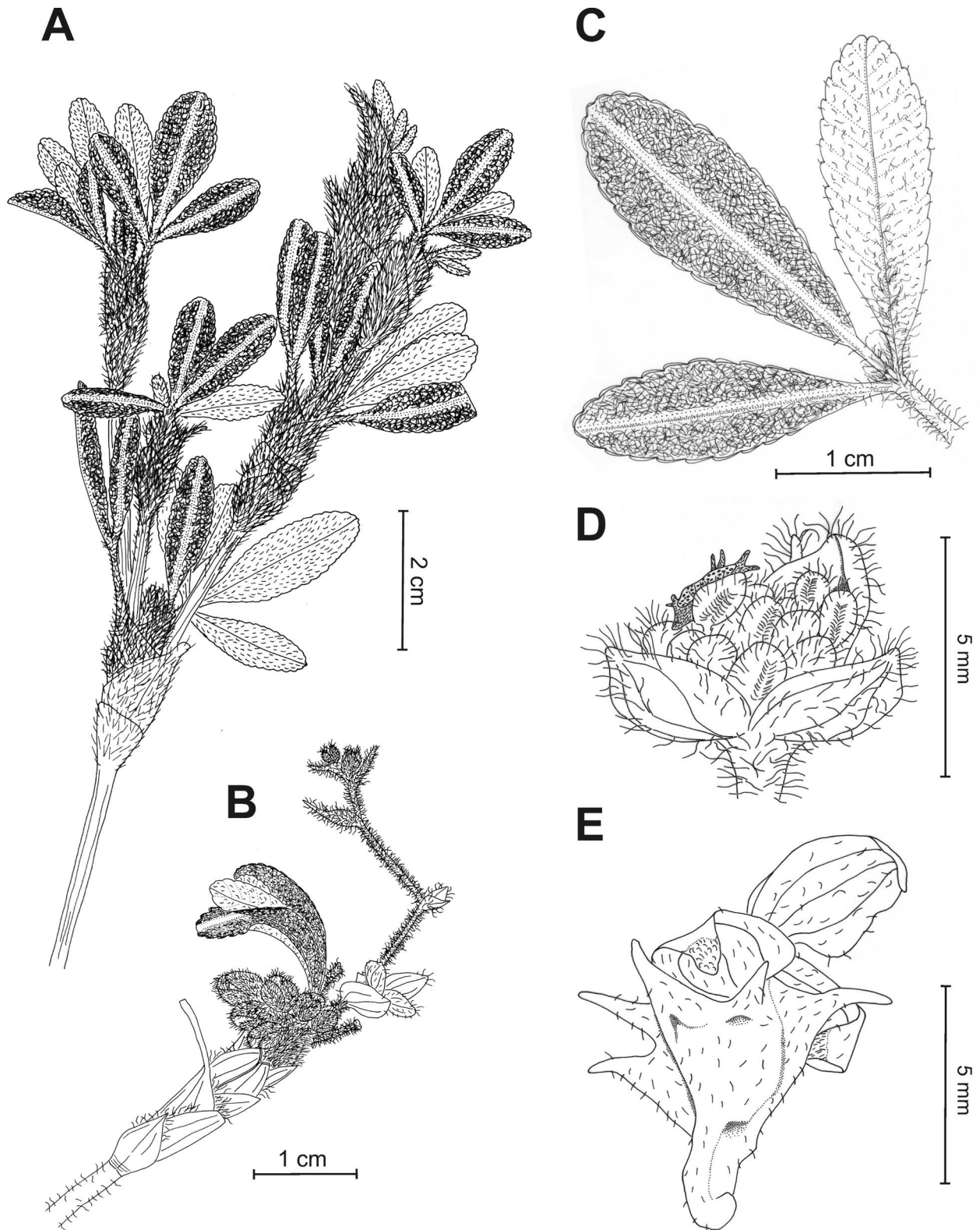


Fig. 2: *Polylepis flavipila*. (A) Habit (Kessler 3064). (B) Branch apex with young inflorescences (Kessler 3653). (C) Leaf; left and apical leaflets show lower surface, right leaflet shows upper surface (Kessler 3064). (D) Flower (Kessler 3653). (E) Fruit (Cerrate & Tovar 1265).