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A new species of *Pericallis* (Senecioneae, Asteraceae) endemic to Porto Santo (Madeira, Portugal)

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Abstract

A new species, *Pericallis menezesii*, is described from the island of Porto Santo in the Madeiran archipelago. Morphological comparisons are made with its sister taxon, *P. aurita* which is now considered to be endemic to the island of Madeira.

Introduction

Pericallis Don (in Sweet 1835: 228) (Senecioneae, Asteraceae) is a monophyletic genus endemic to Macaronesia where it has a distribution spanning the oceanic archipelagos of the Canaries, Madeira and the Azores (Panero *et al.* 1999; Swenson & Manns 2003). Sixteen taxa are currently recognized: thirteen are endemic to the Canaries (Acebes Ginovés *et al.* 2010), one species (with two subspecies) is endemic to the Azores (Silva *et al.* 2010) and one species, *Pericallis aurita* (L'Héritier 1789: 26) Nordenstam (1978: 20) is endemic to the Madeiran archipelago (Jardim & Sequeira 2008).

Pericallis aurita is a woody chamaephyte occurring mainly in laurisilva and rocky in Madeira and Porto Santo. This species was first described by L'Héritier de Brutelle (1789) as *Cineraria aurita* (L'Héritier, 1789: 26), based on plants collect by Francis Masson in Madeira. Lowe (1857) was the first to record it from Porto Santo (as *Senecio maderensis* Candolle 1838: 409). He subsequently noted that it occurs “only on the summit of Pico Branco”, the highest point of the island, using the name *S. auritus* (L'Hér.) Lowe (1868: 449–450).

Porto Santo (60 km NE of Madeira Island) is a volcanic island with a central–western plain area of fossiliferous calcareous sediments located between the volcanic peaks. It is approximately 14 mya old, therefore it is older than Madeira Island which age is less than 6 million years (Geldmacher *et al.* 2006). With a maximum length of 11 km and width of 5 km, the total area is close to 43 km². It has a smooth orography as a result of intense erosion and the maximum elevation at Pico do Facho is 517 m a.s.l. The island has a low annual rainfall (less than 400 mm) and a mean annual temperature of 18°C, with a yearly range from 13°C to 25°C. Its bioclimate is classified as Mediterranean xeric oceanic (Rivas-Martínez 2009).

Recent analyses of chloroplast and ITS sequence data revealed consistent differences between populations of *P. aurita* from Madeira and Porto Santo (Jones *et al.* 2014). Furthermore, field observations in Porto Santo and Madeira, together with the examination of herbarium specimens (MADJ, MADM, MADS, BM and K) revealed clear morphological differences between populations of *P. aurita* from the two islands. In this study we describe *P. menezesii* as a new species endemic to the island of Porto Santo and closely related to *P. aurita* that is now recognized as endemic to Madeira.

Pericallis menezesii R. Jardim, K. E. Jones, M. Carine & M. Sequeira, *sp. nov.* (Plates 1–3)

Type:—PORTUGAL. Madeira, Porto Santo: Pico Branco, on North facing slopes, alt. 440 m, 33° 05' 37.49" N, 16° 18' 09.44" W, 21 May 2011, R. Jardim RJ 1596 (holotype BM000833061!, isotype Universidade da Madeira!).

Diagnosis:—*Species nova a Pericalli aurita tota planta indumento densiore, foliis utrinque pilis crassis conicis multicellularibusque opertis, auriculis (quas semper praesens sunt immo in primis interdum absunt) saltem dimidio longitudine petiolo pervenientibus, capitulis paucioribus (9–30) grandioribusque (7.5–9.5 × 9–12.5 mm), bracteis involucris pilis densioribus purpureis (nec albis), cypselis disci pilis crassis inter costis densisque (nec tenuis sparsis) differt.*



PLATE 1. *Pericallis menezesii*: **a**, habit (Pico Branco, R. Jardim, 16/05/2010); **b**, capitula (Pico Branco, Miguel Sequeira, 29/04/2013).

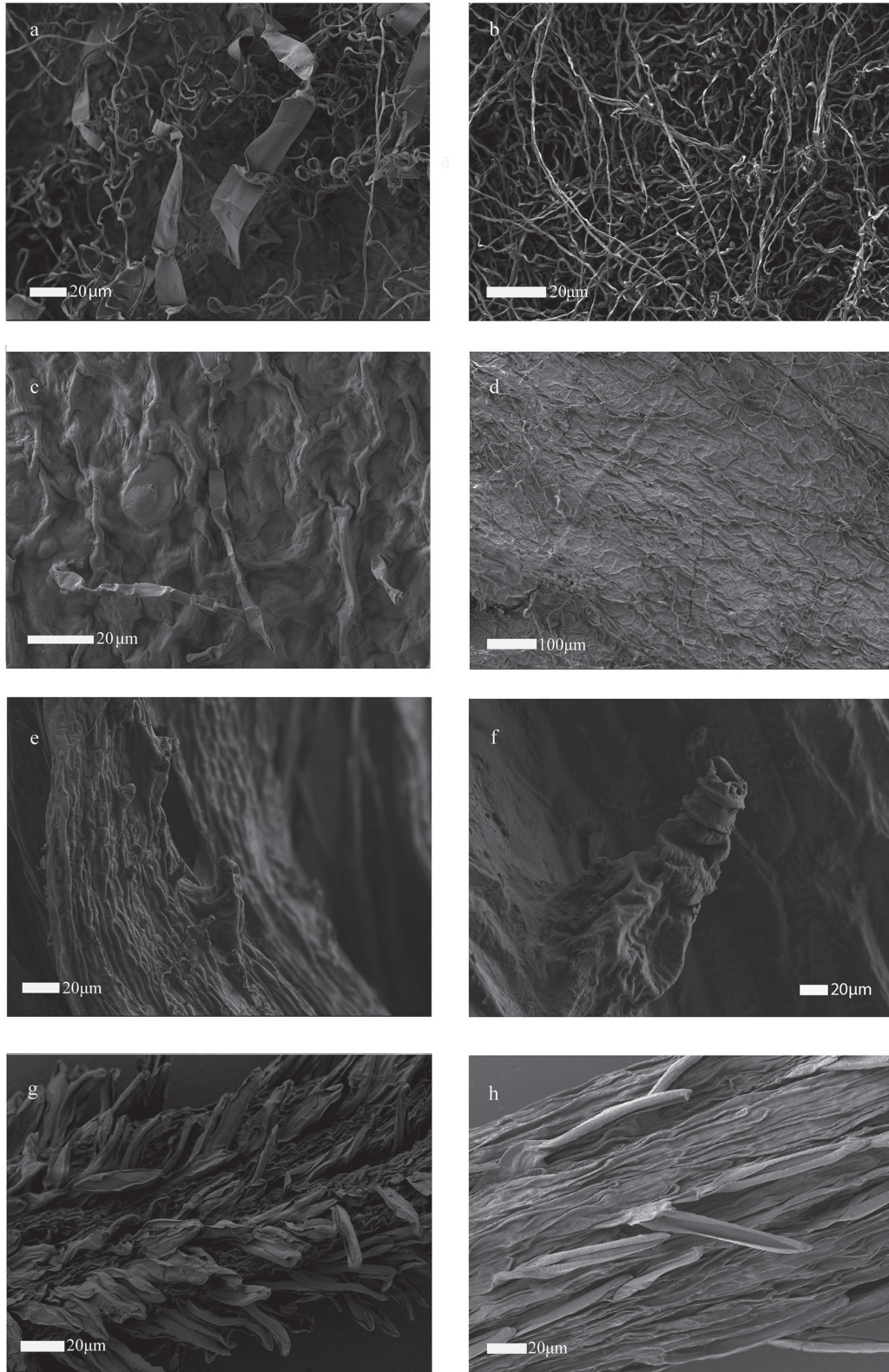


PLATE 2. Indumentum variation in *P. menezesii* and *P. aurita*: **a**, *P. menezesii* (holotype), abaxial leaf surface with both filiform and thick, multicellular hairs; **b**, *P. aurita* (*M. Sequeira & A. Pupo MS7087A* (BM)), abaxial leaf surface with dense filiform hairs only; **c**, *P. menezesii* (holotype), adaxial leaf surface with thick, multicellular, conical hairs; **d**, *P. aurita* (*M. Sequeira & A. Pupo MS7087A* (BM)), adaxial surface with sparse filiform hairs; **e–f**, *P. menezesii* (holotype), conical scales on involucre bracts; **g**, *P. menezesii* (holotype), cypsela surface with rows of dense, thick hairs along the furrows; **h**, *P. aurita* (*Short & Hampshire 35* (BM)), cypsela surface with rows of sparse, slender hairs along the furrows. All images were obtained by K. Jones (using Carl Zeiss Ultra Plus SEM at the Imaging and Analysis Centre, Science Facilities, NHM).

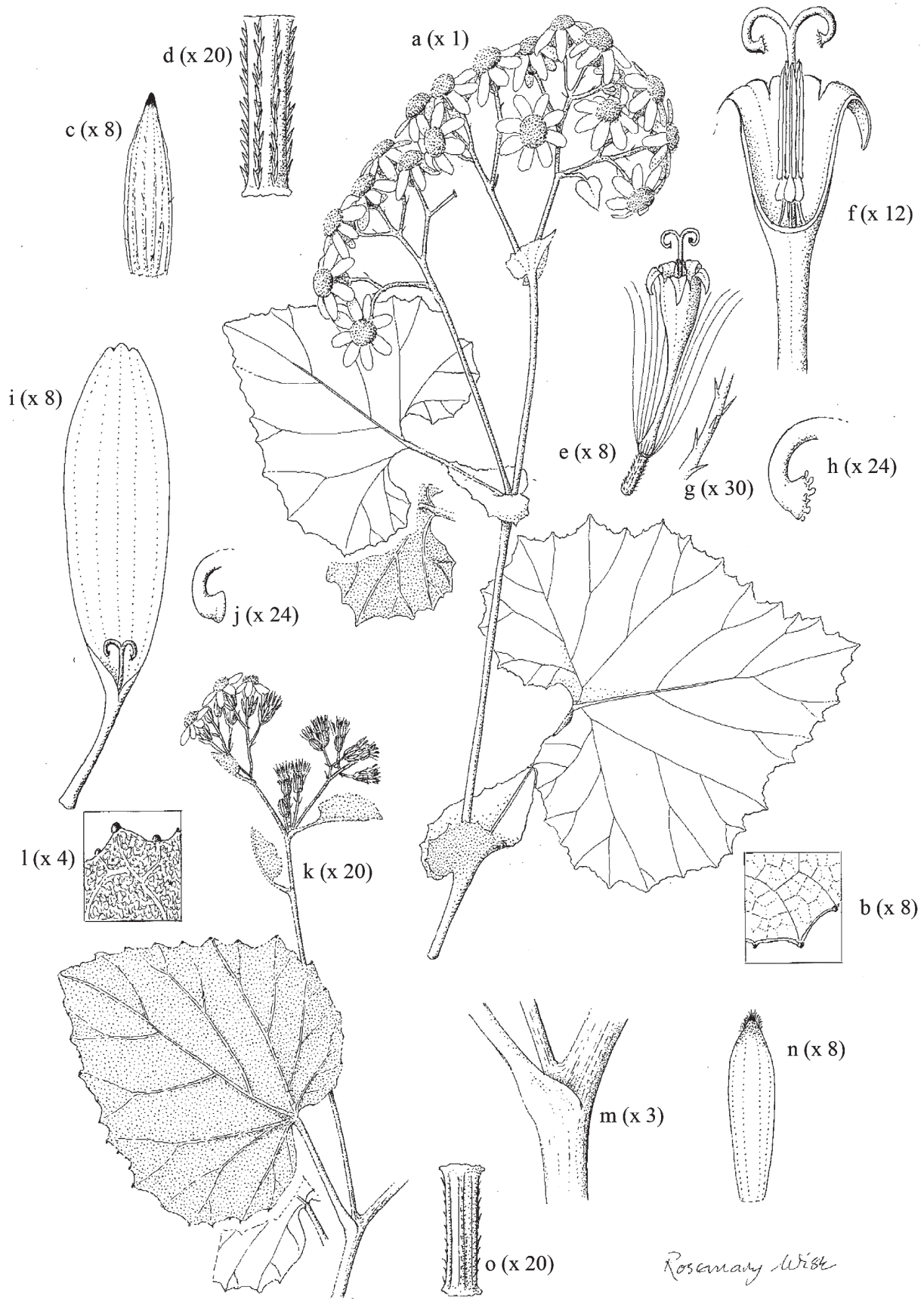


PLATE 3. *Pericallis menezesii* (holotype): **a**, habit; **b**, adaxial leaf lamina surface; **c**, involucre bract; **d**, disc cypsela; **e**, disc floret; **f**, longitudinal section of disc floret; **g**, disc pappus; **h**, disc floret style apex; **i**, ray floret; **j**, ray floret style apex. *Pericallis aurita* (R. Jardim RJ 3057 (BM)): **k**, habit; **l**, abaxial leaf lamina surface; **m**, base of petiole; **n**, involucre bract; **o**, disc cypsela. Drawn by Rosemary Wise (Department of Plant Sciences, University of Oxford).

Description:—Woody chamaephyte (Plate 1a), less than 80 cm tall. Stem branched, less than 4 mm in diameter, ribbed, brown-purple; indumentum sparse to dense white arachnoid with some white multicellular thick hairs, upper part of stem sometimes glabrous. Leaves petiolate, auriculate; lamina 50–250 × 55–125 mm, green or white to grey, palmately veined, suborbicular-cordate to cordate; margin doubly callose-denticulate, greenish with purplish callosities, apex acuminate-acute; petiolar sinus depth less than 0.3 × the lamina length; abaxial indumentum densely white arachnoid to lanate with filiform white-grey hairs and numerous thick, white-brown multicellular hairs, mostly along the veins (Plate 2a and b); adaxial indumentum sparse to dense white arachnoid with filiform white-grey hairs and numerous stiff brownish multicellular conical hairs, that are thinner than the multicellular hairs on the abaxial lamina indumentum, with an acuminate apex and bulbous base, mostly along the veins (Plate 2c); petiole 0.5–1 × the lamina length, brownish-light purplish, indumentum white arachnoid with numerous brownish multicellular conical hairs, those of juvenile leaves with white filiform hairs; auricles, 2, usually more than 0.5 times the petiole length, semicircular, decurrent on the petiole, amplexicaul, margin entire to denticulate; indumentum similar to the leaf (Plate 3a). Inflorescence terminal, branched corymbose cymes; peduncles light-dark purple; indumentum sparse to dense white arachnoid, with purple multicellular hairs; inflorescence bracts linear, light-dark purple, glabrous to arachnoid with sparse white filiform hairs. Capitula 9–30, 7.5–9.5 × 9–12.5 mm; urceolate-campanulate (Plate 1b). Involucre 5.5 × 9 mm long. Involucre bracts 3.5–5.5 × 1.5–1.8 mm, caniculate, purple becoming dark purple at the apex, glabrous or sparsely to densely white arachnoid, with up to 13 conical, erect purple scales, 0.1–0.3 mm long (Plate 2e and f), margin scarious, apex glabrous to ciliate (Plate 3c). Ray florets female, (7–)9–12(–13), 10.5–14.5 mm long, ligules 7–10 × 3.4–3.6 mm, oblong-ovate, 3-toothed (Plate 3i), adaxial surface light to dark purple, abaxial limb surface paler; corolla tube 2.3–2.8 mm long, light purple. Disc florets hermaphrodite, numerous (ca. 50), 6.2–8.3 mm long, deep purple, tabulate-infundibuliform; tube 4.8–6.9 mm long, lobes 5, ca. 0.8 × 0.6 mm (Plate 3e and f). Anthers united, crowned by an oblong, blunt, membranous appendage. Style slender, filiform, smooth and hardly thickened at the base; ray floret style branches recurved, glabrous (Plate 3j); disc floret branches recurved with a truncate papillose apex (Plate 3h). Cypselae oblong, slightly compressed, light brown; ray cypselae 0.8–2.2 × 0.3–0.8 mm, papillose but sometimes epapillose, with 5–7 longitudinal ridges, the furrows between the ridges glabrous to pubescent sometimes with white, thick, oblong hairs, 0.06–0.11 mm long; disc cypselae 1.1–1.9 × 0.4–0.7 mm, always papillose, with 5–8 longitudinal ridges, the furrows between the ridges with white, thick, oblong hairs, 0.06–0.11 mm long (Plate 2g and 3d). Pappus scabrous, with acutely tipped decurrent spines (Plate 3e), ray floret pappi 3.7–4.8 mm long; disc floret pappi 5.8–6.6 mm long (Plate 3e).

Etymology:—This species is dedicated to and named after the prominent Madeiran botanist Carlos Azevedo de Menezes (1863–1926), author of many contributions to the Madeira archipelago flora and of the *Flora do Archipelago da Madeira (Phanerogamicas e Cryptogamicas Vasculares)*, the first complete Flora of Madeira archipelago (Menezes 1914). Menezes also described several species endemic to Madeira, e.g. *Sinapidendron sempervivifolium* Menezes (1922: 113) and *Scilla madeirensis* Menezes (1926: 24).

Distribution:—*Pericallis menezesii* is endemic to Porto Santo. The three known populations are restricted to northern slopes of Pico Branco, the northeastern peak of the island (ca. 450 m a.s.l.). The known distribution has not changed since descriptions by Lowe (1868), Menezes (1914), Pickering (1962) and Press (1994) and was confirmed during Porto Santo surveys between 1996 and 2013. Population sizes have, however, reduced over this time.

Ecology:—*Pericallis menezesii* is restricted to the steep slopes of Pico Branco, on leptosol derivatives of igneous volcanic trachyte rocks. The species occurs in the Mediterranean xeric-oceanic, inframediterranean dry bioclimate. It forms part of the nanophanerophytic community *Siderito multiflorae-Echietum portosanctensis* Jardim, Capelo, Sequeira, Aguiar & Costa (Costa *et al.* 2012: 101). This community is endemic to Porto Santo and is characterized by several Porto Santo endemic taxa, notably *Echium portosanctensis* Carvalho, Pontes, Baptista-Marques & Jardim (2010: 87) and *Sideritis candicans* Aiton (1789: 289) var. *multiflora* Bornm. ex Mendoza-Heuer (1974: 135), with *Helichrysum melaleucum* Reichenbach ex Holl (1830: 382) subsp. *roseum* (Lowe 1868: 483) Jardim & Sequeira (2011: 240), *Carlina salicifolia* (Linnaeus filius 1782: 350) Cavanilles (1801: 81) var. *latifolia* Lowe (1868: 515–516), *Phyllis nobla* Linnaeus (1753: 232), *Cheirolophus massonianus* (Lowe 1856: 297) Hansen & Sunding (1979: 92).

Phenology:—Flowers between (March) April and May.

Conservation status:—*Pericallis menezesii* should be considered as Critically Endangered (CR, D) due to the scarce number of populations and individuals, reduced occupancy and occurrence area as defined by IUCN (2001). Overgrazing by introduced rabbit populations is a threat to *P. menezesii* populations. However, recent episodes of myxomatosis are likely to cause rabbit populations to decrease which is expected to aid the recovery of this species; this will require careful monitoring. Two populations of *P. menezesii* occur in accessible places along the path of Pico Branco and they are threatened by human disturbance.

Comparison with *Pericallis aurita*:—*Pericallis menezesii* is morphologically similar to *P. aurita* from Madeira. However there are a number of characters which distinguish the species (Table 1 and Plates 2 and 3). They may be readily differentiated by characters of the auricles, involucre bracts, lamina indumentum and disc cypselae (see Plate 2a–d for abaxial and adaxial leaf surface comparisons, Plate 2g and h for comparisons of cypselae and Plate 3 for illustrations of morphological comparisons). An identification key to the *Pericallis* of Madeira is provided below.

- Auricles usually more than half of the petiole length; abaxial indumentum of the leaf lamina densely arachnoid to lanate, with numerous thick, long multicellular hairs; adaxial indumentum of the leaf lamina with numerous conical multicellular hairs; involucre bracts usually with purple, erect scales; furrows of disc cypselae with rows of dense thick white hairs *Pericallis menezesii*
- Auricles less than third of the petiole length; abaxial indumentum of the leaf lamina arachnoid-floccose, with very sparse thick, long multicellular hairs; adaxial indumentum of the leaf lamina seldom with conical long multicellular hairs; involucre bracts lacking purple, erect scales; furrows of disc cypselae with rows of sparse slender white hairs *Pericallis aurita*

Additional specimens examined (paratypes):—PORTUGAL. Madeira, Porto Santo: Pico Branco, 21 January 1954, *Nóbrega 714* (MADS); Pico Branco, 17 September 1960, *R. Vieira 5972* (MADJ); Pico Branco, escarpa N, na vereda para a Terra Chã, alt. 340 m, 16 May 2010, *R. Jardim RJ 990* (BM, Universidade da Madeira); Pico Branco, 15 March 2011, *J. Silva s.n.* (MADM); Pico Branco, escarpa exposta a N, na vereda para a Terra Chã, 23 April 2011, *R. Jardim RJ 1458* (BM, Universidade da Madeira); Pico Branco, próximo do topo, vertente N, alt. 445 m, 08 September 2012, *R. Jardim & M. Sequeira RJ 2560* (BM); Pico Branco, 1894, *Murray s.n.* (BM, K); Summit of Pico Branco. 8 May 1855, *R.T. Lowe s.n.* (BM).

TABLE 1. A comparison of morphological characters of *Pericallis menezesii* and *P. aurita*.

	<i>Pericallis menezesii</i>	<i>Pericallis aurita</i>
Stem indumentum	Sparse to dense white arachnoid, with some white multicellular thick hairs	Sparsely white arachnoid to floccose
Leaf lamina shape and margin	Suborbicular-cordate or cordate, margin doubly callose-denticulate	Ovate-cordate to ovate-triangular, margin callose-crenate
Leaf lamina abaxial indumentum	Densely white arachnoid to lanate, with both filiform hairs and numerous thick multicellular hairs mostly along the veins	White-arachnoid to floccose, with mostly filiform but seldom thick multicellular hairs
Leaf lamina adaxial indumentum	Sparse to dense white arachnoid, with both filiform hairs and numerous stiff brownish multicellular conical hairs	Sparse white to grey-arachnoid, with filiform hairs but seldom with multicellular conical hairs
Auricles	2, more than half of the petiole length	0–2, less than third of the petiole length
Capitula per inflorescence	9–30	30–50
Size of capitulum	7.5–9.5 × 9.2–12.5 mm	4.9–10.5 × 3.8–9.2 mm
Involucre	5.5 × 9 mm	4.0 × 5.7 mm
Involucre bracts	3.5–5.5 × 1.5–1.8 mm, purple; glabrous or sparsely to densely white arachnoid, with multicellular purple scales, up to 13 0.1–0.3 mm long; apex glabrous to ciliate	3.1–6.6 × 1.3–1.9 mm, green-purple; glabrous to dense white arachnoid sometimes with less than whitish multicellular scales, 0.05–0.15 mm long; apex ciliate
Ray florets	(7–)9–12(–13), 10.5–14.5 mm long; ligules 7–10 × 3.4–3.6 mm, oblong-ovate, corolla tube 2.3–2.8 mm long	5–9, 7.8–8.2 mm long, ligules 4.7–5.1 × 2.8–3.0 mm, lanceolate, corolla tube 1.6–2.0 mm long
Disc florets	6.2–8.3 mm, tube 4.8–6.9 mm, lobes ca. 0.8 × 0.6 mm	5.6–5.8 mm, tube 3.6–5.5 mm, lobes ca. 0.6 × 0.4 mm
Disc cypselae	1.1–1.9 × 0.4–0.7 mm; 5–8 furrows with thick, dense hairs; light-brown	1.1–2.1 × 0.4–0.5 mm; 4–7 furrows, with slender sparse (rarely dense) hairs; dark-brown

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