

# Two new species of *Quesnelia* (Bromeliaceae: Bromelioideae) from the Atlantic Rainforest of Bahia, Brazil

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**Abstract.** *Quesnelia koltesii* and *Q. clavata*, two new species of Bromeliaceae, are described and illustrated, and their affinities with related taxa are discussed. Both species are endemic to southern Bahia, occur in low population densities above 600 m elevation, and must be considered to be endangered.

**Key Words:** Atlantic forest, Brazil, Bromeliaceae, *Quesnelia*, systematics.

**Resumo.** *Quesnelia koltesii* and *Q. clavata*, duas novas espécies de Bromeliaceae, são descritas e ilustradas, com discussão acerca de suas afinidades taxonômicas. Ambas as espécies são endêmicas para o sul da Bahia, ocorrem em populações de baixa densidade acima de 600 m de altitude e devem ser consideradas como ameaçadas de extinção.

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Bromeliaceae, with 56 genera and 3086 species recognized, have been traditionally divided into three subfamilies: Bromelioideae, Pitcairnioideae and Tillandsioideae (Luther, 2008). The family is distributed mainly in the neotropics with one exception: *Pitcairnia feliciana* (A. Chev.) Harms & Mildbr. occurs in western Africa (Smith & Downs, 1974).

Bromeliads are one of the most remarkable constituents of tropical forests in the Americas and contribute significantly to the amazing biodiversity of the communities in which they live (Benzing, 2000). Many of these herbs have phytotelmata, formed by a dense spiral of leaf rosettes, and have therefore developed complex interactions with other plants, animals, and microorganisms that are partially or totally dependent on this aquatic microhabitat resulting in a huge array of pollinators, fruit consumers

and seed dispersers dependent on bromeliads (Leme & Siqueira-Filho, 2006).

Bromeliad species richness and abundance in a given biome can be used to estimate habitat conservation status and biodiversity support capacity (Leme & Marigo, 1993). The fact that over half of the bromeliad species are obligate or facultative epiphytes underscores the importance of their biological role, since these plants create a series of ecological niches inside the forest, well above the forest floor (Leme & Siqueira-Filho, 2006).

*Quesnelia* Gaudich. is a comparatively small genus of the subfamily Bromelioideae, comprising 17 species (Wanderley & Proença, 2006; Luther, 2008) divided into two subgenera. Subgenus *Quesnelia* (three species) is characterized by simple, densely strobilate inflorescences, and pollen with psilate exine; subgen. *Billbergiopsis* Mez, with the remaining species, is characterized by simple to

compound, dense to lax inflorescences, and pollen with reticulate exine.

Due to the well-known genetic, structural and morphological complexity and a poor understanding of species delimitation, *Quesnelia* constitutes with *Aechmea* Ruiz & Pav. and *Canistrum* E. Morren one of most important challenges in bromeliad taxonomy today (Leme, 1997, 2005; Leme & Siqueira-Filho, 2006). These generic limits are so unstable that it is difficult to determine to which of these genera a species belongs, even when complete information is available (Smith & Downs, 1979). This is the case of the two unusual new species described below, proposed as putative members of subgen. *Billbergiopsis*, which represents another example of discordant elements in *Quesnelia*.

The new species proposed here were found in a diverse and endangered biome of the Brazilian Atlantic Forest. All specimens were collected during recent fieldwork conducted in two different privately protected areas: the Serra Bonita and Serra das Lontras Reserves. The Serra Bonita Reserve, where one of the species occurs, is located about 100 km south of Ilhéus and reaches 1000 m in elevation, comprising a large patchwork of montane forests and small cocoa farms. It is the focus of significant private conservation efforts aiming to acquire and preserve the forest and to make it accessible to ecotourists and researchers. The Serra das Lontras, located about 60 km south of Ilhéus, is the habitat of the other species. Its uppermost forest stratum is situated over 950 m elevation and is the focus of international conservation efforts (e.g., Conservation International Foundation and BirdLife International) to preserve and acquire the forest remnants. Both areas exhibit similar cloud forest formations on the highest peaks, with higher precipitation than the surrounding lowlands.

***Quesnelia koltessii* Amorim & Leme, sp. nov.**

Type: Brazil. Bahia: Mun. Camacan, RPPN Serra Bonita, 9.7 km W de Camacan, na estrada para Jacareci, 6 km na estrada para a RPPN e torre da Embratel, 15°23'30"S, 39°33'55"W, 835 m, 29 Oct 2005, A. M. Amorim, J. L. Paixão, L. C. J. Gomes & W.

*Nascimento* 5443 (holotype: CEPEC; isotypes: HB, MBM, NY, RB). (Fig. 1)

A *Quesnelia dubia* Leme, cui affinis, inflorescentia simplicissima, bracteis floriferis longioribus prope apicem recurvatis azureisque, sepalis longioribus, antheris in apice obtusis et tubo epigyno ca. 2 mm longo differt.

Plant epiphytic or terrestrial, flowering 60–100 cm tall, propagating by stout basal shoots; leaves 10–20, thinly coriaceous, forming a broadly funnellform rosette; sheaths broadly elliptic, 15–19×8–10 cm, densely brown lepidote on both sides, green on the abaxial surface, pale castaneous on the adaxial surface; blades linear, suberect-arcuate, 50–82×4.5 cm, slightly narrowed toward the base, apex acute to subrounded and minutely apiculate, sparsely and inconspicuously white-lepidote on both sides, green, margins irregularly and inconspicuously spinulose, spines ca. 0.3 mm long or shorter, densely to very sparsely arranged; scape suberect, 50–80 cm long, 0.8–1 cm in diam., red, glabrous; basal scape bracts oblong, the upper ones sublinear to oblong-ovate, acute and apiculate, entire, erect, distinctly exceeding the internodes, completely covering the scape, papyraceous, nerved, sparsely and inconspicuously white-lepidote mainly abaxially, 4–9×2.5–3.2 cm, red except for the sometimes paler apex; inflorescence simple, densely spicate, oblong to long cylindrical, terete, erect, 7–27×4–4.5 cm, rachis 0.5–0.8 cm in diam., completely covered by the bracts; floral bracts broadly elliptic-ovate, apex obtuse to slightly emarginate and inconspicuously apiculate, slightly cucullate, 32–35×20–25 mm, the basal 2/3 red, the apical 1/3 light blue, nerved, membranaceous, inconspicuously and sparsely brown lepidote adaxially, convex and cymbiform, densely imbricate at anthesis except for the spreading-recurved apex, ecarinate, distinctly exceeding the sepals, margins entire; flowers 32–35 mm long (including the petals), sessile, densely and polystichously arranged; sepals suboblong, asymmetrical with the lateral membranaceous wing slightly exceeding the midnerve, 13–15×7–8 mm, connate at the base for ca. 2.5–3 mm, pale rose toward the apex to whitish, glabrous, ecarinate, apex obtuse, muticous; petals subspatulate, apex subrounded, ca. 29×7 mm, free, white,

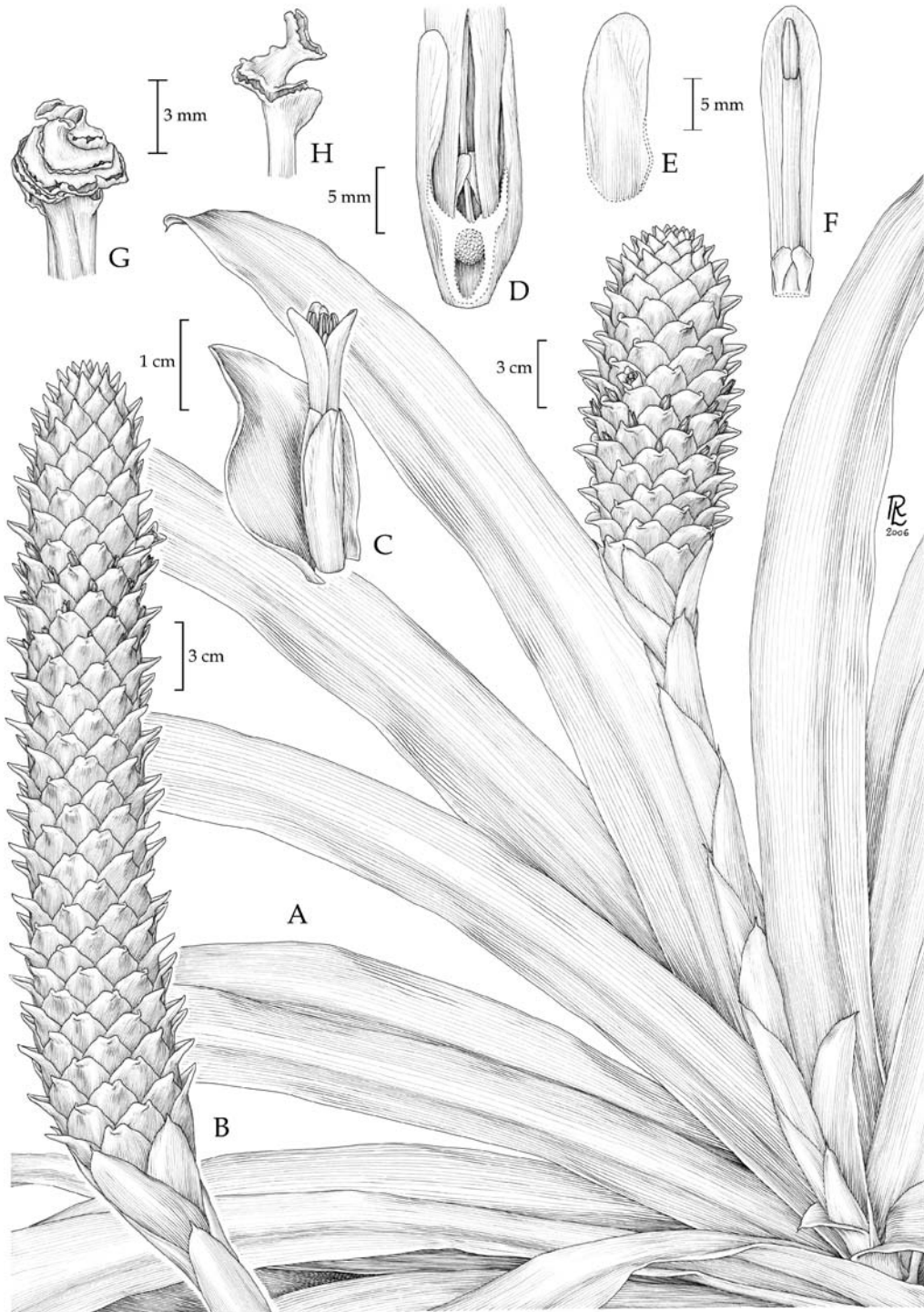


FIG. 1. *Quesnelia koltesii*. A. Habit. B. Variation of inflorescence length. C. Floral bract and flower. D. Details of the petal appendages and ovary in longitudinal section. E. Sepal in abaxial view. F. Details of petal and antepetalous stamen. G. Stigma. H. Detail of stigma. (From the holotype.)

TABLE I  
MORPHOLOGICAL CHARACTER COMPARISON OF FIVE *QUESNELIA* SPECIES, INCLUDING THE TWO NEW SPECIES.

Character	<i>Q. quesneliana</i>	<i>Q. edmundoi</i> var. <i>rubrobracteata</i>	<i>Q. dubia</i>	<i>Q. koltestii</i>	<i>Q. clavata</i>
Leaf blade margins	Spines 1-4 mm long	Spines 3-7 mm long	Spines ca. 0.5 mm long	Spines ca. 0.3 mm long	Entire or spines ca. 0.3 mm long
Leaf blade apex	Acute, ending in a rigid spine ca. 10 mm long	Obtuse to rounded and apiculate	Subacute to rounded and minutely apiculate	Acute to subrounded and minutely apiculate	Subacute to rounded and minutely apiculate
Inflorescence	Simple, cylindrical	Simple or compound, cylindrical to ovoid	Compound, cylindrical	Simple, cylindrical to oblong	Simple, cylindrical to subclavate
Floral bracts	Oblong, 33-50×9-25 mm, exceeding the sepals	Ovate, 15-24×14-22 mm, exceeding the sepals	Broadly ovate, 18-20×15 mm, equaling to exceeding the sepals	Broadly elliptic-ovate, 32-35×20-25 mm, exceeding the sepals	Suborbicular to broadly oblong-obovate, 25-30×15-26 mm, exceeding the sepals
Sepals	Oblong, apex obtuse and apiculate	Oblong, apex obtuse	Suboblong, apex obtuse and apiculate	Suboblong, apex obtuse and muticous	Oblong-obovate, apex obtuse and muticous
Petals	Purple, apex obtuse-cucullate	Lilac, apex obtuse-cucullate	White, apex subacute	White, apex subrounded	White, apex subrounded
Pollen	Biporate, exine psilate	Biporate, exine reticulate	Unknown	Triporate, exine reticulate	Biporate, exine reticulate
Ovule apex	Obtuse	Shortly apiculate	Obtuse	Obtuse	Obtuse

suberect at anthesis, bearing at the base 2 obovate appendages, ca.  $5 \times 2.5$  mm, basally adnate to the petals for ca. 2 mm, obtuse-rounded, crenulate; filaments complanate and dilated toward the apex, ca.  $21 \times 2$  mm, the antepetalous ones adnate to the petals for ca. 16 mm, the antesepalous ones free; anthers sublinear, ca. 6 mm long, base and apex obtuse, dorsifixed slightly below the middle; pollen triporate, subglobose, exine broadly reticulate, muri narrowed, lumina rounded; ovary ca. 6.5 mm long, ca. 6 mm in diam. at the apex, greenish-white, glabrous, laterally obtusely if at all carinate; placentation apical; ovules obtuse; epigynous tube crateriform, ca. 2 mm long; stigma broadly ellipsoid to globose, conduplicate-spiral, white, blades obtusely and inconspicuously crenulate to nearly entire; fruits and seeds unknown.

*Distribution and ecology.*—According to the available information, this new species is endemic to southern Bahia state and is only found in wet forest, growing in shady localities of primary or advanced secondary forest remnants, at 800–1000 m elevation. Because it is only known from the type locality, which is a montane forest fragment, this taxon needs to be assigned to the conservation category of endangered species.

*Phenology.*—Flowering individuals were observed in September, October, and February.

*Etymology.*—*Quesnelia koltesii* is named after Stephen F. Koltes for his generosity and dedication to preserve Serra Bonita Reserve, one of the few remains of the Atlantic Rain Forest of Bahia, Brazil.

**Additional specimens examined.** BRAZIL. BAHIA: Mun. Camaçan, RPPN Serra Bonita, 9.7 km W de Camaçan, na estrada para Jacareci, 6 km na estrada para a RPPN e torre da Embratel,  $15^{\circ}23'30''S$ ,  $39^{\circ}33'55''W$ , 835 m, 1 Feb 2004, *Thomas et al. 13804* (CEPEC, NY), 29 Oct 2004, *Amorim et al. 4361* (CEPEC), 27 Sep 2005, *Amorim et al. 4197* (CEPEC).

*Quesnelia koltesii* is morphologically related to the recently described *Q. dubia* Leme, which was encountered in an ecologically similar region of Bahia state, in the county of Camaçan. However, this new species differs from it by the simple inflorescence (vs. compound); longer floral bracts (32–35 mm vs. 18–20 mm), with a spreading-recurved apex (vs. erect), which is

light blue (vs. greenish-white); longer sepals (13–15 mm vs. 10–11 mm), anthers with an obtuse apex (vs. obtuse and apiculate), and by the distinct, ca. 2 mm long epigynous tube (vs. inconspicuous). Further morphological differences are presented in Table I.

Like its close relatives, *Quesnelia koltesii* presents a combination of characters not typical of the genus. As highlighted by Leme (2005), all showy bromelioids have a tendency to be a victim of the so called “*Aechmea* attraction effect” and are included in that genus, due to the precarious delimitation of *Aechmea*, its paraphyletic composition and a high number of taxa. However, due to the combination of the inflorescence structure, floral bract morphology, flower size, sepals, filaments, petal appendages and ovule characteristics of the new species, its inclusion in *Quesnelia* appears to be the most reasonable choice and does not conflict with the revised concept for this genus (Vieira, 2006).

*Quesnelia dubia*, the closest morphological relative of *Q. koltesii*, was associated in the protologue to *Q. edmundoi* var. *rubrobracteata* E. Pereira (Leme, 2005). These three taxa, especially *Q. koltesii* and *Q. dubia*, are not typical members of the genus *Quesnelia*, when comparing them to, e.g., *Q. quesneliana* (Brongn.) L., which includes the type species of *Quesnelia*. The most striking morphological differences are related to the leaf blade marginal spines and apex, corolla form and pollen exine. The morphological characteristics are compared in Table I for these and other similar species.

***Quesnelia clavata* Amorim & Leme, sp. nov.** Type: Brazil. Bahia: Mun. Arataca, Complexo Serra das Lontras, Serra do Peito de Moça, road Arataca-Una, ramal 22.4 km de Arataca, Assentamento Santo Antonio, RPPN Caminho das Pedras, trilha para o pico,  $15^{\circ}10'325''S$ ,  $39^{\circ}20'30''W$ , 1000 m, 12 Oct 2005, *A. M. Amorim, J. L. Paixão, L. C. J. Gomes & S. Sant'Ana 5351* (holotype: CEPEC; isotype: NY). (Fig. 2)

A *Quesnelia koltesii* Amorim & Leme, cui proxima, bracteis floriferis erectis brevioribusque prope apicem albis, petalis per anthesin patentibus differt.

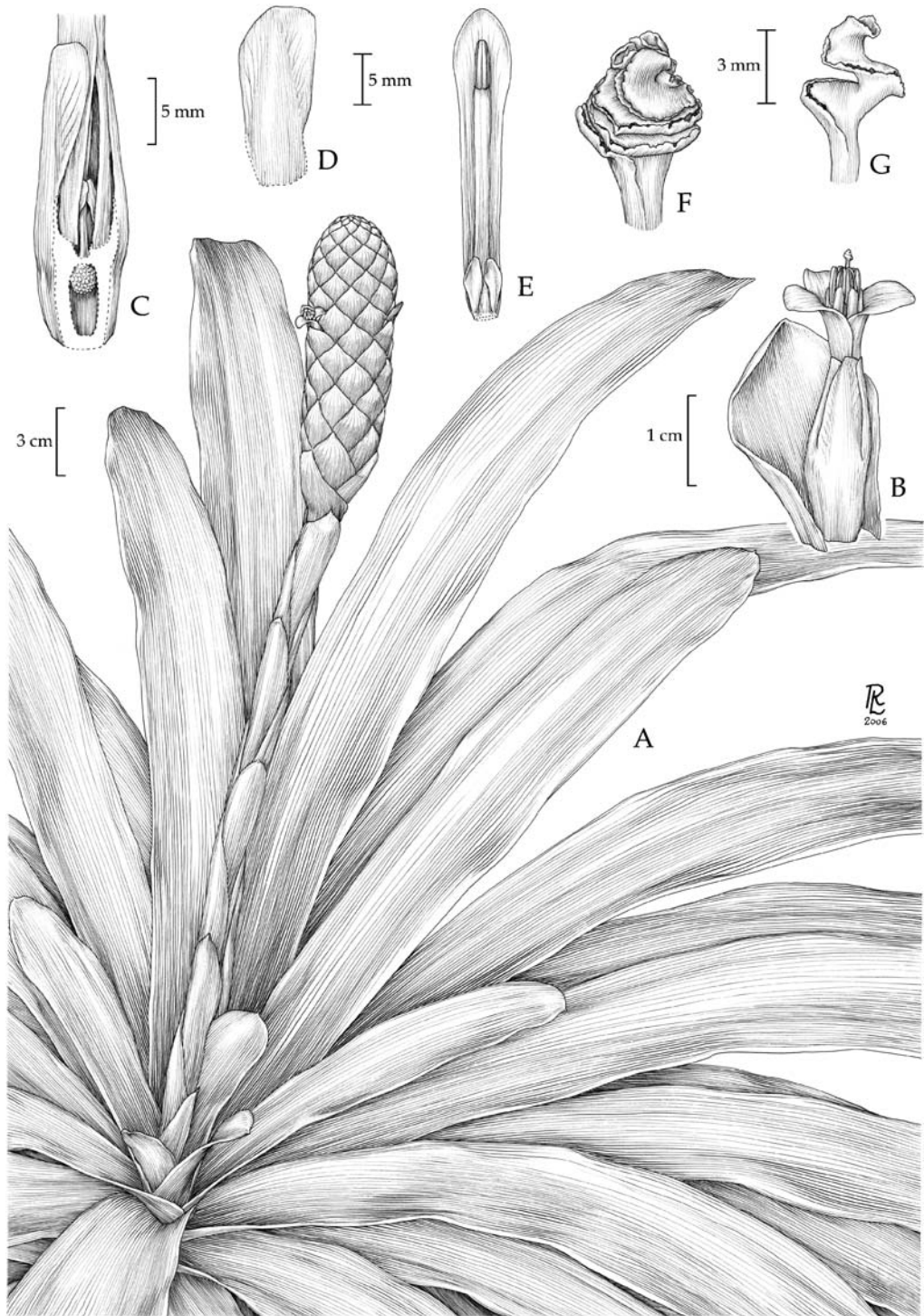


FIG. 2. *Quesnelia clavata*. A. Habit. B. Floral bract and flower. C. Details of the petal appendages and ovary in longitudinal section. D. Sepal in abaxial view. E. Details of petal and antepetalous stamen. F. Stigma. G. Detail of stigma. (From the holotype.)

Plant epiphytic or terrestrial, flowering 60–80 cm tall, propagating by stout basal shoots; leaves 16–32, coriaceous, forming a broadly funnellform rosette; sheaths broadly elliptic-obovate, 16–24×9–11 cm, densely brown lepidote on both sides, green on the abaxial surface; blades linear, suberect-arcuate, 52–68×5–5.5 cm, slightly if at all narrowed toward the base, apex subacute to rounded and minutely apiculate, sparsely and inconspicuously white-lepidote on both sides, green with irregular darker green spots, margins entire or irregularly and inconspicuously spinulose with spines ca. 0.3 mm long; scape erect, 37–49 cm long, ca. 1 cm in diam., glabrous; scape bracts subovate to lanceolate, acute and apiculate, entire, erect, distinctly exceeding the internodes and completely covering the scape, papyraceous, nerved, sparsely and inconspicuously white-lepidote abaxially, 6–8.5×3.5–3.7 cm, red except for the upper ones which have a white apex, the upper ones resembling the floral bracts; inflorescence simple, densely spicate, cylindrical to subclavate, terete, erect, 12–17×3.5–4.5 cm, rachis completely hidden by the bracts; floral bracts suborbicular to broadly suboblong-obovate, apex subacute to obtuse, muticous to inconspicuously apiculate, slightly cucullate, 25–30×15–26 mm, the basal 2/3–4/5 red, the apical 1/3–1/5 white, nerved, membranaceous, inconspicuously and sparsely brown lepidote adaxially, glabrous abaxially, strongly convex and imbricate at anthesis, including the erect apex, ecarinate, distinctly exceeding the sepals, margins entire; flowers 35–41 mm long (with extended petals), sessile, densely and polystichously arranged, odorless; sepals oblong-obovate, asymmetrical with the lateral membranaceous wing equaling to slightly exceeding the midnerve, 13–14×7–7.5 mm, connate at the base for 1–2.5 mm, pale rose-white, glabrous, ecarinate, apex obtuse, muticous; petals subspatulate, apex subrounded, 29–30×6 mm, free, white, spreading at anthesis, bearing at the base 2 obovate appendages, 5.5–6×2–2.5 mm, basally adnate to the petals for ca. 1 mm, obtuse-rounded, irregularly crenulate to subentire; filaments complanate and dilated toward apex, 22–24×1.5–2 mm, the antepetalous

ones adnate to the petals for ca. 15 mm, the antesealous ones free; anthers sublinear, ca. 4.5 mm long, base sagittate and apex obtuse, dorsifixed near the middle; pollen biporate, subglobose, exine reticulate, muri slightly thickened, lumina subrounded; ovary obovate, subquadrate, 6–7 mm long, 5–6 mm in diam. at the apex, green, glabrous, laterally obtusely if at all carinate; placentation apical; ovules obtuse; epigynous tube crateriform, 1.5–2 mm long; stigma exceeding the anthers, globose, ca. 2×2 mm, conduplicate-spiral, white, blades obtusely and inconspicuously crenulate to nearly entire; fruits and seeds unknown.

*Distribution and ecology.*—*Quesnelia clavata* is endemic to southern Bahia state and only found in wet forests, growing in shady localities of primary remnants, between 400 and 800 m elevation. This taxon needs to be assigned to the conservation category endangered because it is only known from forest fragments at the type locality and from one additional collection in the neighboring region of Serra de São José, Mun. São José da Vitória, Bahia, Brazil.

*Phenology.*—Flowering individuals were observed in October and January.

*Etymology.*—The specific epithet is an allusion to the inflorescence shape.

**Additional specimen examined. BRAZIL. BAHIA:** Mun. São José da Vitória, Serra de São José, ca. 400 m, Jan 2004, *Leme 7009* (HB).

*Quesnelia clavata* is very closely related to *Q. koltesii*, but can be easily distinguished from it by its erect and shorter floral bracts (vs. spreading-recurved toward the apex), which are 25–30×15–26 mm (vs. 32–35×20–25 mm) and have a white apex (vs. light blue), and by the petals spreading at anthesis (vs. suberect) which may have implications in its pollination strategy. Further morphological differences are presented in Table I.

This new species, together with its closer relatives *Q. koltesii* and *Q. dubia*, forms a natural complex of species in *Quesnelia* without any clear affinity to the remaining members of the genus. This suggests a need for evaluation of the generic circumscription,

which will require the complete revision of the genus and its species.

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