

# Botanical novelties from Sierra de Maigualida, southern Venezuela. I

by

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## Abstract

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The almost unexplored Sierra de Maigualida is the largest and highest non sedimentary, granitic mountain system in the Guayana Shield. Because of its particular geological constitution, a surprisingly large number of new plant taxa has been found in its high mountain ecosystems. In this first installment, two new species, *Sauvagesia cryptothallis* (Ochnaceae) and *Aegiphila uasadiana* (Lamiaceae) are described and illustrated. *Sauvagesia cryptothallis* belongs to *Sauvagesia* sect. *Imthurniana* and is closely related to *S. imthurniana*, differing mainly in the axis of the inflorescence being densely covered by 5-8 tightly overlapping bracts, hiding the entire axis, and with the principal and secondary leaf veins almost flat, not salient on the lower surface, and poorly differentiated from tertiary veins. *Aegiphila uasadiana* is a very distinctive species somewhat similar to *A. luschnathii*, from Brazil. It can be distinguished by its leaves that are coriaceous, conspicuously revolute, entire, shiny, glabrescent, conspicuously bullate, and foveate adaxially; the inflorescences that are relatively compact and crowned at the apex of the twigs; the calices that are adpressed-pubescent, densely so at the base, progressively glabrescent towards the apex, truncate apex, 4-apiculate, each apiculi of ca. 0.4 mm long, and stamens that are largely exerted from the corolla.

**Keywords:** *Aegiphila*, Guayana Highland, Guayana Shield, Guayana Shield, Lamiaceae, Ochnaceae, Pantepui, *Sauvagesia*, taxonomy.

## Introduction

During the past 50 years, botanical exploration of the Guayana Shield region in northeastern South America has made significant advances, resulting in the recent publication of the monumental *Flora of the Venezuelan Guayana* (Steyermark & al., 1995-2005),

## Resumen

Nozawa, S., Grande, J.R. & Huber, O. 2010. Novedades botánicas de la Sierra de Maigualida, en el sur de Venezuela. I. *Anales Jard. Bot. Madrid* 67(2): 195-202 (en inglés).

La casi inexplorada Sierra de Maigualida es el sistema montañoso no sedimentario granítico más extenso y alto del Escudo Guayanés. En sus ecosistemas altimontanos se ha encontrado un elevado número de táxones nuevos para la ciencia, gracias a su constitución geológica particular. En esta primera entrega se describen e ilustran dos nuevas especies, *Sauvagesia cryptothallis* (Ochnaceae) y *Aegiphila uasadiana* (Lamiaceae). *Sauvagesia cryptothallis* pertenece a *Sauvagesia* sección *Imthurniana* y es muy afín a *S. imthurniana*, de la cual difiere principalmente en el eje de la inflorescencia densamente cubierto por 5-8 brácteas, sin dejarlo ver, y hojas con los nervios principales y los secundarios planos, sin sobresalir en el lado abaxial, pobremente diferenciados de los nervios terciarios. *Aegiphila uasadiana* es una especie bastante particular, la cual presenta cierta similitud con *A. luschnathii*, de Brasil. Se puede diferenciar por presentar hojas enteras coriáceas, revolutas, con haz lustroso, glabrescente, densamente bulado y fuertemente foveado; inflorescencias agrupadas en el ápice de las ramas, relativamente compactas; cáliz adpreso-pubescente, densamente en la base y progresivamente glabrescente hacia el ápice, de ápice truncado, 4-apiculado, cada apículo de ca. 0,4 mm de largo, y estambres largamente exertos de la corola.

**Palabras clave:** *Aegiphila*, Escudo Guayanés, Lamiaceae, Ochnaceae, Pantepui, *Sauvagesia*, taxonomía, tierras altas de la Guayana.

an ongoing *Flora of the Guianas* (Görts-van-Rijn, 1985- ), as well as a detailed and updated checklist of the flora of the entire Guayana region (Funk & al., 2007). In spite of these impressive achievements, there still remain large areas of the region where botanical inventories are either not existing or very scarce (Hu-

ber & Foster 2003; Funk & Berry 2005). One such area is the mountain system Sierra de Maigualida located in southern Venezuela, which has only been visited by few botanists during the last 20 years.

The highlands of the Sierra de Maigualida above

1500 m asl are covered by a variety of montane forest types which are still virtually unexplored. From about 1800/2000 m asl, the forest cover is progressively open, especially because of the many rock outcrops; shrubby and herbaceous high mountain ecosystems

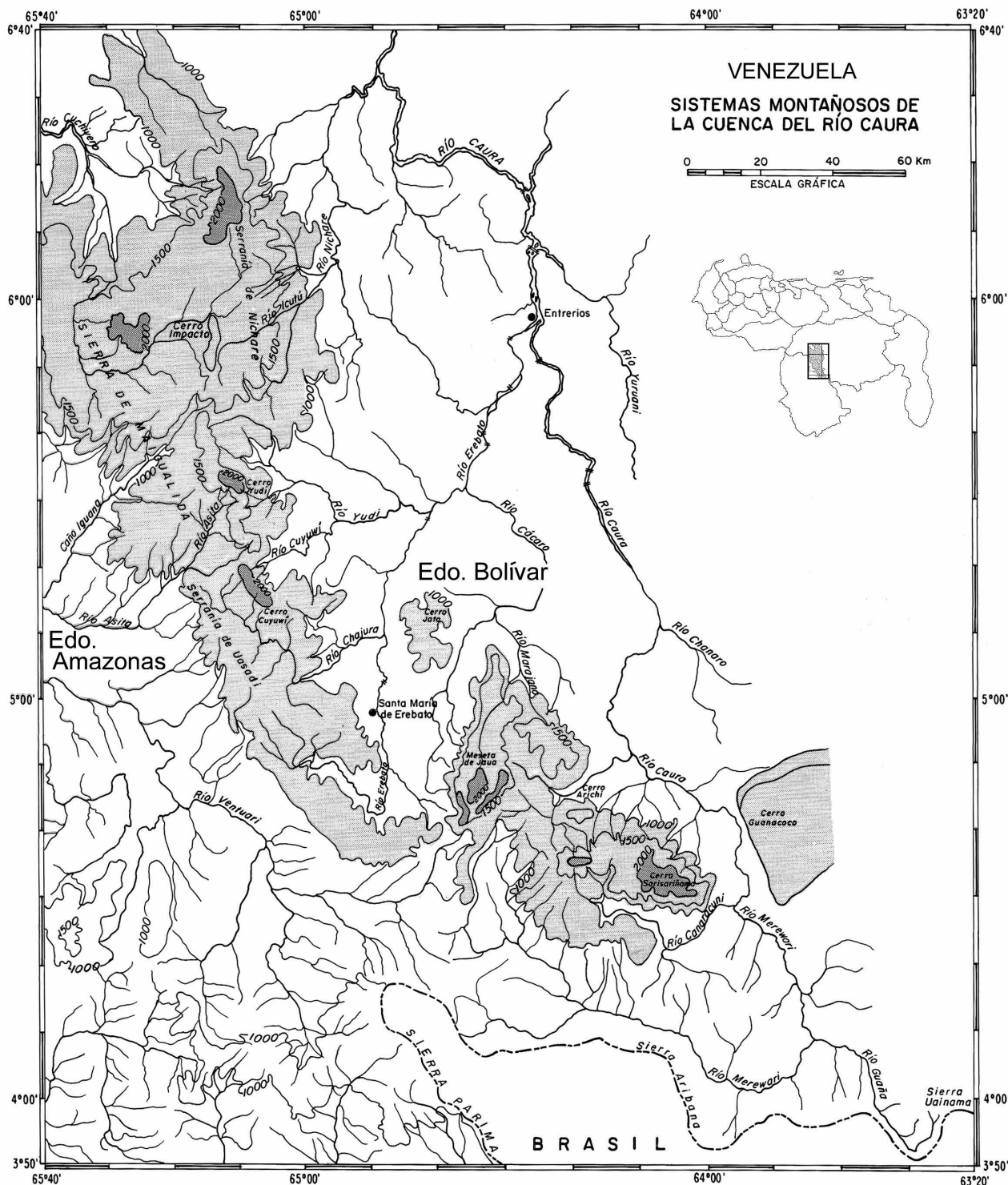


Fig. 1. Map of Sierra de Maigualida, Venezuela.

begin to predominate and the forest formation is limited to river margins or to patches of low elfin forest with abundant epiphytes.

### Geography of Sierra de Maigualida

The Sierra de Maigualida is entirely located in southern Venezuela (Fig. 1): its watershed forms part of the borderline between the states of Bolívar, to the east, and Amazonas to the west. The whole mountain system, more than 200 km long and approx. 60 km wide, has a roughly N-S extension between 65° and 66° W; the northern foothills reach almost the middle Orinoco river at approx. 7° 30' N, whereas the southern limit lies approx. at 4° 40' N, and is formed by the hillands of the southern Sierra Uasadi. The highest peak, Cerro Yudi, is located in the northern part of the Sierra de Maigualida and reaches nearly 2400 m asl; the surrounding highlands lie mostly between 1600 and 2200 m. Towards the south, the average elevation of the mountains decreases steadily until changing into a low hilland topography of ca. 500-700 m elevation in the headwaters of the Río Erebató, forming the southern limit of this huge mountain complex (Huber, 1995; Huber & al., 1997).

In contrast to the famous sandstone table mountains ("tepui") sparsed over the territory of the northern Guayana Shield such as Mt. Roraima, Mt. Duida or Cerro de la Neblina, the Sierra de Maigualida is a mountain system made up of igneous-metamorphic rocks (principally granites belonging to the Santa Rosalía Formation of the Proterozoic Cuchivero Group) (Mendoza, 2000). This implies different geochemical weathering processes of the substrate and therefore also different edaphic conditions for the plant life growing on it.

There are no meteorological data available on this mountain system. Generally speaking, the eastern and southeastern slopes are more humid than the slopes exposed to the west and southwest; mean annual rainfall must be high and may oscillate between 2000 and 3000 mm. Average annual air temperature above 1500 m varies between 15 and 12 °C (Huber & al., 1997).

Based on a preliminary floristic analysis of the different plant communities of the Maigualida highlands, a surprisingly high number of new taxa was discovered representing many different families. Up to present, one new monotypic genus in the Asteraceae (*Huberopappus maigualidae* Pruski), eight new species in Acanthaceae (*Justicia huberi* Wassh.), Lythraceae (*Cuphea galeato-calcarata* Lourteig, *C. maigualidensis* Lourteig), Malpighiaceae (*Byrsonima huberi* W.R. Anderson), Melastomataceae (*Leandra gorzulae* Wurdack, *Macrocentrum huberi* Wurdack,

*Tibouchina huberi* Wurdack), and Rubiaceae (*Paliourea ottobuberi* J.H. Kirkbr.), as well as two new infraspecific taxa in the Lythraceae (*Cuphea curiosa* Lourteig var. *oresbia* Lourteig) and Rubiaceae (*Coccochondra laevis* (Steerm.) Rauschert subsp. *maigualidae* J.H. Kirkbr.) have been described.

This paper presents additional botanical novelties from this interesting mountain range in the heart of the Guayana Highlands; in forthcoming contributions the remaining new taxa collected will be published and eventually a checklist of the area will be presented.

### Ochnaceae

*Sauvagesia* is a predominantly neotropical genus with pantropical distribution, represented in Venezuela by 22 species, 21 of which can be found in the Guayana bioregion. Three species and one subspecies are endemic to Venezuela, with all but the subspecies coming from tepuy summits or quartzite outcrops (Sastre & Wallnöfer, 2008; Sastre, 2003).

### *Sauvagesia cryptothallis* S. Nozawa, sp. nov.

*Type*: Venezuela. Bolívar: Sierra de Maigualida, sector nor-oriental. Altiplanicie tepuyana ubicada en las cabeceras del Río Chajura, afluente occidental del Río Erebató, aprox. 100 km (en línea recta) al SW del Campamento Entreríos, 05°33'N 65°13'W, ± 2100 m, muy escaso entre la grama del herbazal, 28-III-1988, O. Huber 12748 (holotype, VEN; isotypes, K, NY, P, RB).

*Subfrutex usque 1.5 m altus. Folia sessilia, 0.9-10 × 3.5-4.5 mm, coriacea, elliptico-oblancoelata, apice mucronata, parva glandulari protuberantia, margine crenato-serrulata, dente parvo appreso coronata, subtus venis parallelis, primariis, secundariis et tertiariis modice inter se differentiatis, marginali vena crassa totam laminam circumdante. Stipulae laminares, apice acutae cum breviter recurva cilia, interdum bifidae, irregulariter fimbriatae in aetate. Inflorescentiae axiales cum singulo flore terminali, axi 9-12 mm longo, bracteis 5-8, stipulis similibus, dense imbricatis, axim occultantibus. Sepala 5, 8-10 × 2-3 mm, lineari-lanceolata, viridirubra vel viridi-purpurea. Petala 5, 8-10 × 4-6 mm, obovata, apice rotundata, rosea, purpurea vel caeruleo-rosea. Staminodia 5, uni-seriata, libera, 4-5 × 0.8 mm, spathulata, petaloidea. Stamina 5, 3.5 mm longa, filamento 1 mm longo, nigro, antherae 2.5 mm longae, apice aristatae, longitudinaliter dehiscentes. Gynoeceum ca. 6 mm longum, nigrum, ovarium apicem versus sensim attenuatum in stylum subulatum, projectans ca. 1 mm ab ore verticilli staminodiorum. Fructum haud vidi.*

Subshrub, up to 1.5 m tall. Stems leafless below, black, terete, branches densely clothed with erect leaves, lower portion with persistent remains of petiole base. Leaves sessile, 0.9-10 × 3.5-4.5 mm, upper surface shiny and coriaceous, elliptic to oblanceolate, apex mucronate with a blunt, glandular protuberance, base decurrent, margin crenate-serrulate with appressed glandular teeth, venation parallel, secondary veins running tightly parallel to each other without converging at apex, principal and secondary veins poorly differentiated from each other and from tertiary veins on the abaxial surface, with a thick marginal vein surrounding the entire lamina. Stipules laminar, apex acute with short recurved cilia, sometimes bifid, irregularly fimbriate with age. Inflorescences axillary, with a single terminal flower thus appearing solitary, axis 9-12 mm long, bracts 5-8, similar to stipules, tightly overlapping, densely covering and hiding entire axis. Sepals 5, rarely 6, 8-10 × 2-3 mm, linear-lanceolate, greenish-red or greenish-purple. Petals 5, 8-10 × 4-6 mm, obovate, rounded at apex, pink, purple or lavender. Staminodia 5 in a single series, free, 4-5 × 0.8 mm, spatulate, petaloid. Stamens 5, 3.5 mm long, filaments 1 mm long, black, anthers 2.5 mm long, awned at apex, dehiscence longitudinal. Gynoecium ca. 6 mm long, black, ovary tapering gradually towards apex into the slender, subulate style, which projects about 1 mm from mouth of staminodal whorl. Fruit not seen. (Fig. 2).

*Etymology.* The specific epithet is based on the latinized Greek words *krypto*, to hide or conceal, and *thallos*, branch, in reference to the hidden inflorescence axis.

*Diagnostic characters.* *Sauvagesia* is divided into two sections: sect. *Sauvagesia* and sect. *Imthurniana* Dwyer ex Sastre (Sastre, 1978), both present in Venezuela. The latter characterized by axillary inflorescences with a single terminal flower and well developed bracts. *Sauvagesia cryptothallis* belongs to sect. *Imthurniana*, which previously consisted of two species, *S. imthurniana* (Oliv.) Dwyer and *S. guianensis* (Eichler) Sastre.

This new species can be distinguished from the species of section *Imthurniana* by the following key.

#### KEY TO SPECIES OF SAUVAGESIA SECT. IMTHURNIANA

1. Inflorescence axis to 2 mm long, much shorter than the leaves, with 1 or 2 bracts; staminodes not petaloid (except *S. guianensis* subsp. *aracuarensis*) ..... **S. guianensis**
1. Inflorescence axis of 6-12 mm long, equaling to slightly surpassing the leaves, with 3 or more bracts; staminodes petaloid ..... 2
2. Bracts 3 or 4, well-spaced, leaving the axis visible at least at the apex, margin ciliate, attenuate to acute at the apex; abaxial surface of the leaves with principal and secondary veins salient, clearly differentiated from each other and from the tertiary veins ..... **S. imthurniana**

2. Bracts 5-8, tightly overlapping, densely covering and completely hiding the axis, margin irregularly fimbriate to shortly ciliate, obtuse to irregular at the apex; abaxial surface of the leaves with principal and secondary veins almost flat, not salient, poorly differentiated from each other and from the tertiary veins ..... **S. cryptothallis**

*S. guianensis* and *S. imthurniana* show plasticity in some characters depending on the site where they are found growing; some of these ecotypes were considered by Maguire & al. (1961) and Steyermark (1987) as subspecies or distinct species, but they were later synonymized in Sastre (2003) and Sastre & Wallnöfer (2008).

The plasticity of *S. imthurniana* can be grouped into three general ecotypes, some of them with characters that match partially the newly described species: 1) populations from the Roraima-Ilú and Los Testigos tepui chains, mentioned by Maguire & al. (1961) as the "typical" *S. imthurniana*, with stipules attenuate to acute at the apex, leaf blades oblanceolate or obovate-oblong, sepals 6-8 mm long, and petals 9-10 mm long; 2) populations growing on the Chimantá massif, which have leaves widest at or slightly below the middle and, more importantly, stipules irregularly fimbriate at the margins and acute to obtuse at the apex [this ecotype considered by Maguire & al. (1961) as subsp. *chimantensis*]; and, 3) populations from Cerro Marahuaca, with relatively large flowers with sepals 9-11 mm long and petals 10-14 mm long. Note that the description of the stipules of ecotype 2 and the flower size of ecotype 3 match those of *S. cryptothallis*.

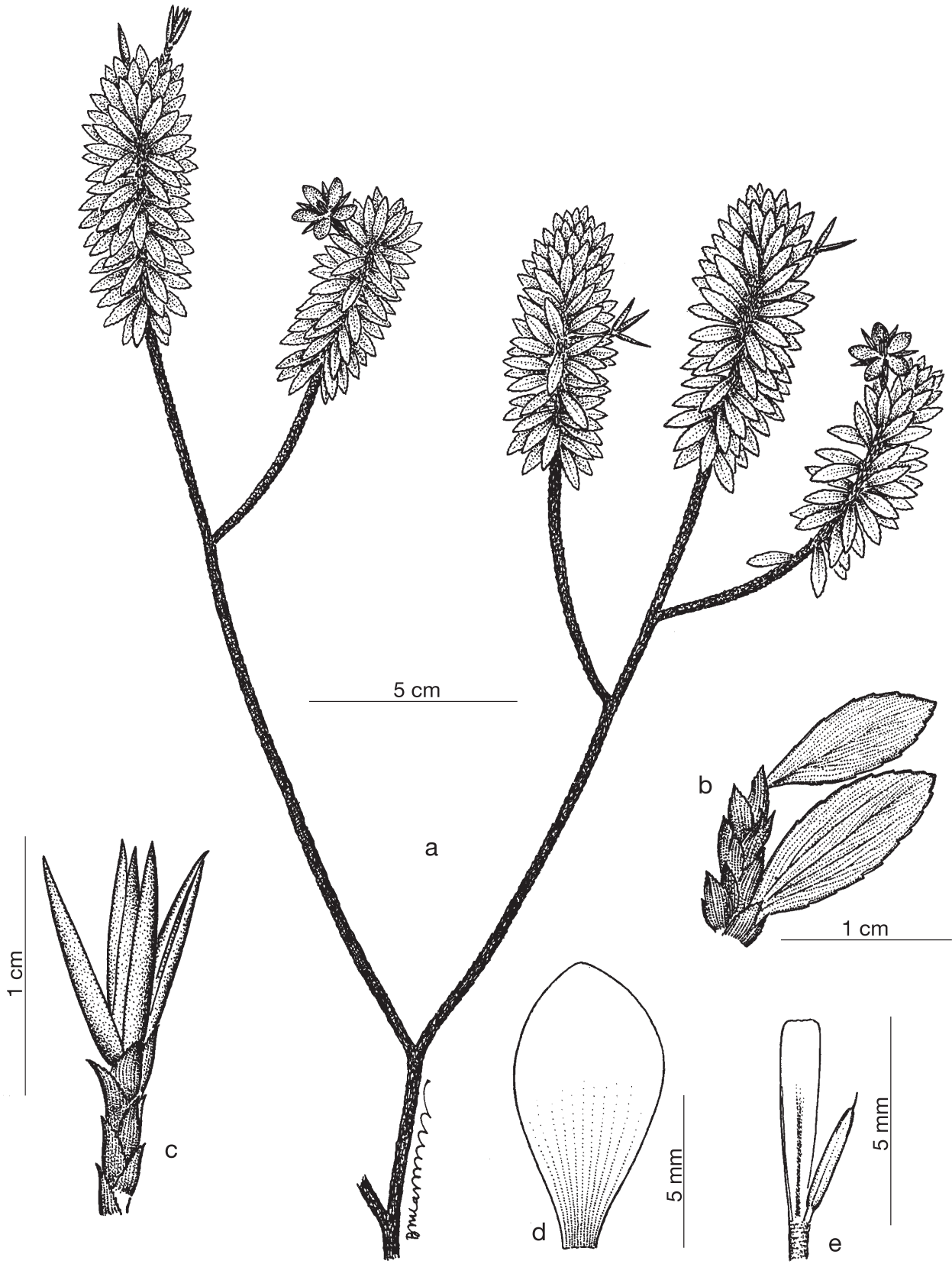
*Distribution and habitat.* Endemic to Sierra de Maigualida and Serranía Uasadi, of the Venezuelan Guayana, at elevations around 2000 m. Scarce to locally abundant in broad-leaved meadows and thickets, on granitic substrates.

#### Additional specimens examined

VENEZUELA. **Amazonas:** Serranía Uasadi, northwestern sector, eastern headwaters of Asita river, 2000 m, 22-XI-1988, *O. Huber 12864* (COL, M, MYF, P, VEN); northeastern sector of Sierra de Maigualida, northeastern headwaters of Asita river, 1700 m, 9-III-1996, *O. Huber & R. Riina 13651* (VEN); Sierra de Maigualida, northwestern sector, upper tributary of Caño Iguana, 2000 m, 28-II to 3-III-1991, *P.E. Berry & al. 4872* (MO, MYF, VEN). **Bolívar:** northeastern sector of Sierra de Maigualida, headwaters of Chajura river, 2100 m, 18-XI-1988, *O. Huber & L. Izquierdo 12766* (MYF, VEN).

#### Lamiaceae

*Aegiphila* Jacq. (ca. 120-150 species) is a neotropical genus of shrubs, small trees, and woody vines traditionally assigned to the family Verbenaceae (Ayraud, 2005; López-Palacios, 1977; Moldenke, 1934),



**Fig. 2.** *Sauvagesia cryptothallis*: **a**, habit; **b**, details of leaves showing thickened marginal vein and stipules (distal leaf showing the abaxial surface and proximal leaf showing the adaxial surface); **c**, inflorescence showing bracts overlapping and hiding the axis, and the sepals; **d**, details of petal; **e**, details of spatulate staminodia and stamen. [Drawn from the holo- and isotype *O. Huber 12864*].

although currently considered a member of the Lamiaceae subfamily Ajugoideae (Cantino, 1992 a, b; Harley & al., 2004; Stevens, 2010).

***Aegiphila uasadiana* J.R. Grande, sp. nov.**

*Type:* Venezuela. Amazonas: Municipio Autónomo Atures: Serranía Uasadi, sector nor-occidental, cumbreras montañosas ubicadas en las cabeceras orientales del río Asita, afluente derecho del río Ventuari, 05°21'N, 65°12'W, 2000 m, herbazales y bosques tepuyanos sobre granito, sobre fila rocosa, 22-XI-1988 (fl, fr), O. Huber 12865 (holotype, VEN; isotypes, COL, K, M, MYF, NY, VEN).

*Frutices dense ramosi 2-3 m alti, caulibus glabris etereti subtetragonis, cortice rimoso; rami floriferi ochracei, foveolati, recti, tetragoni, 1.8-8.6 cm longi, 2.1-3.3 mm diametro, ad basin strigillosi, ad apicem adpresse pubescentes; folia simplicia, opposita vel raro subopposita, (1.7)3.5-8.6(10.5) cm longa, (0.4)1.2-4.1(4.5) cm lata, petiolo tumente 2-6 mm longo, glabro, sparse foveolato; lamina subcoriacea, discolor, facie nitens, dorso opaca, ex obovato elliptico-obovata, basi cuneata, margine integra, revoluta; utrinque conspicue pustulata et foveolata, foveis supra vulgo trichomatibus papillois donatis; inflorescentiae axillares ad apices ramorum terminalium sitae, axibus adpresse pubescentibus ochraceis, 3.1-4.1 cm longae, trichomatibus simplicibus complanatis, 0.5-0.8 mm longis; pedunculus 2-2.7 cm longis; pedicellis 1.5-1.8 mm longis; bracteis bracteolisque subulatis, squamiformibus, adpresse pubescentis; flores fragantes, ca. 1 cm longi sub anthesi, staminibus pistilloque ulterius productis; calyx viridis, 4.5-4.8 mm longus, campanulatus, apice truncatus, quatuor dentibus discretis 0.4 mm longis donatus, adpresse pubescens; corolla e pallide luteo alba, dense foveolata et sparse strigillosa, 4-lobata, lobulis lineari-oblongis, 3 mm longis, 1.1 mm latis, e patenti reflexis sub anthesis, tubus 3.8 mm longus. Fructus ellipsoideus, pericarpo pulposo, 1.1 × 0.7 cm, glaber, nitens, accrescente cupuliformi calyce, 0.5 × 0.9 cm, subtensus.*

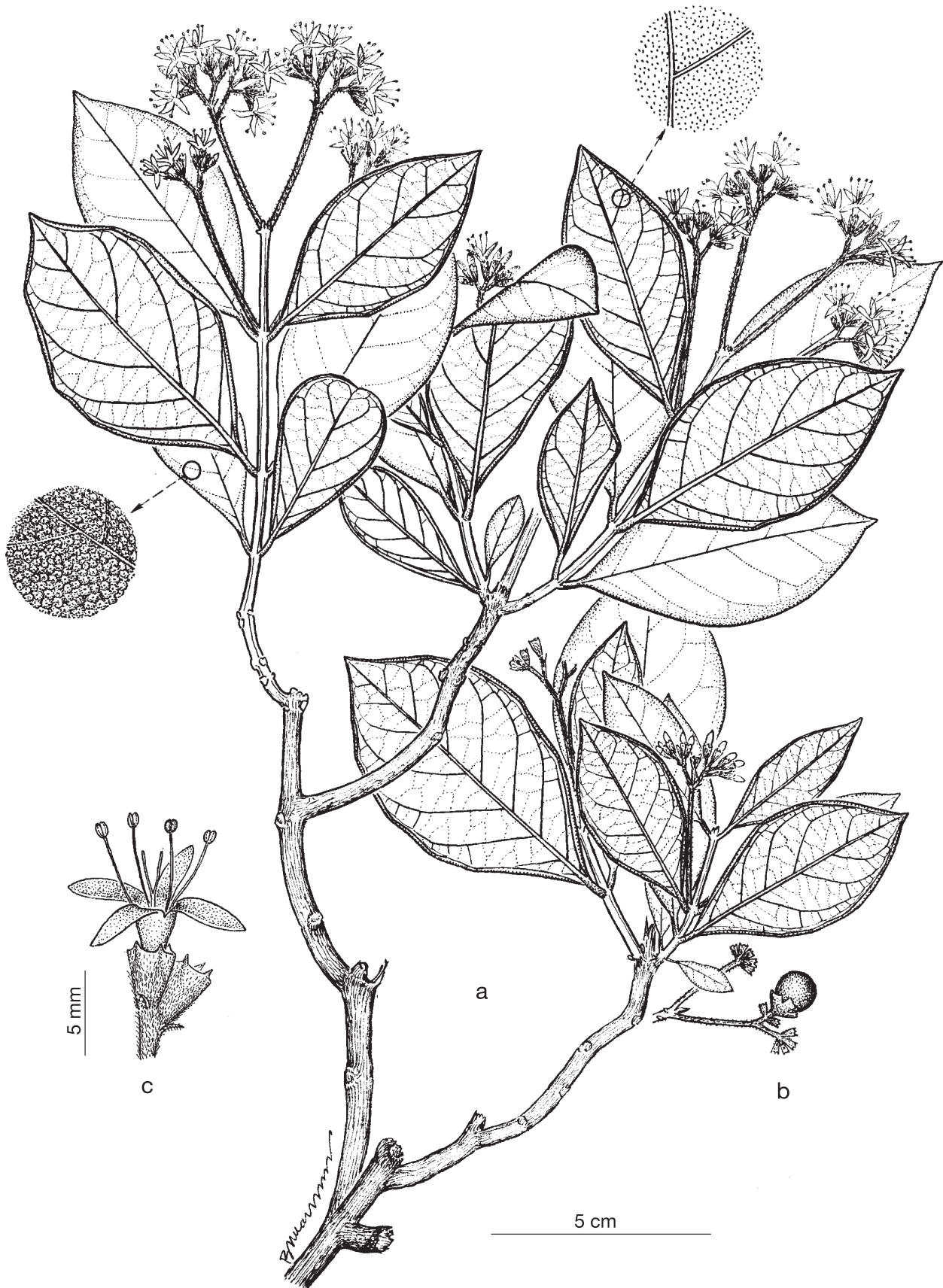
Shrubs 2-3 m tall; main stems gnarled, terete to subtetragonal, glabrous, with irregularly striate bark; floriferous stems erect, tetragonal, ochraceous, foveolate, 1.8-8.6 cm long, 2.1-3.3 mm diam., strigillose (with simple trichomes 0.02 mm long) towards base, and adpressed-pubescent (with simple, flattened, septate trichomes 0.5-0.8 mm long) towards the apex; leaves opposite to rarely subopposite; petiole tumid, 2-6 mm long, glabrous, scattered foveolate; leaf blades subcoriaceous, discolorous, lustrous adaxially, dull abaxially, obovate to elliptic-obovate, base cuneate, apex acute, margins revolute, (1.7)3.5-8.6(10.5) ×

(0.4)1.2-4.1(4.5) cm, entire, conspicuously bullate and foveate on both surfaces, the foveas of the adaxial surface usually with papillose trichomes while those of the abaxial surface usually glabrous; inflorescences axillary, cymose, sometimes appearing terminal by the deciduousness of the apical pair of leaves, borne from the one or two uppermost nodes, 3.1-4.1 cm long, adpressed-pubescent, with ochraceous, flattened, and septate trichomes of 0.5-0.8 mm long; peduncles 2-2.7 cm long; pedicels 1.5-1.8 mm long; bracts and bracteoles subulate, squamiform, 1-2 mm long, adpressed-pubescent; flowers fragrant, ca. 1 cm long (not including the stamens and pistil); calyx green, 4.5-4.8 mm long, campanulate, the apex truncate, 4-apiculate (apiculi of ca. 0.4 mm long) adpressed-pubescent, densely so at the base, progressively glabrescent towards the apex; corolla pale yellow to white, densely foveate, sparsely strigillose adaxially, 4-lobed; corolla tube 3.8 cm long, expanded basal portion 2 mm long, apical portion (corresponding to point of attachment of stamens) 1.8 mm long; corolla lobes linear-oblong, 3 × 1.1 cm, patent to reflexed; stamens 4, alternating with corolla lobes, ca. 1 cm long when extended; filaments exerted to 6 mm from base of corolla lobes, excurved at anthesis; anthers 2-locular, longitudinally dehiscent, ca. 1 mm long, exerted ca. 3 mm from calyx margin at anthesis; stigmas 2, subulate, 2.3 mm long, thickened at base, slightly revolute at apex; fruit ellipsoid, 1.1 × 0.7 cm, glabrous, shiny, the pericarp fleshy, subtended by an accrescent, cup-shaped calyx 0.5 × 0.9 cm. (Fig. 3).

*Etymology.* The species is named after Serranía Uasadi, part of Sierra de Maigualida, where the type material was collected.

*Diagnostic characters.* *Aegiphila uasadiana* belongs to section *Aegiphila*, group *Cymosae*, subgroup *Subtruncatae* (Moldenke, 1934). By its tetramerous flowers, cymose, axillary, and multiflorous inflorescences, and truncate-apiculate calices this new species is similar to *A. luschnathii* Schauer (although supposing somewhat larger petioles), an endemic and poorer known species from Brazil. However, *A. uasadiana*, is distinguished from the latter by its shorter petioles (2-6 vs. 6-9 mm long), the coriaceous leaves (vs. membranous) with the margins conspicuously revolute (vs. slightly revolute), and the inflorescences, crowded at the defoliated apex of the branchlets (vs. inflorescences disposed along the normally foliate branchlets).

*Aegiphila roraimensis* Moldenke and the two varieties of *Aegiphila venezuelensis* Moldenke (including the type variety and *A. venezuelensis* var. *serrata* Moldenke), are two other taxa morphologically relat-



**Fig. 3.** *Aegiphila uasadiana*: **a**, plant (adaxial as well as abaxial surfaces of leaves are shown under magnification); **b**, fruiting inflorescence; **c**, detail of a flower at anthesis. [Drawn from the holotype].

ed to *A. uasadiana*, distributed in the Guayana region between 300 and 2600 m asl; *A. venezuelensis* var. *ser-rata* is also known from the Coastal Cordillera in northern Venezuela (Aymard, 2005, 2008; López-Palacios, 1977). These two species, however, differ from *A. uasadiana* by their markedly dentate calyx (opposed to truncate and with setulose projections in the new species). While *Aegiphila roraimensis* and *A. venezuelensis* grow on acidic substrates derived from Roraima sandstone and quartzites, *A. uasadiana* has only been collected on granitic substrates.

*Distribution and habitat.* Known only from the type locality (Serranía Uasadi, Venezuelan Guayana). Scarce in the border of elfin tepui forests, on granitic substrates.

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