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A new species of *Marcgravia* (*Marcgraviaceae*) from Amazonia with some notes on the *Galeatae* group including a key

Abstract

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Marcgravia zonopunctata is described as a species new to science and illustrated. The species is remarkable for its hypophyllous glands arranged in bands on the lower leaf surface (not known before from *Marcgravia*), for its peculiar shape of the nectary bracts and for its inflorescences appearing on short-shoots (as far known). This is the first species of an unranked, obviously natural group within *Marcgravia* (*Galeatae* group) known to range in Amazonia and at low altitudes. Some features of this *Galeatae* group are discussed here (e.g. pollination, distribution, leaf anatomy) and a key to its species is given.

During revisionary work on the genus *Marcgravia* a new species from the vicinity of Rio Vaupés in Amazonian Brazil and Colombia was detected. All gatherings known to me were collected in the late 1940s. This new species clearly belongs to a group which has its centre of diversity on the Greater Antilles and was named *Marcgravia* [unranked] *Galeatae* Wittm. (according to ICBN Art. 35.3 (Greuter & al. 2000) the delimitation proposed by Wittmack (1878) consists of valid but, since he gave no indication of the ranks involved, inoperative supraspecific names). This group is characterised by having a relatively long rachis thus still exposing the racemose nature of its inflorescences as opposed to the nearly umbelliformly contracted inflorescences in the remainder of the genus. Furthermore, the nectary cups are conspicuously boat-shaped (galeate), as the group's name indicates, and often very vividly coloured (scarlet to orange). Especially the latter trait is a strong indication for adaptation to ornithogamy (bird pollination). Other characteristics of the group include the lack of an adaxial hypodermis and a rather uniform spheroidal pollen with tectate-perforate sexine and comparatively long, slit-like colpi (data from Dressler 1994, *Marcgravia* L. in der Karibik – Studien zur Evolution und Systematik der Gattung, unpublished doctoral thesis, Humboldt-Universität Berlin).

Marcgravia zonopunctata S. Dressler, sp. nova

Holotype: Brazil, Amazonas, Rio Vaupés, between Ipanoré and confluence with Rio Negro, Taracua, 9.11. 1947, R. E. Schultes & F. López 9034 (GH!; isotypes: IAN 60045!, US 1996694! [second collector in the US specimen given as J. Murça Pires not F. López]). – Fig. 1.

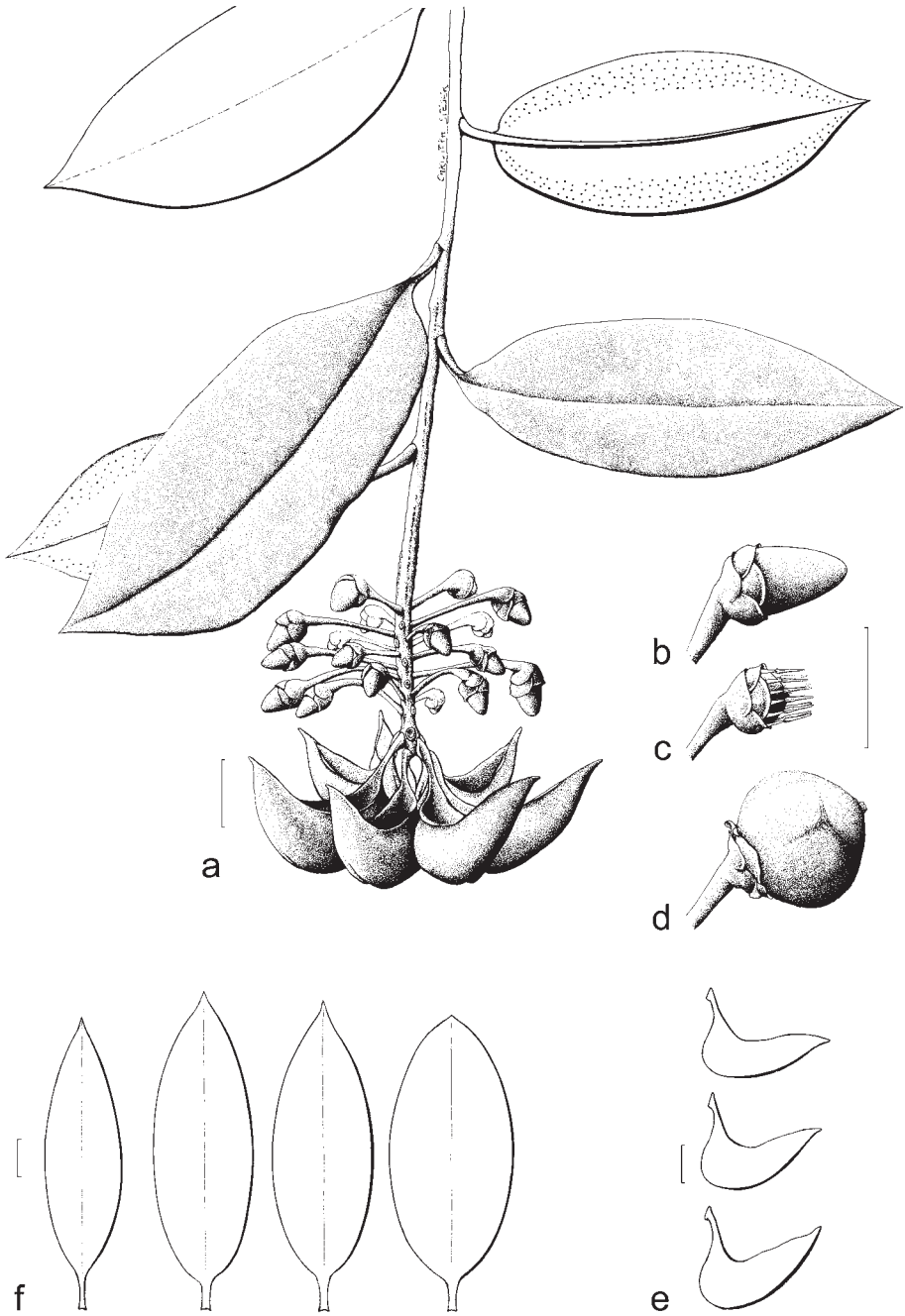


Fig. 1. *Marcgravia zonopunctata* S. Dressler – a: stem with leaves and inflorescence before anthesis; b: flower bud; c: flower at anthesis; d: fruit; e: schematic outline (lateral view) of nectary shapes; f: schematic outline of leaf shapes. – Scale bars = 1 cm; drawings by C. Steger after Schultes & López 9034.

Diagnosis: Haec species nova generis *Marcgravia* ex taxone egradato *Galeatae* rachide comparate longe (20-25 mm) nectariisque galeatis fere unguiformibus notata est. Maculae glandulosae minutae solidae in zona parallela ad marginem foliorum subtus dispositae, character novus pro genere est. Inflorescentiae ut videtur e brachyblastis emergentes.

Etymology: The epithet refers to the arrangement of the solid hypophyllous glands in a zone-like band, a trait hitherto unknown from the genus *Marcgravia*.

Description: *Liana*; fertile branches pendulous, (light) brownish, terete to angular with dense rows of dark lenticels. *Adult leaves* (3-)4-7(-8) mm petiolate, petioles semiterete, sulcate above, 2-2.5 mm diam.; lamina elliptical to slightly ovate, apically acuminate to acute, acumen up to 6 mm long, sometimes minutely mucronate, basally obtuse to rounded, rarely slightly cordate, 60-85 × 25-38(-40?) mm, margin entire, revolute, coriaceous, midrib basally sulcate and apically obscure above, prominent beneath, lateral veins not visible (obscure) on both sides; submarginal hypophyllous glands tiny (up to 0.1 mm diam.), solid, reddish brown, at irregular distance from margin and in between; basilaminar/laminar hypophyllous glands numerous, tiny (up to 0.2 mm diam.), solid, round, dark brown or blackish, along the margin in 2-3 irregular lines or scattered in a zone (5-9 mm wide) between the mediane and the margin of each leaf-half. *Juvenile leaves* not seen. *Inflorescences* pendulous, mostly on short-shoots (if always?), glabrous, with (17-)20-30 fertile and (7-)8-9(-10) sterile flowers (nectaries), the rachis clavate, relatively long (20-25 mm), 3-4(-5) mm diam. with few lenticels. *Nectaries* galeate, hood-shaped, free stalk 3-7 mm long, slightly canaliculate inside, nectary cup laterally flattened, terminally testiform, 7-10 mm wide, 7-10 mm deep, distally with a very long tapering, apiculate, 15-20 mm long lip, orifice slightly decurrent along the pedicel, distally conspicuously apiculately extended. *Flowers* oblique on the pedicels, pedicels 10-15(-20 in fruit) mm long, 1-2 mm diam., tapering towards their base, with few, oval lenticels up to 1 mm long on fruit-pedicels. *Bracteoles* directly subtending the calyx, sepaloid, broadly ovate, c. 1.5 × 2.5 mm, chartaceous with thinned, lighter, entire margin. *Sepals* very broadly semiorbicular to broadly ovate, 2-2.5 × 4-5 mm, chartaceous, margin entire, marginally thinned, appressed to corolla, spreading from fruit. *Corolla* cap conical to ovoidal, apically asymmetrically obtuse, 6-7 mm long, c. 4 mm diam. basally. *Stamens* c. 11-15, filaments narrowly triangular, flattened, 2.5-3 × 0.5-0.8 mm, anthers narrowly triangular to narrowly ovate, apically obtuse to emarginate, (sub)basifixed, c. 2 × 0.5-0.8 mm. *Ovary* globose to semiglobose, apically umbonate (style), 2.5-3 mm diam., 2-2.5 mm tall, locules 5-6, style c. 0.5 mm long, stigma umbonate, 0.7-1 mm diam. *Fruits* globose, roughish, 9-10 mm diam., 8-10 mm tall, apically umbonate (style) up to 1.5 mm diam.; during fruiting pericarp becoming fissured, lenticels emerging on pedicel and pedicel length increasing.

Distribution: So far only known from two localities in Amazonian Brazil and Colombia.

Ecology: Found in lowland rain forests; nothing known about substrate; obviously rare.

Additional specimens seen: BRAZIL: Amazonas, Rio Uaupés, Taraquá, 8.11.1947, *J. Murça Pires* 903 (IAN 30354); *ibid.*, 9.11.1947, *J. Murça Pires* 936 (IAN 30378); *ibid.*, 1947, *J. Murça Pires* 1899 (IAN 50075). — COLOMBIA: Amazonia, Casa de Orosco, Trapecio, 8.11.1946, *Black & Schultes* 46-339 (IAN 20463).

The long inflorescence axis and the galeate nectaries clearly indicate an affiliation of this new species to the *Galeatae* group of *Marcgravia*. The nectaries, however, are rather conspicuous: with their almost “claw-like” appearance and the long tapering, apiculate lip they find no equivalent. Their colour in the dry state suggests a vivid colour when fresh (reddish?). Another unique feature (among all *Marcgravia* spp. known so far) is the band-like arrangement of the solid(!) hypophyllous glands. We know either leaves dotted all over with punctate solid glands, or with a ± long, ± regular row of poriform glands. In other marcgraviaceous genera (for an overview of the family see Dressler 2000, Dressler in press) species are known with hypophyllous glands ar-

Table 1. Taxa belonging to the group *Marcgravia* [unranked] *Galeatae* to my opinion.

| Taxa | Distribution | Altitude a.s.l. |
|--|-------------------------|------------------|
| <i>M. domingensis</i> Urb. | Hispaniola | (800)1100-1565 m |
| <i>M. evenia</i> Krug & Urb. | | |
| subsp. <i>evenia</i> | Central and E Cuba | 400-1100 m |
| subsp. <i>calvicola</i> (Britton) S. Dressler ¹ | W Cuba | 150-450 m |
| <i>M. oligandra</i> Griseb. | E Cuba and W Hispaniola | 700-1450 m |
| <i>M. sintenisii</i> Urb. | Puerto Rico | 600-1338 m |
| <i>M. stonei</i> Utley | S Mexico | 1300-2020 m |
| <i>M. trianae</i> Baill. | N Venezuela | 1400-2450 m |
| <i>M. zonopunctata</i> S. Dressler | Amazonia: Rio Vaupés | lowland < 200 m |

Note: Wittmack (1878) placed also *M. affinis* into this group but this species lacks galeate nectaries and an elongated rachis, has a hypodermis (material studied: *Vogel CR 189*, WU, from Costa Rica) and hence does not belong here.

ranged in a zone (e.g. *Marcgraviastrum pauciflorum* A.C. de Roon & H.G. Bedell), but these glands are always poriform not solid.

Beside the early described endemic of the coastal cordillera around Caracas, *Marcgravia trianae* Baillon (1872), this new species is the second occurring in South America, extending the range of the group *Galeatae* even further south and away from the area around the Caribbean Sea. Curiously, this is the first species among the hitherto montane group obviously growing in lowland rainforests.

It must be mentioned here that *M. nepenthoides* to my opinion does not belong to this group since it lacks the prolonged rachis (it shows a globoidally contracted rachis) and, furthermore, has an adaxial hypodermis. Also the nectaries are sac- or dipper-shaped rather than boat-shaped and laterally flattened. However, they are brightly coloured and this was probably the reason why Wittmack placed this species in his group *Galeatae*.

M. nepenthoides was also the first species of the entire genus where bird-visits were reported (Belt 1874) laying the foundation for the long lasting opinion which considered the genus *Marcgravia* predominantly ornithophilous (e.g. Schimper 1898, Knuth 1904, Wettstein 1935, Proctor & Yeo 1973). Bailey (1922) questioned this and recent upswing in research on tropical pollination ecology revealed that the majority of the species seem rather adapted to bat-pollination. Also *M. nepenthoides* was shown to be visited by bats and even marsupials (Tschapka & Helversen 1999). However, with the strikingly coloured and characteristically formed nectaries the *Galeatae* group contains species with a clear adaptation to bird pollination. Especially *M. stonei* of S Mexico (Chiapas, Veracruz, Oaxaca) with the abaxial attenuate beak on the nectaries forces visiting birds to fly deeper into the inflorescence thus improving the chance of pollen transfer (Miranda 1944: fig. 16.; copied in: Wagner 1946: fig. 11.; Poley 1994: 44, fig. 17 [copied after Wagner 1946, err. named *M. mexicana*]; Proctor & al. 1996: 239, fig. 8.9 D [copied after Wagner 1946]). This hypothesis needs to be tested in field studies. Occasional bird visits to respective species were reported (Wagner 1946: *M. stonei*, Howard 1970: *M. sintenisii*, H. Stenzel, pers. comm. 2000: *M. evenia*). It would fit into the hypothesis of Grant & Grant (1968) which says that vividly coloured ornithophilous taxa concentrate at the northern edge of neotropical distribution areas. Their flowers have a selective advantage in being located by migrating hummingbirds which do not migrate in tropical regions.

¹ This combination is not intended to be validated here. This is done in a paper in press ("Marcgraviaceae" for the "Flora de Cuba").

Marcgravia evenia subsp. *calcicola* has a very localised distribution on cretaceous limestone inselbergs (mogotes) in W Cuba and is thus edaphically and geographically vicariant with *M. oligandra*, which grows in seasonal montane forests on limestone in E Cuba, Haiti and the N Dominican Republic. The other endemics of the Greater Antilles do not occur on limestone: *M. evenia* subsp. *evenia* and *M. domingensis* occur in montane rain forest and cloud forests, occasionally in montane pine forests and dryer shrubland, mostly on lateritic, sometimes on serpentinitic grounds. *M. sintenisii* lives in montane rain forests over igneous underground, but prefers wetter conditions (elfin forests). They all are geographically vicariant.

Two montane species with a limited distribution were known so far from continental America: *M. stonei* is a rare endemic of montane rain forests and cloud forests (also secondarily influenced) in the states Chiapas, Veracruz and Oaxaca of Mexico. *M. trianae* is only known from the higher slopes of Cordillera de Merida and Cordillera de la Costa of Venezuela. The newly described *M. zonopunctata* is the first species obviously occurring in lowland rain forests.

Key to the species of the group *Marcgravia* [unranked] *Galeatae*

The following key is to aid determination of the species of the *Galeatae* group, which to my opinion forms a monophyletic assemblage within the genus *Marcgravia*. In contrast, I regard the proposed subgenera *Plagiotalamium* Delpino (flowers angled on pedicel) and *Orthotalamium* Delpino (flowers erect on pedicel) to be rather artificial “containers”. Nevertheless, they are of practical use. Without a deeper knowledge of the whole genus it seems inappropriate to date to propose a more natural infrageneric classification. Hence Wittmack’s (1878) delimitation of the genus was provisionally adopted. A phylogenetic analysis is in preparation, which shall lead to a better understanding of the genus.

1. Inflorescence with a short rachis, axis strongly contracted (< 15 mm long, if longer, then with a conspicuous interstice between the nectarial pedicels and the flower pedicels); nectary bracts mostly cylindrical-tubular, dipper- or sac-shaped . . . remainder of *Marcgravia*
 - Inflorescence with a comparatively long rachis (> 15 mm long); nectary bracts boat-shaped (galeate) or hood-shaped, mostly laterally compressed or flattened . . . *Galeatae* group (2)
2. Rachis very long (65-75 mm); nectary bracts very large, 40-60 mm long, 30-40 mm wide, with a wing-like keel and abaxial curved beak; plant of Mexico. *M. stonei*
 - Rachis shorter (< 50 mm long); nectary bracts smaller, boat- or claw-shaped 3
3. Leaves with dark solid glands beneath (at most basilaminar with a pair of inconspicuous poriform glands) 4
 - Leaves with poriform glands beneath 5
4. Glands scattered all over the lower leaf surface; inflorescence 40-60-flowered; nectary abaxially not lipped, emarginate; plant of Puerto Rico *M. sintenisii*
 - Glands in a zone parallel to and near the margin; inflorescence 20-30-flowered; nectary with long apiculate lip; plant of Amazonia *M. zonopunctata*
5. Poriform glands only in basal part of leaf, 2-3 glands only; plant of Venezuela . . . *M. trianae*
 - Poriform glands (> 4) in a row from base to apical part of leaf; plant of Greater Antilles . . . 6
6. Row of 4-6 glands from upper leaf base to median margin; leaf margin apically crenate (by glands!); leaf apex acuminate; leaves chartaceous when dry; petal cap conical with acuminate top, < 4 mm diameter; bracteoles mostly distinctly separated from calyx, up to 0.8 mm long *M. oligandra*
 - Row of 4-12 glands from upper leaf base towards apex; leaf margin entire; leaf apex acute to obtuse; leaves coriaceous when dry; petal cap broadly ovoid, > 4 mm diameter; bracteoles mostly directly subtending calyx, > 0.8 mm long 7
7. Stamens 6-8; 9-16 nectary cups with free stalk 2-4 mm long; row of 7-12 laminar glands beneath; pedicels (8)12-17 mm long; petal cap acute, 4.5-7 mm long; plant of Hispaniola *M. domingensis*
 - Stamens 10-27; 5-10 nectary cups with free stalk 5-14 mm long; row of (4)5-7(9) laminar

- glands beneath; pedicels (15)20-30 mm long; petal cap obtuse, 8-11 mm long; plant of Cuba 8
8. Petiole of adult leaves (3)4-6(8) mm long; inflorescence 29-50-flowered; nectaries (9)15-25(32) × (8)13-18(22) mm; sepals (2)4-5 × (4)6-10(12) mm; bracteoles 3-4 × 4-6 mm; stamens 12-27; dried leaves dark reddish brown; plant of Central and E Cuba
 *M. evenia* subsp. *evenia*
- Petiole of adult leaves (1)2-3(4) mm long; inflorescence 20-25-flowered; nectaries 7-9 × 5-7 mm; sepals 0.5-0.7 × c. 3 mm; bracteoles c. 0.5 × c. 1 mm; stamens 10-11; dried leaves light greyish brown; plant of W Cuba *M. evenia* subsp. *calvicola*

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