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RESEARCH ARTICLE

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Two new magnoliid (*Annonaceae*, *Lauraceae*) tree species from Manabí, western Ecuador

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Key words

Aniba
deforestation
Guatteria
IUCN conservation assessments
Manabí region
new species

Abstract Western Ecuador harbours high plant diversity and endemism. The region of Manabí has known intense deforestation over the last decades, but lowland rain forests persist in a network of small forest fragment patches. Here, we describe two new magnoliid tree species from a small privately owned forest fragment known as La Esperanza reserve, in the El Carmen canton (Manabí): *Aniba ecuadorica* (*Lauraceae*) and *Guatteria esperanzae* (*Annonaceae*). For both species a detailed morphological description, a preliminary conservation status following IUCN criteria, distribution maps and high quality photographs are provided. This represents the second species of *Aniba* known to occur in western Ecuador, while there are 14 species of *Guatteria* documented for Ecuador west of the Andes. *Aniba ecuadorica* is only known from two localities and has a preliminary IUCN conservation status of Critically Endangered, while *Guatteria esperanzae* is known from six localities and is suggested to be Endangered. Finally, we provide a quick overview of *Guatteria* species in western Ecuador with a key to the species in the region. The description of these two new tree species underlines the important need of prospection and conservation of the remnant forests in the Manabí region of western Ecuador. We also stress the importance of privately owned forest fragments for biodiversity conservation.

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INTRODUCTION

The Chocó bioregion, included in the Tumbes-Chocó-Magdalena hotspot, extends from southern Panama, along western Colombia and into northern Ecuador (Pérez-Escobar et al. 2019). The Chocó as a whole is one of the most biodiverse regions on the planet and home to nearly 3 % (~11 000 species) of all plant species (Christenhusz & Byng 2016, Christenhusz et al. 2017, Pérez-Escobar et al. 2019). The loss of biodiversity has been flagged as one of the major problems of this century (Pimm & Raven 2000) and thus a better description of biodiversity hotspots such as the Chocó are key to better conservation strategies.

Western Ecuador is home to the southern extent of the Chocó bioregion. There is a marked rainfall gradient from the north, one of the wettest places to the south with marked long dry seasons (Gentry 1986). Since the 1950s the lowland rain forests of the Chocó have undergone significant deforestation and the region is now classified as one of the world's Biodiversity Hotspot (Myers et al. 2000, Mittermeier et al. 2011) in urgent need of conservation actions. Although there are still large areas of high quality forests remaining (in particular to the north), these are steadily decreasing in size leaving a network of fragmented rain forest patches (Cuenca & Echeverria 2017). Unfortunately, this part of the world is now a classic example of rapid and uncontrolled rain forest deforestation (Dodson & Gentry 1991, Pitman et al. 2022). Rain forests are threatened by selective logging, fragmentation, and the expansion of agriculture (Cuenca & Echeverria 2017).

El Carmen canton in the Manabí region (Fig. 1) is a textbook example of a biodiversity hotspot. Indeed, the region is very biodiverse (Gentry 1986), but most of the forest patches suffer from a huge human pressure linked to extensive and non-sustainable agricultural practices (Cuesta et al. 2017). The situation has led from a once continuous rain forest to a state of highly fragmented patches ranging in size between 5 and 100 hectares. These fragment remnants represent old-growth forests, being close to primary lowland rain forests. Across the region, these fragments are privately owned and conserved for different reasons such as being inaccessible (steep slopes not usable for pasture), part of a community effort or by private individuals understanding the need for biodiversity conservation.

Even though c. 28 % of forested lands are officially reported as protected (GAD 2014) across the El Carmen canton (Protective Forest/Bosque Protector), most of these forests are nevertheless highly altered and degraded linked to uncontrolled deforestation and land use changes (GAD 2014). In addition, the list of protected forests listed (4) in the report (GAD 2014) remains highly incomplete, as many owners protect some of their lands but do not report it to the government. Thus, there is an urgency to document and protect self-owned forest patches across the region.

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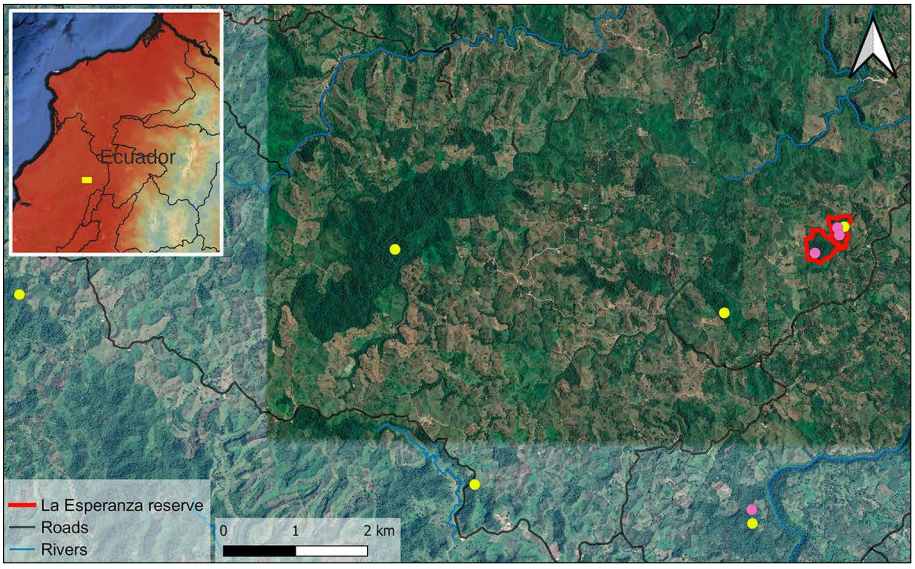

Fig. 1 Distribution map of *Aniba ecuadorica* (purple) and *Guatteria esperanzae* (yellow) in the El Carmen canton in western Ecuador. Satellite image from Google Earth (15/12/2021). The insert shows the larger area of western Ecuador with altitude variation across the region (red for lower areas to yellow to higher areas). The yellow rectangle indicates the study site in Ecuador. The finer black lines represent the different regions in Ecuador.

La Esperanza reserve is located near the Sapote community, some 20 km south-east of the town of El Carmen in the canton of El Carmen (Manabí province) at c. 200 m altitude (Fig. 1). La Esperanza is but one of the several forest fragments we have documented in this region. These fragments are classified as near old-growth or near primary lowland rain forests not having been logged or little altered. La Esperanza has a particularly interesting conservation history. The owner, Anelio Loor, bought this land some 20 years ago. Anelio is from a very modest background and was trained as a plant parataxonomist within the Yasuní Dynamic Forest Plot project in the Ecuadorian Amazon, led by the Pontificia Universidad Católica del Ecuador (PUCE). This professional experience made him aware of the importance of biodiversity conservation. After working for 20 years for the PUCE, he returned to his homeland and bought 17 hectares of land. This land had already suffered some deforestation, but there persisted a fragment of primary forest (c. 7 hectares). Instead of transforming this forest into pasture, which would have allowed him to have more income, Anelio has dedicated these last 20 years to protect and value this forest. La Esperanza is on a hill that slopes to a stream delimiting the property. There are large diameter trees (e.g., *Eschweilera awaensis* S.A.Mori & Cornejo (*Lecythidaceae*)) and tall palms (*Attalea colenda* (Cook) Balslev & A.J.Hend.; *Oenocarpus bataua* Mart.), with an open under-forest containing a variety of shrubs, lianas, herbs and epiphytes, which is typical of primary rain forests. The first census provided a preliminary list of c. 200 plant species in a single hectare (results not published), with about half remaining unidentified at the species level. A new species of *Celastraceae* (*Monteverdia multicostata* Cornejo & Biral) was also recently described with the type collected from La Esperanza in 2021 (Biral & Cornejo 2021).

In this article, we describe two new tree species of Magnoliids (sensu APG IV 2016), one *Annonaceae* and one *Lauraceae*, both first collected within La Esperanza.

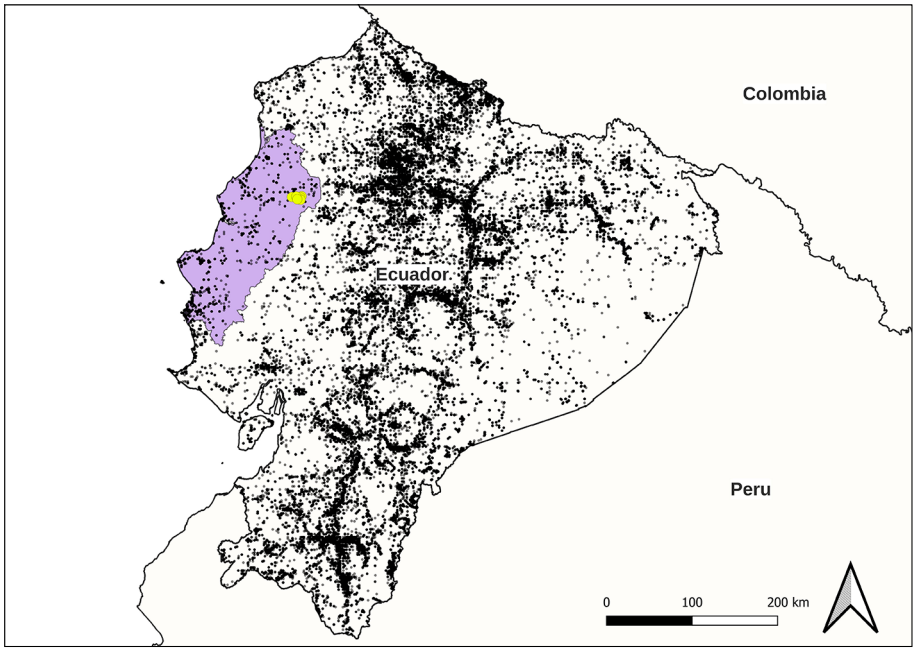

Fig. 2 Density of collecting in Ecuador shown by localities of herbarium collections. Black circles: Botanical specimens based on the projection of 386868 specimens downloaded from GBIF (GBIF 2021). Yellow circles: collections made at La Esperanza and cited in the species descriptions. The Manabí region is shown in purple.

MATERIALS AND METHODS

Field work in the La Esperanza reserve and in nearby forest patches was undertaken between 2018 and 2021. For each botanical specimen precise geo-coordinates using a GPS were recorded and duplicates were deposited when possible in different herbaria in Ecuador (GUAY, QCA) and abroad (P, WAG) (acronyms following Thiers continuously updated). All specimens were collected under the research permits to Thomas Couvreur and Xavier Cornejo provided by the Ministerio del Ambiente, Agua y Transición Ecológica of Ecuador. Herbarium specimens were compared to the different known species occurring in coastal Ecuador based on Maas et al. (2015) and study of the types (Table 1). Distribution maps were generated using QGIS v.3.20. The conservation status for each species was undertaken using the R package ConR (Dauby et al. 2017). This package calculates the different basic statistics needed to undertake the full assessment. We followed the IUCN guidelines (IUCN 2019) and assessments were undertaken using distribution data following criterion B (Schatz 2002). For each species, the extent of occurrence (EOO) and the area of occupancy (AOO) were calculated. For the AOO a cell size of 2 km^2 was used. Within this highly fragmented landscape each forest fragment is considered to be a different location (sensu IUCN 2019) because a single threatening event (such as selling the forest fragment), will rapidly affect all individuals linked to deforestation.

To show that Manabí is a poorly botanically explored region when compared to other regions in Ecuador, we generated a map of botanical specimen collections of mainland Ecuador. We downloaded raw data from GBIF using the following filters: Basis of record: Preserved specimen; Administrative areas (gadm.org): ECU; Occurrence status: present; Scientific name: Magnoliopsida (see GBIF 2021). We deleted specimens collected from Galapagos and no attempt was done to correct geolocalisation.

RESULTS AND DISCUSSION

The two new species described here underline the botanical importance of this region in Ecuador and add to previous new tree species known to occur there (Cornejo & Mori 2011, Biral & Cornejo 2021). Interestingly, the Manabí region has been very little botanically prospected with few botanical collections documented from the region (Fig. 2). This is probably the result of its apparent forest-less landscape, and thus botanists do not take the time to prospect there. Nevertheless, as for most of coastal Ecuador (Pitman et al. 2022), El Carmen canton in Manabí is dotted with numerous small to medium sized old-growth rain forest fragments (between 5 and 100 ha). Thus, although this region has suffered from extensive deforestation, it is in need of urgent and continued botanical prospection (Pitman et al. 2022).

In addition, privately owned old-growth (near primary) forests, such as La Esperanza, significantly contribute to the conservation of biodiversity (Gibson et al. 2011). Once lost they are irreplaceable in terms of tropical biodiversity (Gibson et al. 2011). These old-growth rain forests must play an important part of conservation strategies in a region almost void of formal protected areas.

Aniba Aubl.

Aniba is a Neotropical genus of *Lauraceae* and comprises 48 species (Kubitzki & Renner 1982, Van der Werff 1994, Da Matta et al. 2016, Palacios 2018), including the new taxon described here. In the latest monographic revision (Kubitzki & Renner 1982), *Aniba* was only known to occur in the Amazon basin, the Guianas, and Venezuela, and northwards to the Lesser Antilles. It was, however, not recorded from western Ecuador. The formal publication of the endemic *Aniba magnifica* W.Palacios is the first generic record to the Pacific side and western Ecuador (Palacios 2018). In this work we thus describe the second species west of the Andes and endemic to western Ecuador.

Table 1 Checklist of the 14 species of *Guatteria* documented to date in western Ecuador (west of the Andes), with data on their distribution and altitudinal range. Most data taken from Maas et al. (2015).

Specific epithet	Authors	Provinces in western Ecuador	Altitude range	Comments
Guatteria brevipetiola	Maas & Westra	Esmeraldas	60–250 m	Endemic to Ecuador, lowland
Guatteria carchiana	Maas & Westra	Carchi	1450–2050 m	Endemic to Ecuador, premontane
Guatteria crassipes	R.E.Fr.	Carchi, Cotopaxi, Pichincha	1200–2400 m	Closely resembles *G. verrucosa;* known from northern western Ecuador and Colombian Choco, premontane.
Guatteria cuatrecasasii	D.Sánchez	Esmeraldas	80–1500 m	Known from northern western Ecuador and Colombian Choco
Guatteria esmeraldae	Maas & Westra	Esmeraldas	100 m	Endemic to Ecuador, lowland, near the coast
Guatteria esperanzae	Couvreur, J.N.Zapata & Loor	Manabí	250–300 m	Endemic to Ecuador; here described, lowland, inland (Fig. 7, 8)
Guatteria goudotiana	Triana & Planch.	Imbabura, Pichincha	960–2450(–3000) m	One of the few species to occur at high elevations
Guatteria microcarpa	Ruiz & Pav.	Cañar, Cotopaxi, Esmeraldas, Guayas, Los Ríos, Manabí	0–1000 m	The only species also occurring towards the southern part of western Ecuador (Guayas and Los Ríos provinces). One putative specimen also collected from the Amazon region (Napo)
Guatteria narinensis	Maas & Westra	Carchi, Esmeraldas	250–450 m	Known from northern western Ecuador and Colombian Choco (Fig. 3f–g).
Guatteria pichinchae	Maas & Westra	Esmeraldas, Pichincha	0–1460 m	Endemic to Ecuador (Fig. 4e–h)
Guatteria pittieri	R.E.Fr.	Carchi, Esmeraldas, Pichincha	0–1900 m	Known from northern western Ecuador and Colombian Choco (Fig. 3a–c).
Guatteria punctata	(Aubl.) R.A.Howard	Carchi, Esmeraldas	0–2800 m	The most widespread and variable species of *Guatteria* occurring across the Amazon basin, and the Chocó region (Fig. 3d–e)
Guatteria scalarinervia	D.R.Simpson	Carchi	200–1000 m	A mainly Amazonian species, but one collection from Carchi
Guatteria venosa	Erkens & Maas	Carchi, Esmeraldas, Pichincha	250–1000 m	Endemic to Ecuador (Fig. 4a–d)

Fig. 3 Other species of *Guatteria* in western Ecuador. *Guatteria pittieri* R.E.Fr., Maship lodge: a. Leaf, upper side view; b. flower buds, c. mature monocarps. *Guatteria punctata* (Aubl.) R.A.Howard, Maship lodge: d. Base of leaf and flower; e. immature fruits. *Guatteria narinensis* Maas & Westra: f. Mature fruit and flower; g. lower side of leaf, basal part, and side view of flower (a–c: *Couvreur 1295*; d–e: *Couvreur 1300*; f–g: *Couvreur 1467*; all QCA, WAG). — Photos by Thomas L.P. Couvreur.

Fig. 4 Other species of *Guatteria* in western Ecuador, continues. *Guatteria venosa* Erkens & Maas, Centinela, Patricia Pilar: a. Leaf, upper side view; b. leaf, lower, note marginal vein, c. single flower, side view; d. fruit. *Guatteria pichinchae* Maas & Westra, Los Bancos: e. Leaf, lower side view; f. flower, side view; g. base of leaf, upper side, and flower; h. near mature fruit, side view (a, c–d: *Couvreur 1510*; b: *Couvreur 1466*; e–h: *Couvreur 1311*; all QCA, WAG). — Photos by Thomas L.P. Couvreur.

Guatteria Ruiz & Pav.

The genus *Guatteria* (*Annonaceae*) is quite diverse in western Ecuador (west of the Andes) (Maas et al. 2015). The description of *Guatteria esperanzae* Couvreur, J.N.Zapata & Loor brings the total number of species described for the region to 14 (Table 1). Of these, five are endemic to Ecuador (Table 1). Most of these species (e.g., *G. cuatrecasasii* D.Sánchez, *G. narinensis* Maas & Westra, *G. venosa* Erkens & Maas), however, occur towards the north western part of Ecuador (Maas et al. 2015), around the high rainfall area of the Chocó (northern Esmeraldas and Carchi regions and border with Colombia). Another region of high species diversity for the genus is along the foothills of the Andes between 1000 and 2000 m, where several species occur such as *G. carchiana* Maas & Westra, *G. crassipes* R.E.Fr., *G. pichinchae* Maas & Westra, *G. pittieri* R.E.Fr. and *G. venosa*. During our prospections of the forest fragments in and around La Esperanza, we only encountered a single *Guatteria* species: *G. esperanzae*. In fact, to date there are only two species of *Guatteria* known to occur in Manabí (*G. microcarpa* Ruiz & Pav. and *G. esperanzae*), and apparently not in sympatry. However, both species are very different morphologically (see key). Finally, *G. esmeraldae* Maas & Westra is another lowland species from coastal Ecuador, but is only known to occur closer to the Pacific Ocean in the region of Esmeraldas, in remnant forests too.

TAXONOMIC TREATMENT

Lauraceae

Aniba ecuadorica Cornejo & Loor, *sp. nov*. — Fig. 1, 5, 6

Etymology. The name of the new species refers to the latitudinal distribution, which is about 30–40 km south from latitude zero equatorial line, and also to the country of Ecuador.

Aniba ecuadorica can be recognized by its subverticillate leaves, the blades narrowly oblanceolate to narrowly elliptic-oblanceolate, 30–60 by 6–10 cm, subcoriaceous, glabrous, secondary veins (12–)16–22 pairs, inflorescences pale-tomentellous with basal bracts 0.8–2 cm long, flowers 3–3.5 mm long, mouth of corolla c. 2 mm wide at anthesis, stamens with a protruding connective, style longer than ovary, glabrous, stigma unexpanded, obliquely cleft, pilose, and fruit ellipsoid-oblong to oblong, 3–3.7 by 1.6–2 cm. — Type: *X. Cornejo & A. Loor 9305* (holo GUAY), Ecuador, Manabí, reserva privada La Esperanza de Anelio Loor, 3 km after San Ramon Del Tigrillo, 15 km on Via Venado from El Carmen, wet forest, -79.59972W -0.3666667S, 250 m, 21 Febr. 2020 (fr).

Tree, up to 10 m tall and 15 cm dbh, subcylindric at base. *Terminal branches* subcylindrical, shortly tomentellous to abundantly short-pilose; lenticels narrowly-elliptic, up to 3 mm long, scattered. *Leaves* subverticillate, mature blades narrowly oblanceolate to narrowly elliptic-oblanceolate, 30–60 by 6–10 cm, subcoriaceous (fresh), thinly chartaceous (dry), green to dark-green above, opaque beneath (fresh); apex acuminate; base narrowly cuneate to attenuate; venation brochidodromous; secondary veins (12–)16–22 pairs, prominent below, sulcate above; tertiary veins reticulate, sometimes to scalariform or irregularly scalariform; glabrous on both sides; petioles 0.5–2 by 0.4–0.8 cm, slightly channelled to flattened adaxially. *Inflorescences* 3–12, subterminal, triangular to narrow panicles, at the base of new growth, those in the axils of bracts below the terminal bud 10–20 cm long, greenish white or whitish to yellowish tomentellous; bracts below terminal bud lanceolate, 0.8–2 cm long, densely short-sericeous adaxially. *Pedicels* 1.5–2 mm long. *Flowers* pyriform, 3–3.5 mm long, including the obconic tube of 1.2–1.7 mm long, mouth of corolla c. 2 mm wide at anthesis; tepals 6, erect, ovate, convex and densely strigulose throughout, minutely ciliate, the outer three 1–1.3 mm long, the inner three 0.8–1 mm long; stamens 9, 1–1.3 mm long, filaments somewhat thinner than anthers, 0.5–0.8 mm long, dorsally tomentellous, anthers 0.3–0.5 mm long, glabrous, flaps opening upwards and towards the connective, the latter protruding beyond the anther cells, first and second whorls with introrse-ventral locules, third whorl with lateral locules and two basal glands per stamen; staminodes not seen; ovary ellipsoid, 0.5–0.7 mm long, glabrous, style longer than ovary, 1.3–1.4 mm long, glabrous, stigma obliquely cleft, unexpanded, pilose. *Fruit* ellipsoid-oblong to oblong, 3–3.7 by 1.6–2 cm, smooth, dark-purple to opaque black at maturity (fresh), inserted at 1/2–1/3 of its basal length in the cupule; cupule red (fresh), 1.3–2 by 1.5–2.2 cm, with thick lenticels of warty appearance.

Distribution — *Aniba ecuadorica* is endemic to Ecuador and only known from the El Carmen canton in the Manabí region in the western part of the country (Fig. 1). The species has been collected to date from two isolated wet forest patches some 5 km apart. The species is documented to occur at around 250 m a.s.l.

Preliminary IUCN (2019) conservation assessment — The EOO of *Aniba ecuadorica* is estimated to be just 12 km^2 (less than the 100 km^2 upper limit for Critically Endangered status under the criterion B1) and its minimal AOO is estimated to be 12 km^2 (just above the upper limit for the Critically Endangered status (< 10 km^2) under the criterion B2). *Aniba ecuadorica* is endemic to the canton of El Carmen in the Manabí province, and has not been collected in a protected area. It does occur, however, in two privately owned forest patches less than 5 km apart (Fig. 1). The species is known from four specimens (collected in 2020 and 2021) representing one 'location' (sensu IUCN 2019), within the limit of the Critically Endangered status. As the wet forests of the province of Manabí are severely fragmented and under steady pressure by the expansion of agricultural and cattle farming frontiers we project a continuous decline of mature individuals. *Aniba ecuadorica* is therefore assigned a preliminary status of CR B1ab(i,ii,iii,iv,v).

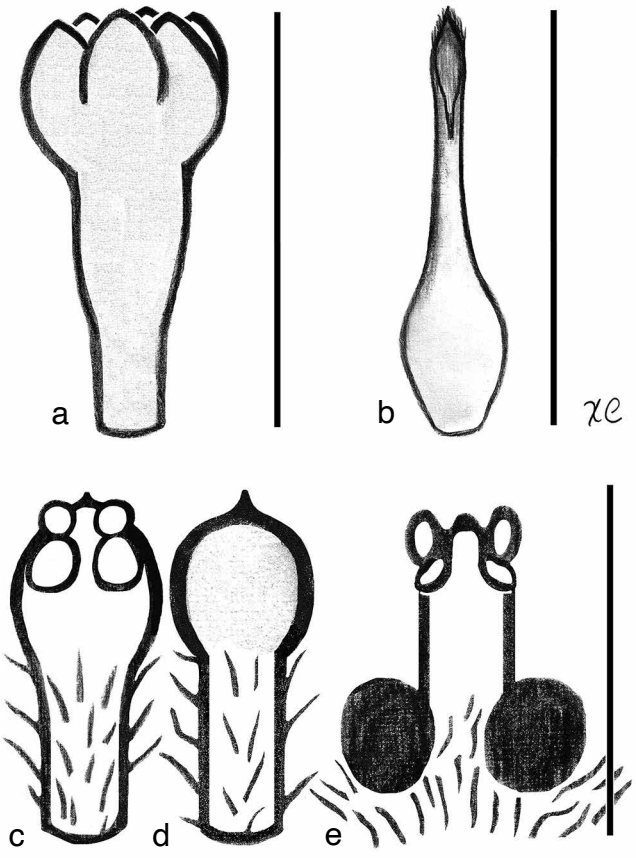

Fig. 5 *Aniba ecuadorica* Cornejo & Loor. a. Flower at anthesis; b. pistil; c. outer stamen, frontal view; d. outer stamen, dorsal view; e. third whorl stamen (from *Cornejo & Loor 9318*, GUAY). — Scale bars: a= 5 mm; b = 2 mm; c–e = 1 mm. — Drawings by Xavier Cornejo.

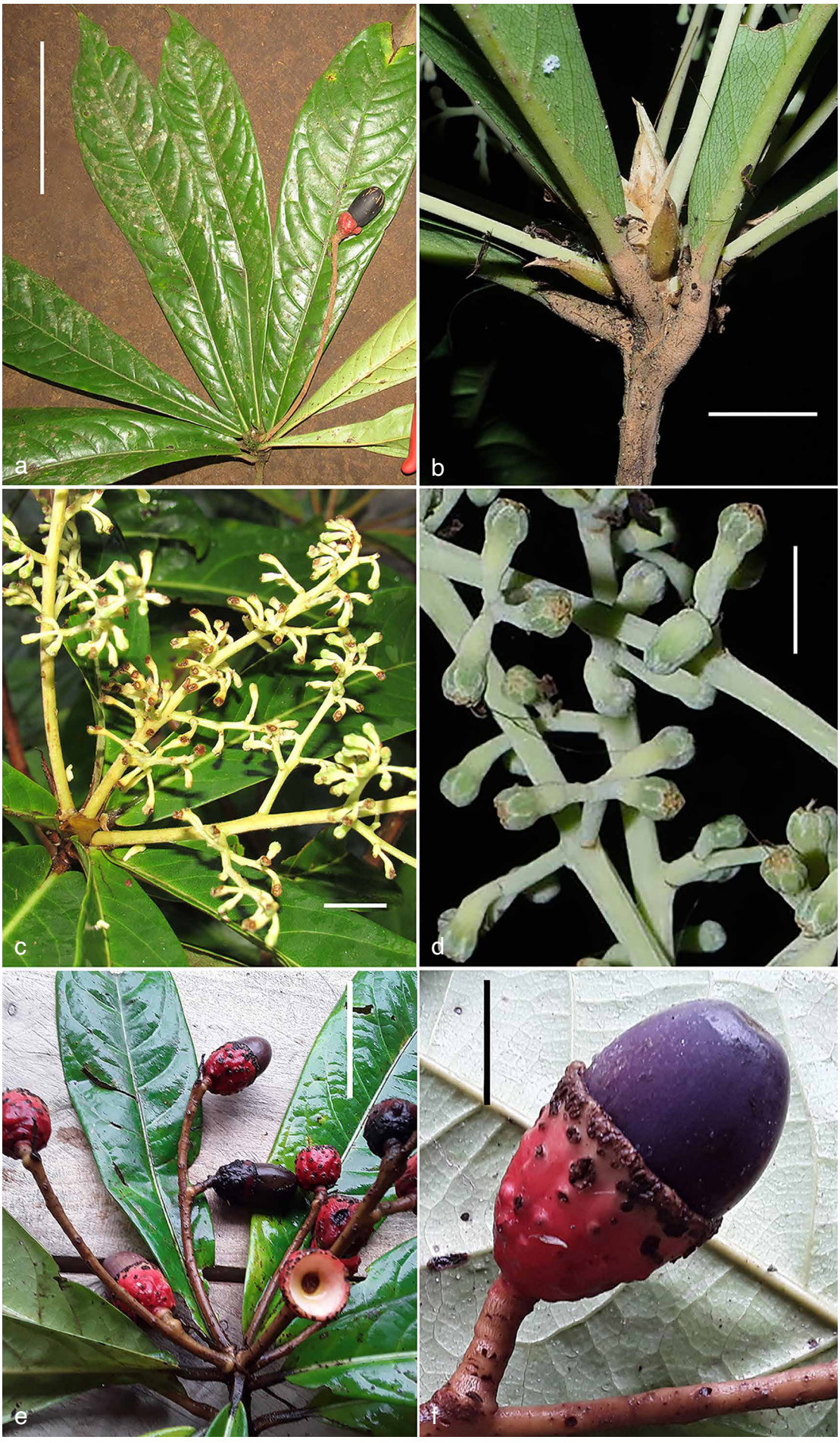

Fig. 6 *Aniba ecuadorica* Cornejo & Loor. a. Subterminal whorl of leaves and infructescence; b. lateral view of terminal branch bearing subverticillate leaves, bracts and inflorescences; c. subterminal inflorescences; d. partial view of rachis, secondary short branches and flowers; e. subterminal infructescence and leaves; f. fruit at maturity. — Scale bars: a = 10 cm; b, f = 2 cm; c = 1 cm; d = 5 mm; e = 5 cm. — Photos: a, c, e–f by Xavier Cornejo; b, d by Thomas L.P. Couvreur.

Phenology — Flowering: January, February and November; fruiting: January to March and September.

Paratypes. Ecuador, Manabí, Reserva privada La Esperanza de Anelio Loor, 3 km after San Ramon Del Tigrillo, 15 km on Via Venado from El Carmen, -0.3666667S, -79.59972W, 250 m, 21 Feb. 2020 (fl), *X. Cornejo & A. Loor 9318* (!-GUAY); Canton El Carmen, private forest fragment, c. 7 km after San Ramon Del Tigrillo, 22 km on Via Venado from El Carmen city, -0.409894S, -79.616256W, 207 m, 15 Sept. 2020 (fr), *T.L.P. Couvreur & A. Loor 127*4 (!-GUAY, QCA, WAG); Reserva privada La Esperanza de Anelio Loor, 3 km after San Ramon Del Tigrillo, 15 km on Via Venado from El Carmen, -0.37790S, -79.60837W, 218 m, 14 Nov. 2021 (fl), *T.L.P. Couvreur, A. Loor, A. Lozinguez 1522* (!-GUAY, P, QCA, WAG).

Notes — *Aniba ecuadorica* differs from *A. magnifica* from the wet forest of western Ecuador by the narrower inflorescences (vs broader, triangular panicles with more developed secondary and tertiary branches), flowers with outer tepals shorter (1–1.3 vs 1.9–2.1 mm long), and fruits with a red calyx at maturity (vs brown, see Palacios 2018, Fig. 5e). *Aniba ecuadorica* resembles *A. hostmanniana* (Nees) Mez from Venezuela and Guianas to the Amazonia of Peru and Brazil (Kubitzki & Renner 1982), but differs from the latter by the rusty tomentose branches, leaves subcordate, rounded or obtuse at the base, smaller flowers (3–3.5 vs 15–18 mm long) and larger fruits (3–3.7 vs 1.5–2.5 cm).

Annonaceae

We provide a tentative dichotomic key to the species of *Guatteria* found in western Ecuador (west of the Andes). We did not include *G. punctata* because this species is morphologically very variable with a large geographic distribution in its latest species concept, making it hard to key out (Maas et al. 2015). However, this species has the following characters that could be helpful for identification: leaves not verruculose and generally coriaceous; secondary veins impressed above; petiole without a revolute margin, flowering pedicels 10–35 mm long, densely to sparsely covered with appressed, semi-erect or erect hairs, the ellipsoid to subglobose monocarps stipitate being between 6–30 mm long. We include in the below key the species *G. scalarinervia* D.R.Simpson, which is a mainly Amazonian species but with a single known collection in western Ecuador (*Øllgaard 57277* (U!); Carchi, Maas et al. 2015). Identifications should be confirmed by checking Maas et al. (2015).

Key to the western Ecuadorian species of Guatteria (except for G. punctata)

1. Plants with cauliflorous inflorescences. — A mainly Amazonian species with a single known collection from Carchi . . . . . *G. scalarinervia*
1. Plants with ramiflorous inflorescences (never cauliflorous) 2
2. Leaves densely to sparely and uniformly verruculose on lower side (small lumps visible with a hand lens) 3
2. Leaves not verruculose all over on lower side (or only very sparsely so and then localized) 6
3. Young and older branches totally covered with erect to appressed 2–3 mm long brown to greyish hairs . . . . . *G. cuatrecasasii*
3. Young branches densely to sparsely covered with appressed 1 mm long hairs (but not totally covering the branches), old branches glabrous 4
4. Leaf blades 4–6 times longer than wide, margins not revolute, petioles 1–3 mm long; flowering pedicels thin (c. 1 mm diam) and 35–45 mm long. — Lowland rain forests . . . . . *G. narinensis*
4. Leaf blades less than 4 times longer than wide, margins revolute, petioles 8–25 mm long; flowering pedicels robust (c. 2 mm diam) and 10–35 mm long. — Premontane or montane forests 5
5. Secondary veins 25–35 per side. . . . . *G. venosa*
5. Secondary veins 14–20 per side. . . . . *G. crassipes*
6. Leaf bases obtuse or acute and petioles shorter than 6 mm 7
6. Leaf bases attenuate or long attenuate or if acute or obtuse then petioles longer than 6 mm 9
7. Leaves coriaceous; flowering pedicels 15–20 mm long; monocarps 14–16 mm long; 1450–2050 m altitude . . . . . *G. carchiana*
7. Leaves membraceous; flowering pedicels 20–55 mm long; monocarps 8–10 (but unknown in *G. brevipetiolata*); below 1000 m altitude 8
8. Secondary veins raised above . . . . . *G. brevipetiolata*
8. Secondary veins impressed above . . . . . *G. microcarpa*
9. Petioles 2–4 mm long, secondary veins 10–12 per side; outer petals 7–9 mm long. — In forests fragments near the coast in Esmeraldas . . . . . *G. esmeraldae*
9. Petioles longer than 4 mm, secondary veins more than 12 per side; outer petals longer than 9 mm. — Not near the coast in Esmeraldas 10
10. Leaf bases long attenuate, narrowed basal part of leaves longer than 15 mm . . . . . *G. pittieri*
10. Leaf bases acute, and, if attenuate, narrowed basal part of leaves generally shorter than 15 mm 11
11. Petioles 7–17 mm long; flowering pedicels 25–80 mm long . . . . . *G. pichinchae*
11. Petioles 4–8 mm long; flowering pedicels generally shorter than 25 mm 12
12. Young branches not zigzagging, leaves chartaceous, margins not revolute, secondary veins 16–19, basal margins of leaf blades not revolute. — In lowland rain forest, between 200–350 m . . . . . *G. esperanzae*
12. Young branches often zigzagging, leaves coriaceous, margins revolute, secondary veins 10–16, basal margins of leaf blades often revolute. — In montane forests between 980–3000 m . . . . . *G. goudotiana*

Guatteria esperanzae Couvreur, J.N.Zapata & Loor, *sp. nov.* — Fig. 1, 7, 8

Etymology. This species is named after the privately owned La Esperanza reserve near El Carmen where this species was first collected and the type locality (see Introduction).

Guatteria esperanzae resembles *G. darienensis* (known from the northern Chocó region of Colombia and Panama) by the shape of its leaves being narrowly elliptic with prominent secondary veins above, the generally single flower in the axis of foliate leaves and the size (9–11 by 4–6 mm in *G. esperanzae*) and shape (ellipsoid with an acute apex) of the monocarps. However, it differs by its much shorter pedicel (15–18 mm vs 30–75 mm long), the petals maturing red vs yellow in *G. darienensis*, and the stipes being shorter in *G. esperanzae* (6–9 mm vs 7–15 mm). — Type: *T.L.P. Couvreur & A. Loor 1271* (holo QCA (QCA244028); iso P, WAG (WAG.1973005, WAG.1973006, WAG.1973007)), Ecuador, Manabí, Reserva privada La Esperanza de Anelio Loor, 3 km after San Ramon Del Tigrillo, 15 km on Via Venado from El Carmen, lowland rain forest, -0.385365S -79.61967W, 14 Feb. 2020 (fl, fr).

Tree 4–9 m tall, 8–15 cm dbh, one primary stem and sometimes several secondary trunks emerging from the base, trunk grey; young twigs sparsely covered with appressed hairs soon becoming glabrous. *Petiole* 5–8 mm long, 3–5 mm diam, canaliculated but not winged, blackish when dry, glabrous; leaf lamina narrowly elliptic, 19–25 by 6.5–9 cm; 2.2–3.1 times longer than wide, chartaceous, shiny above, glabrous above, not ver-

Fig. 7 *Guatteria esperanzae* Couvreur, J.N.Zapata & Loor. a. Base of the trunk, note the several smaller stems arising from the base with a main larger one; b. lower side of leaf, showing prominent tertiary venation; c. upper side of leaf, showing bullate texture; d. a foliate branch; e. flower at anthesis, top view, showing red carpels; f. flower at anthesis, side view, showing red petals, g. flower, immature, bottom view, showing reflexed sepals; h. immature flower, top view and mature fruits in the background (a–c, g–h: *Couvreur 1271*; e–f: *Couvreur 1267*; all WAG). — Scale bars: b–c = 2 cm; e–h = 1 cm. — Photos by Thomas L.P. Couvreur.

Fig. 8 *Guatteria esperanzae* Couvreur, J.N.Zapata & Loor. a. Immature flower and mature fruits, showing black colour of monocarps and reddish stipes; b. fruit, side view; c. fruit on branch; d. fruit, near maturity, stipes starting to turn reddish; e. detail of mature monocarps, longitudinal section of a monocarp revealing the single seed (a, c–e: *Couvreur 1271*; b: *Couvreur 1417*; all QCA, WAG). — Scale bars: b–c = 1 cm; d = 2 cm; e = 0.5 cm. — Photos by Thomas L.P. Couvreur.

ruculose, bullate, sparsely covered with appressed hairs below, mainly along midrib; base acute or attenuate; apex acuminate, acumen 20–24 mm long, margins not revolute; primary vein impressed above, forming a small channel, distinct and raised below; secondary venation brochidodromous, 16–19 veins on either side of primary vein, looping 4–6 mm from margin; tertiary venation reticulate, raised and very prominent below. *Flowers* axillary, solitary on leafless branches or in the axils of leaves; bracts caducous, not seen; flowering pedicels 15–18 mm long, 1–2 mm diam, blackish, densely covered with appressed hairs, articulated; flower buds spherical, slightly flattened at top; sepals ovate-triangular, 4–5 by 5–7 mm, densely covered with appressed pale brown hairs on both sides, apical part of sepals recurved *in vivo*, green *in vivo*; outer and inner petals similar in size and shape, ovate, 11–21 by 9–14 mm, densely covered with appressed pale brown hairs outside, glabrous but with appressed pale brown hairs towards the apex inside, margins folded outwards *in vivo*, colour varying from green to yellow turning red when mature. *Stamens* 180–190, c. 2 mm long, connective shield papillate, orange *in vivo*. *Carpels* 30–35, c. 3 mm long, covered with erect, golden brown hairs; stigma umbonate, pubescent, red *in vivo* at maturity. *Monocarps* 16–30, ellipsoid, 9–11 by 4–6 mm, sparsely covered with appressed hairs to glabrous, apex acute, white to pinkish when immature turning red to black when mature; stipes 6–9 mm long, sparsely covered with appressed hairs, white *in vivo* when immature, turning light red *in vivo* when mature; seed 1 per monocarp, ellipsoid, 7–8 by 4–5 mm, rugose, reddish brown *in vivo*, black when dried.

Distribution — *Guatteria esperanzae* is endemic to Ecuador and only known from the El Carmen canton in the Manabí region (Fig. 1). To date it has been collected in several forest fragments around La Esperanza. One sterile collection (*T.L.P. Couvreur 1250*) from a forest patch in the Tinalandia Hosteria (Santo Domingo de los Tsáchilas) might also belong to this species based on the similarity of its leaves. More fertile material is needed to confirm its presence in Santo Domingo de los Tsáchilas region.

Habitat & Ecology — The species grows in lowland rain forests on *tierra firme* soils and documented to occur between 200 and 320 m a.s.l. Up to 15 mature individuals are documented from the La Esperanza reserve.

Preliminary IUCN conservation assessment — The EOO of *Guatteria esperanzae* is estimated to be 27 km^2 (much smaller than the 5000 km^2 upper limit for Endangered status under the criterion B1) and its minimal AOO is estimated to be 20 km^2 (much smaller than the 500 km^2 upper limit for Endangered status under the criterion B2). *Guatteria esperanzae* is, to date, endemic to the canton of El Carmen in the Manabí province, and has not been collected in a protected area. It does occur, however, in several privately owned forest patches less than 15 km apart (Fig. 1). The species is known from seven specimens (collected between 2018 and 2021) representing one subpopulation and five 'locations' (sensu IUCN 2019, see Materials and Methods), within the limit of the Endangered status. Moreover, in La Esperanza reserve around 15 individuals have been located and are tracked for phenological studies (Anelio Loor, pers. obs.). As the wet forests of the province of Manabí are severely fragmented and under steady pressure by the expansion of agricultural and cattle farming frontiers we project a continuous decline of mature individuals, locations and EOO or AOO. *Guatteria esperanzae* is therefore assigned a preliminary status of EN B1ab(i,ii,iii,iv,v).

Phenology — Flowering: February, September and December; fruiting: June, September and December.

Paratypes. Ecuador, Manabí, Reserva privada La Esperanza, 3 km after San Ramon Del Tigrillo, 15 km on Via Venado from El Carmen, -0.374621S -79.604718W, 205 m, 15 July 2018 (st), *T.L.P. Couvreur, A. Loor, R.J. Montúfar & S.P. Escobar 1189* (!-P, QCA, WAG); Reserva privada La Esperanza, 3 km after San Ramon Del Tigrillo, 15 km on Via Venado from El Carmen, -0.374621S -79.604718W, 205 m, 19 Feb. 2020 (fl), *T.L.P. Couvreur & A. Loor 1267* (!-GUAY, P, QCA, WAG); private forest fragment, c. 7 km after San Ramon Del Tigrillo, 22 km on Via Venado from El Carmen city, -0.411619S -79.616165W, 209 m, 15 Sept. 2020 (fr), *T.L.P. Couvreur & A. Loor 1275* (!-P, QCA, WAG); 2 km south of El Mono (N38 road), -0.38308S -79.70758W, 317 m, 8 June 2021 (st), *T.L.P. Couvreur, A. Loor & N. Zapata 1400* (!-P, QCA, WAG); some 5 km southeast of El Mono village (N38 road), -0.37745S -79.66074W, 215 m, 9 June 2021 (fr), *T.L.P. Couvreur, A. Loor & N. Zapata 1417* (!-P, QCA, WAG); Reserva privada of Don Horacia, c. 12 km after San Ramon Del Tigrillo, c. 25 km on Via Venado from El Carmen, -0.406767S -79.650801W, 300 m, 29 Dec. 2021 (fl.), *T.L.P. Couvreur, A. Loor & L.J.V. Couvreur 1523* (!-QCA, WAG).

Notes — *Guatteria esperanzae* is distinguished from the other species in the region (see key too) by its large (> 19 cm long) membraceous leaves, with a distinct acumen (> 2 cm long), bullate above with a prominent secondary and tertiary venation below, its flowers with a medium sized pedicel (15–18 mm long), deep red petals at maturity, and it fruits with numerous monocarps that are red turning black at maturity. The red petals at maturity have rarely been reported for *Guatteria* (Maas et al. 2015, P. Maas pers. comm.).

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