# *Ecclinusa nervosa* (Sapotaceae, Chrysophylloideae), a New Species Discovered in Central Amazonia

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## Communicating Editor: Shawn Krosnick

Abstract—A new tree species of *Ecclinusa* (Sapotaceae, Chrysophylloideae) from Central Amazonia is described and illustrated. It occurs in non-flooded upland forests (*terra-firme*) in the municipalities of Manaus, Presidente Figueiredo, and Rio Preto da Eva in Amazonas state, Brazil. *Ecclinusa nervosa* sp. nov. resembles *E. ulei*, *E. parviflora*, and the sympatric *E. guianensis*, as these species share overall similar foliage at first sight. However, it differs by the combination of the presence of intersecondary veins (vs. absent in all congeners, except in *E. lancifolia*) and flowers with a sparse tomentulose indumentum inside the sepals (vs. glabrous inside in all congeners, except in *E. ramiflora* and *E. psilo*-*phylla*) and shorter styles ( $\leq 0.7$  mm long vs. > 0.7 mm long in the morphologically similar taxa). We compare the new species with similar taxa through diagnostic morphological features, geometric morphometrics, and infrared spectral analyses of dried leaves. Additionally, we provide information on habitat, distribution, phenology, and a preliminary conservation assessment. An identification key for *Ecclinusa* species from the Brazilian Amazonia is also presented.

Keywords—Amazonian tree flora, integrative taxonomy, leaf spectroscopy, outline analysis, terra-firme forests.

The Neotropical genus *Ecclinusa* Mart. (Sapotaceae Juss., Chrysophylloideae Luerss.) currently comprises twelve accepted species of shrubs, sub-canopy treelets, and large canopy trees (Pennington 1990; Swenson and Anderberg 2005; Terra-Araujo et al. 2015). It occurs in dry and wet tropical forests from Central America (Panama) to most of South America (Pennington 1990; C. C. Vasconcelos et al. in mss.). According to previous molecular studies, the genus has been recovered as monophyletic (Swenson and Anderberg 2005; Swenson et al. 2008, 2023; Faria et al. 2017) and is currently positioned in a significant lineage in the Chrysophylloideae subfamily that also encompasses *Elaeoluma* Baill., *Nemaluma* Baill., and *Ragala* Pierre (Swenson et al. 2023).

*Ecclinusa* was established by Martius (1839) and has been accepted by almost all taxonomists, except Baehni (1965), who reduced it to a synonym of *Chrysophyllum* L. However, the presence of stipules is an unusual feature across species of Neotropical Chrysophylloideae, distinguishing *Ecclinusa* and *Chromolucuma* Ducke from other related genera (Faria et al. 2017; Swenson et al. 2023). Although stipules may sometimes be caducous, they typically leave conspicuous scars on the two sides of the petiole. Additional consistent morphological characters for *Ecclinusa* against *Chromolucuma* are white latex, sessile flowers, and the absence of staminodes (vs. yellow latex, pedicellate flowers, and the presence of staminodes) (Pennington 1990; Alves-Araújo and Alves 2012b; Terra-Araujo et al. 2015; Faria et al. 2017; Vasconcelos et al. 2021).

At least six species of *Ecclinusa* have been reported in Brazil, all of which are found in the Amazonian ecoregion, a major center of diversity for Sapotaceae (Pennington 1990, 1991, 2006; BFG 2015; Terra-Araujo et al. 2015; C. C. Vasconcelos et al. in mss.). The most widespread species in Brazil, *Ecclinusa ramiflora* Mart., is distributed from Amazonia to the Atlantic Forest biomes (Pennington 1990; C. C. Vasconcelos et al. in mss.). Central Amazonia is recognized as a center of high tree species richness and an overlapping area for several biogeographic regions (Oliveira and Daly 1999; ter Steege et al. 2023; Householder et al. 2024; Luize et al. 2024). In this region, *Ecclinusa* species grow in different ecosystems (sensu Junk et al. 2011), including dense non-flooded upland forests (known as *terra-firme*), white-sand forests (*campina* or *campinarana*), as well as in both black- or clear-water (*igapó*) and white-water (*várzea*) floodplain forests (Pennington 1990, 2006; Terra-Araujo et al. 2015).

The last comprehensive taxonomic revision of *Ecclinusa* was conducted by Pennington (1990), who recognized almost all currently known species and identified several taxonomic challenges related to poorly sampled species and insufficiently understood morphological variation. However, in the last three decades, many collections of South American Sapotaceae have been included in herbarium collections, providing a more comprehensive understanding of the geographic range and morphological variability within existing species. Overall, since Pennington (1990, 2006), new species of Sapotaceae have been described from Brazil in the last decade, especially from Central Amazonian forests (Terra-Araujo et al. 2012, 2015; Vasconcelos et al. 2020, 2021; Lima et al. 2024) and the Atlantic Forest (Alves-Araújo and Alves 2011, 2012a,

2012b; Terra-Araujo et al. 2013; Popovkin et al. 2016; Alves-Araújo 2020; Alves-Araújo and Mônico 2017; Sossai et al. 2017; Lima et al. 2021).

This study was conducted as part of a taxonomic treatment of South American *Ecclinusa* (Vasconcelos et al. in mss.). In 2016, during a field expedition in the municipality of Presidente Figueiredo (Amazonas state), we collected a flowering tree of *Ecclinusa* that differed from any known congeners. The plant matched earlier some collections from the same locality and vicinities archived in the Projeto Dinâmica Biológica de Fragmentos Florestais (PDBFF hereafter) and Programa de Pesquisa em Biodiversidade (PPBio hereafter) reference collections. After a careful inspection, these specimens were identified as representatives of a distinct and undescribed taxon, which was also corroborated by leaf geometric morphometrics and infrared spectral analyses. Hence, we describe and illustrate *Ecclinusa nervosa* C.C.Vasconc. & Terra-Araujo as a new species.

#### MATERIALS AND METHODS

*Species Concept*—Our concept of a species corresponds to a metapopulation lineage that evolves independently (De Queiroz 2007). In this way, any property that provides evidence for lineage separation can be used to infer species limits, but none of them is individually necessary. Here, we considered diagnosable morphology, infrared spectral differences, and geographic distribution as lines of evidence.

*Species Description*—Unless otherwise indicated, the measurements and descriptions are based on dried collections. Flowers (n = 15) from the type collection were dissected and measured with a stereomicroscope (Leica<sup>®</sup> model S8APO, with a DFC295 camera coupled). The general plant descriptive terminology follows Hickey and King (2000), Harris and Harris (2001), and Ellis et al. (2009). Characters used in the identification key are from our data and previously published studies (Pennington 1990, 2006; Terra-Araujo et al. 2015). The illustrations are based on specimens and photographs taken in the field and laboratory. All type specimens of *Ecclinusa* spp. in different herbaria (acronyms according to Thiers 2024) were consulted from images (viz. COL, G, K, M, MO, NY, RB, and U) on JSTOR Global Plants (https://plants.jstor.org/) and the REFLORA Virtual Herbarium (https://floradobrasil.jbrj.gov.br/reflora/herbarioVirtual/) or while visiting INPA.

Distribution and Conservation Assessment—Georeferenced specimen data were used to prepare the distribution map using QGIS (v3.28.1; QGIS Development Team 2022) and as input to calculate the extent of occurrence (EOO), area of occupancy (AOO; 2 km grid), number of locations (10 km grid), and number of subpopulations (5 km radius). We used these parameters to assess the preliminary conservation status of the new species, following the IUCN Red List categories and criteria (IUCN 2012, 2024).

Geometric Morphometrics and Spectra Acquisition—The dataset includes a total of 62 core specimens (fertile and sterile) comprising Ecclinusa nervosa and five morphologically related congeners: Ecclinusa guianensis Eyma, including two informal morphotypes in Central Amazonia sensu Ribeiro et al. (1999) named as E. guianensis FormaA and E. guianensis FormaB (coded here as GUIA and GUIB, respectively); Ecclinusa parviflora T.D. Penn. (PARV); Ecclinusa psilophylla Sandwith (PSIL); Ecclinusa ramiflora Mart. (RAMI); and Ecclinusa ulei (K.Krause) Gilly ex Cronquist (ULEI). This set of physical specimens was based on representative collections borrowed from the INPA, IAN, RB, and MO herbaria (Thiers 2024), as well as local reference collections from Central Amazonia (PDBFF and PPBio), and collections from fieldwork expeditions (see Table S1).

Geometric morphometrics approaches directly capture geometry, which can be separated into size and shape (Quitzau et al. 2022). For this, we digitized all specimens at high resolution to extract at least two complete leaves per specimen. In cases where leaves were overlapping or damaged, we post-processed the images. We then applied the Fourierbased outline analysis (leaf contour) to describe the coordinates of points along the outline of the leaves using mathematical functions, ensuring objectivity in describing their morphology (Adams et al. 2004).

The spectroscopy approaches capture the spectral response of the leaf tissue in terms of internal chemical composition and anatomical structure (Asner and Martin 2008; Feret and Asner 2013), detecting with high accuracy any molecule in which the principal chemical bonds are CH, OH, NH, SH, or C=O (Pasquini 2003). Despite among-lineage heterogeneity, leaf spectra can retain a detectable phylogenetic signal, capturing the phylogenetic history of seed plants and the evolutionary dynamics of leaf chemistry and structure (Meireles et al. 2020). The spectral data were collected using an ASD® FieldSpec® 4 portable high-resolution spectroradiometer (ASD Inc., Boulder, Colorado, USA). Each spectrum has 2151 reflectance values spanning the 350-2500 nm wavelength region. The spectral resolution was 3 nm for the VIS (visible light, 350-700 nm) and NIR (near-infrared, 700-1000 nm) regions and 8 nm for the SWIR region (short-wave infrared, 1000-2500 nm). Before each measurement session, a reference baseline was established by placing the ASD® contact probe over a white Spectralon® plate. To assure the quality of the data, we consider the average spectrum of six readings for each specimen (Durgante et al. 2013), consisting of three readings on each of the adaxial and abaxial leaf surfaces of at least three different leaves. A black body of ethylene vinyl acetate (rubber material) was used in the reading area of the samples to avoid light scattering.

Data Processing and Analysis-The raw spectra were processed by removing scans with reflectance values exceeding 1.0 (Stasinski et al. 2021). We combined the leaf geometric morphometrics and spectral variables in a unique dataset and scaled them to have unit variance. We tested the species identity using Discriminant Analysis of Principal Components (DAPC), a multivariate analysis that transforms variables by PCA before performing Discriminant Analysis (DA). This method ensures that variables are uncorrelated, making it a suitable methodological approach for phenotypic data (e.g., morphometrics and spectral data), which typically present high correlation (Jombart et al. 2010). We used 85% of the combined data to classify species as a training set to build a predictive model. We used all combined data for the testing set. Posterior probabilities of group membership resulting from the DAPC model were used to assess species hypotheses. The overall accuracy of the DAPC model was defined as the ratio of correctly predicted samples to the total number of samples. Correct and incorrect predictions were summarized in a confusion matrix.

All analyses were conducted using the open-source statistical software R (v4.2.2; R Core Team 2022), employing a custom R script alongside addon packages such as 'ConR' for conservation assessment; 'EBImage' and 'Momocs' for outline analysis (leaf contour), 'asdreader' and 'dplyr' for data wrangling; 'factoextra', 'adegenet', and 'caret' for multivariate analyses; and 'ggplot2', 'ggConvexHull', 'gridExtra', and 'NIRtools' for data visualization (see Table S2).

## TAXONOMIC TREATMENT

Ecclinusa nervosa C.C. Vasconc. & Terra-Araujo, sp. nov. TYPE: BRAZIL. Amazonas: Mun. Presidente Figueiredo, AM-240 highway, Balbina village, Sussuarana trail, a few meters from the central trail, on a slope of "terra-firme" forest on clayish soil, 01°54′23.70′S, 59°24′41.70′W, 146 m, 22 Oct 2016 (fl.), M.H. Terra-Araujo 1325B (holotype: INPA barcode INPA0203794; isotypes: EAFM, HUAM, IAN, MG, MO, RB, VIES).

At first sight, the foliage of *E. nervosa* resembles that of *E. guianensis*, *E. parviflora*, and *E. ulei*, which all usually share coriaceous, broadly elliptic or obovate leaves (vs. lanceolate or oblanceolate). The new species can be morphologically distinguished by the presence of intersecondary veins (absent in all congeners, except in *E. lancifolia*) and flowers with a sparse tomentulose indumentum inside the sepals (vs. glabrous inside in all other congeners, except in *E. ramiflora* and *E. psilophylla*) and style  $\leq 0.7$  mm long (vs. > 0.7 mm long in the morphologically related species).

*Description*—Medium-sized **trees** up to 18 m tall; trunk 25 cm in diameter at breast height (dbh), cylindrical, unbuttressed; bark blackish brown and slightly rough, slash pale yellowish with copious white latex; young twigs goldenbrown tomentulose, eventually glabrous, rugulose, without lenticels, turning pale gravish with age. Stipules 4.6-8.0 mm long, lanceolate, golden-brown tomentulose on inner surface, adjacent on the two sides of the petiole. Leaves entire alternate, spaced, coriaceous, discolorous, obovate to elliptic,  $8.5-17.8 \times 4.9-8.4$  cm; base cuneate to rounded, apex usually acuminate, rounded or emarginate, rarely acute, margin revolute, adaxial surface glabrous, abaxial surface golden-brown tomentulose on midrib and veins, sparser on the blade; venation mixed eucampto-brochidodromous, sometimes with a marginal vein, midrib sunken on the adaxial surface; secondary veins in 10–16 pairs, slightly arcuate; intersecondary veins present, short; tertiary veins oblique, conspicuous, numerous; higher order veins often forming a visible reticulum. Petiole 0.8–1.9 cm long, slightly channeled, appressed golden-brown tomentulose. Fascicles 2-5-flowered, axillary, and ramiflorous. Flowers sessile, 5-merous, ♀ unisexual, plant probably dioecious; 3 not seen. Sepals quincuncial, 2.9–3.9 mm long, ovate or suborbicular, apex acute to obtuse, appressed tomentulose outside, sparse tomentulose at the apex inside, often with a glabrous margin. Corolla cup-shaped, greenishyellow in vivo, 4.2-6.0 mm long, tube 1.8-3.8 mm long, lobes, 1.2-2.9 mm long, ovate, apex acute, glabrous, not papillate. Staminodes absent. Ovary broadly globose, ca. 2.0 mm long, densely strigose, style 0.2-0.7 mm long, glabrous; style head simple or minutely 5-lobed, glabrous. Fruit ca. 2.0 cm, globose, with remnant trichomes (based on Brito et al. 47). Seed solitary (based on Brito et al. 47), but not described here because of the limited material. Figures 1, 2.

Distribution and Habitat-So far as we know, Ecclinusa nervosa occurs only in the municipalities of Manaus, Presidente Figueiredo, and Rio Preto da Eva in Amazonas state, Central Amazonia, Brazil (Fig. 3). The type specimen was discovered in the Sussuarana trail, which is part of a touristic complex of waterfalls in Presidente Figueiredo. The vegetation along the trail (ca. 4.5 km) changes from terra-firme forest (Fig. 2A) on yellow clay soil at higher elevations (120 m) to formations of campinarana (Fig. 2B) on white-sand soil at lower elevations (70 m), leading to Sussuarana waterfall (Sobreira 2018). This area is accessible through Balbina village, located near the Balbina Dam in the Uatumã River Basin. Moreover, it has been recorded in two protected areas in Rio Preto da Eva (some permanent plots in the PDBFF) and Manaus (the PPBio grid at Reserva Ducke), in terra-firme forests at 50-150 m elevation. The region's topography consists mainly of flat, clay-rich plateaus dissected by numerous streams and river gullies (Bohlman et al. 2008).

*Etymology*—The specific epithet refers to the conspicuous intersecondary and tertiary veins on the abaxial surfaces of the leaf blades. It derives from the Latin word nervus, which means rope or tendon.

**Phenology**—The sexual system of *Ecclinusa* is thought to consist of unisexual or bisexual flowers (Pennington 1990; Terra-Araujo et al. 2015). Unisexual female flowers of *E. nervosa* were recorded in September and October and fruits in November, which is the end of the dry season in this region. To date, male or bisexual flowers are unknown. Nevertheless, we suspect the species to be dioecious.

**Preliminary Conservation Status**—The new species has an EOO of 3279  $\text{km}^2$  and an AOO of 24  $\text{km}^2$  and is known from only four locations (grid res. 10 km) in Amazonas state. These represent four subpopulations and three within protected areas (PDBFF and Reserva Ducke). This species is restricted to a small area, but the subpopulations are reasonably protected from deforestation. Therefore, declines in the EOO, AOO, habitat extent and quality, number of subpopulations, and number of mature individuals are not expected to be potential threats in the future. Thus, we assign *E. nervosa* a preliminary status of Least Concern (LC) according to IUCN.

Taxonomic Comments and Species Discrimination Using Geometric Morphometrics and Infrared Spectroscopy of Leaves—Specimens of Ecclinusa nervosa from the PDBFF and Reserva Ducke were previously misidentified as *E. guianensis* due to the similarity in foliage observed in sterile material. However, E. nervosa is easily distinguished from E. guianensis by a combination of features: the presence of intersecondary veins (vs. absence of intersecondary veins), conspicuous tertiary veins (vs. inconspicuous) (see Fig. 1A, C), fewer secondary veins (up to 16 pairs vs. up to 30 pairs), sparse indumentum on the abaxial leaf surface (vs. glabrous both surfaces), twigs without lenticels (vs. lenticellate), and tree bark blackish brown without conchoidal scars (see Fig. 2C) (vs. reddish to gravish brown with conchoidal scars; see Carvalho et al. 2024, Fig. 1B). These two species occur sympatrically and syntopically (same habitat and location) in Central Amazonia. In contrast, the other morphologically related species are known from northeastern Pan-Amazonia (mainly Venezuela) and occur on mountain slopes at 1400–2200 m (E. ulei) or in low forests on granitic rocks at 80 m (E. parviflora) (Pennington 1990). Some morphological differences between E. nervosa and these three morphologically related species are summarized in Table 1.

It is worth mentioning that *Ecclinusa guianensis* is considered a morphologically variable species in terms of overall foliage (Pennington 1990), with distinct morphotypes recognized throughout its distribution range. In Central Amazonia, our understanding of this variation is improving, as some of the previously recognized morphotypes (e.g., Ribeiro et al. 1999; Carvalho 2017) have been confirmed as new species (this study and Vasconcelos et al. in mss.) or as the result of phenotypic plasticity (Carvalho et al. 2024). This evidence is supported by morphological characters of both vegetative and reproductive structures, and infrared spectral, ecological, and geographic data (Carvalho et al. 2024; Vasconcelos et al. in mss.).

The results of the multivariate analysis combining the leaf geometric morphometrics and infrared spectral datasets are shown in Figs. 4, 5, and Supplemental Figs. S1-S3. The first PC axis captured 75.9% and the second PC axis 9.5% of total variation in the combined dataset (Fig. S1). The DAPC model achieved an overall accuracy of 98.39% (95% CI = 91.34-99.96%) in assigning specimens to morphologically defined species (Fig. S2). All core specimens of E. nervosa were correctly predicted as such (Fig. 4), supporting our hypothesis of it being a new taxon. Previous studies have successfully used laboratory- or field-based spectroscopy approaches to identify closely related species, often surpassing the accuracy typically achieved by DNA barcoding in tropical plant lineages (Draper et al. 2020). These methods have been effective using both dried leaves (e.g., Durgante et al. 2013; Lang et al. 2017; Vasconcelos et al. 2021) and bark spectra of standing trees (Hadlich et al. 2018), as well as by integrating geometric morphometrics and spectra of dried leaves (Gaem et al. 2022).

In the DAPC ordination derived from geometric morphometrics and infrared spectral data, we observed minimal



Fig. 1. *Ecclinusa nervosa*. A. Flowering branch. B. Close-up of twig apex showing stipules (arrows). C. Leaf showing the short intersecondary and oblique tertiary veins (abaxial surface). D. Close-up of reticulate high-order veins (abaxial surface). E. Flower (side view). F. Open corolla of the female flower (non-staminate). G. Sepal from the outside. H. Sepal from the inside. I. Gynoecium. J. Ovary (cross section). A–J from the holotype, *Terra-Araujo* 1325B. (Drawings: A–B and D–J by M. Del Rei; C by C. C. Vasconcelos).



FIG. 2. A–B. Forest types on the Sussuarana trail, Presidente Figueiredo, type locality of *Ecclinusa nervosa*. C. Bark slash showing the white latex. D. Flowers. E. Flowering branch showing leaf arrangement and inflorescences. F. Close-up of twig apex showing lateral stipules (black arrows). G. Adaxial and abaxial leaf surface and shape variations of the leaf apex and base. H. Close-up of trichomes on midrib. C–H from holotype, *M. H. Terra-Araujo* 1325B. (Photos: A by J. V. Caranha; B by G. P. Calvi; C–E by M. H. Terra-Araujo; F–H by C. C. Vasconcelos).

10 cm

2 cm



FIG. 3. Distribution of *Ecclinusa nervosa* (marked by red circles) in some permanent plots of PDBFF (Dimona and Florestal sites) and PPBio (within Reserva Ducke), and Balbina village (Sussuarana trail) along of 100 km north of Manaus region, central Amazonia. Credit: C. C. Vasconcelos.

Character

Indumentum on abaxial leaf surface

Intersecondary veins Sepals (inner surface)

Gynoecium

Ovary broadly ovoid

or pulvinate; style

1.0-1.5 mm long

gical features of Ecclinusa nervosa and its most similar taxa (E. ulei, E. parviflora, and E. guianensis).						
E. nervosa	E. ulei	E. parviflora	E. guianensis			
Golden-brown tomentulose on midrib and veins, sparser on the blade	Tomentose with very short crisped ferruginous trichomes on the blade (very contrasting color)	Shortly crisped brown pubescent on midrib and veins, sparser on the blade	Glabrous			
Present	Absent	Absent	Absent			
Sparsely tomentulose at	Glabrous	Glabrous	Glabrous			

TABLE 1. Distinctive morpholo

overlap only between core specimens of E. nervosa, E. guianensis FormaA (sensu Ribeiro et al. 1999), and E. psilophylla (Figs. 5, S3). Ecclinusa ulei is the most distinct from the other species compared here, probably because it has a ferruginous indumentum on the abaxial leaf surface that strongly contrasts with the adaxial surface (vs. glabrous or glabrescent abaxial surface), which is further captured by the spectral signal of the leaves.

the apex

Ovary broadly globose;

style 0.2–0.7 mm long

Unlike the morphologically similar species compared in Table 1, E. nervosa has a sparse tomentulose indumentum inside the sepals (Fig. 1H), which helps distinguish it from congeners. This floral feature was previously described only for E. ramiflora and E. psilophylla (Pennington 1990). The former species is widespread and morphologically variable but easily distinguished from E. nervosa (see the identification key), while the latter is a white-sand specialist endemic to Guyana and Suriname (Pennington 1990; ter Steege et al. 2000). We have also included core specimens of these two

species in our analysis to ensure robust results in the species discrimination.

Ovary broadly ovoid; style

ca. 1.0 mm long

Description of Ecclinusa nervosa increases the number of known species of the genus to thirteen in the Neotropics. However, most species need to be better known, reinforcing the importance of continuous botanical surveys, especially in the Amazonian region, to provide sound data for taxonomic and systematic studies.

Paratypes-Brazil. - AMAZONAS: Mun. Manaus. Rodovia AM-10, Manaus-Itacoatiara, km 26, Reserva Florestal Ducke, Tinga, floresta de vertente, 2°57'42.1"S, 59°55'50.5"W, 91 m, 25 Nov 1997 (fr.), J. M. Brito et al. 47 (IAN!, INPA!, S). Rodovia BR-174, Manaus-Presidente Figueiredo, km 72, PDBFF, leste da Estrada ZF-3, Fazenda Dimona, Sítio amostral Dimona, Reserva 2206, Parcela 2206-3, Quadrante 66, 2°20'10.0"S, 60°06'49.1"W, 96.5 m, 14 Oct 1982 (fl. bud), R.B. B. Magalhães 2206-1736 (INPA). Mun. Rio Preto da Eva. Rodovia BR-174, Manaus-Presidente Figueiredo, km 64, PDBFF, Estrada ZF-3, Fazenda Esteio, Sítio amostral Florestal, Reserva 1301, Parcela 1301-7, Quadrante 159, 2°23'18.7"S, 59°51'09.5"W, 108.7 m, 25 Sep 1986 (fl.), N. I. Ahmad-Junior 1301-3997 (INPA).



FIG. 4. Confusion matrix of inferred (rows) vs. expected (columns) species using Discriminant Analysis of Principal Components (DAPC) model to discriminate Ecclinusa nervosa from its similar congeners (E. guianensis FormaA and FormaB, E. parviflora, E. psilophylla, E. ramiflora, and E. ulei).



FIG. 5. Discriminant Analysis of Principal Components (DAPC) scatter plot of leaf geometric morphometrics and spectral dataset for Ecclinusa nervosa and its similar congeners (E. guianensis FormaA and FormaB, E. parviflora, E. psilophylla, E. ramiflora, and E. ulei).

Ovary broadly globose;

style 0.7-1.0 mm long

## SYSTEMATIC BOTANY

### KEY TO THE ECCLINUSA (SAPOTACEAE) FROM THE BRAZILIAN AMAZONIA

This key is based on vegetative characters also to facilitate the identification of sterile specimens.

l.	Sh	rubs up to 7 m tall (already flowering when 2 m tall)2
	2.	Petioles 1.0–1.5 cm long; secondary veins of 11–14 pairs, arcuate near the margin; tertiary veins oblique or laxly
		reticulate Ecclinusa campinae
	2.	Petioles 0.6–1.0 cm long; secondary veins of 25–40 pairs, straight; tertiary veins admedial, becoming laxly reticulate only
		near the margin
l.	Me	edium to large-sized trees between 10–35 m tall (flowering when they reach more than 10 m tall)
	3.	Leaf blade completely glabrous on both surfaces Ecclinusa guianensis
	3.	Leaf blade glabrous on adaxial surface and with visible indumentum on abaxial surface
		4. Stipules 0.4–0.8 cm long; leaves obovate or elliptic; intersecondary veins present Ecclinusa nervosa
		4. Stipules (0.6–)0.8–3.7 cm long; leaves predominantly oblanceolate; intersecondary veins absent
		5. Abaxial leaf surface with sparse indumentum restricted to midrib
		5. Abaxial leaf surface with dense indumentum covering the blade, midrib, and veins
		6. Leaves strongly bullate
		6. Leaves not bullate

#### ACKNOWLEDGMENTS

This paper is part of the doctoral thesis of the first author at the Programa de Pós-Graduação em Botânica (PPGBOT) of the Instituto Nacional de Pesquisas da Amazônia (INPA). The research was funded by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES, finance code 001), Fundação de Amparo à Pesquisa do Estado do Amazonas (FAPEAM), American Society of Plant Taxonomists (ASPT), International Association for Plant Taxonomy (IAPT), Thomas Lovejoy Fieldwork Supporting Program (PDBFF), Amazon Tall Tower Observatory (ATTO), German Federal Ministry of Education and Research (BMBF; process numbers 01LK1602F and 01LK2101D), Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq; Call 01/2022, process number 440166/2022-5), Universal FAPEAM (Call 006/2019), and Programa Mulher Faz Ciência (Call 006/2024, SpectraPop project). CCV received a doctoral scholarship from the CNPq (process number 142214/2018-3). We are grateful to the curators and staff of the IAN, INPA, MO, and RB herbaria, as well as the teams of the Projeto Dinâmica Biológica de Fragmentos Florestais (PDBFF) and the Centro de Estudos Integrados da Biodiversidade Amazônica (CENBAM) - Programa de Pesquisa em Biodiversidade (PPBio), for loans of collections, especially Michael Hopkins, Ana Andrade, Alberto Vicentini, and Flávia Costa. We sincerely thank Kaio da Cunha and Jaqueline Gomes for the overall support; Michella Del Rei for drawing the line art; and Jairo Caranha and Geângelo Calvi for permission to use their images. The first author also thanks the Seed Lab team at INPA for all the support provided. We are grateful to Editor-in-Chief Daniel Potter, Associate Editor Shawn Krosnick, and three anonymous reviewers for their careful reading of our manuscript and their many insightful comments and suggestions. This is contribution number 882 of the PDBFF Technical Series.

### AUTHOR CONTRIBUTIONS

CCV wrote, analyzed, and organized all parts of this manuscript. MHTA, IDKF, and JLCC supervised the first author throughout the process. MHTA collected the specimens of the new species, obtained the field images, and provided taxonomic expertise on *Ecclinusa*. FMD, FW, JS, and MTFP secured funds to acquire the spectral device. All co-authors contributed to the discussions, critically reviewed the manuscript, provided feedback, and approved the final version.

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TABLE S1. List of specimens used in the multivariate analysis. Herbarium acronyms follow Thiers (2024). Specimens also include reference collections from permanent plots of PPBio (Programa de Pesquisa em Biodiversidade) and PDBFF (Projeto Dinâmica Biológica de Fragmentos Florestais), specifically: PPBio-BR319 (samples collected along the BR-319 highway), PPBio-RFAD (samples from Reserva Ducke), and PDBFF (samples from some sampling sites). *leg. ign.* refers to the Latin abbreviation *legit ignotus*, meaning "unknown collector". PFRD refers to the Reserva Ducke Flora Project, where Ribeiro et al. (1999) recognized two informal morphotypes in *Ecclinusa guianensis*.

1     Ectimus guinnensis FormaA-PERD     CUIA     lp; lp, MC(TN350-J32     PPBIO-R839       2     Ectimus guinnensis FormaA-PERD     CUIA     lp; lp, MC(TN350-J32     PPBIO-R839       3     Ectimus guinnensis FormaA-PERD     CUIA     lp; lp, MC(TN350-J32     PPBIO-R839       4     Ectimus guinnensis FormaA-PERD     CUIA     lp; lp, MC(TS350-J7     PPBIO-R839       5     Ectimus guinnensis FormaA-PERD     CUIA     Assungia 503     TNPA       7     Ectimus guinnensis FormaA-PERD     CUIA     Cashin L02-000-J282     PPBIO-R839       8     Ectimus guinnensis FormaA-PERD     CUIA     Cashin L02-000-J282     PPBIO-R830       10     Ectimus guinnensis FormaA-PERD     CUIA     Ferreins 7-5     INPA       11     Ectimus guinnensis FormaA-PERD     CUIA     Ferreins 7-5     INPA       12     Ectimus guinnensis FormaA-PERD     CUIB     Buncis 513     MO       15     Ectimus guinnensis FormaA-PERD     CUIB     Buncis 514     INPA       16     Ectimus guinnensis FormaA-PERD     CUIB     Buncis 514     MO       16     Ectimus	N	Group	Code	Voucher	Collection
2     Echimus giumensis FormaA-PERD     GUIA     log. for. MOTN850-457     PPBIO-RR39       3     Echimus giumensis FormaA-PERD     GUIA     log. for. MOTN850-467     PPBIO-RR39       5     Echimus giumensis FormaA-PERD     GUIA     log. for. MOTN850-477     PPBIO-RR39       6     Echimus giumensis FormAA-PERD     GUIA     Assingia 513     NPA       7     Echimus giumensis FormAA-PERD     GUIA     Cashihu LO2 4000-7226     PPBIO-RR39       8     Echimus giumensis FormAA-PERD     GUIA     Fordin S7-3     INPA       10     Echimus giumensis FormAA-PERD     GUIA     Fordin S7-3     INPA       11     Echimus giumensis FormAA-PERD     GUIA     Fordin S7-3     INPA       12     Echimus giumensis FormAA-PERD     GUIB     Blauos 53     MO       14     Echimus giumensis FormAA-PERD     GUIB     Blauos 53     MO       15     Echimus giumensis FormAA-PERD     GUIB     Davids 16.325     MO       16     Echimus giumensis FormAA-PERD     GUIB     Earlins giumensis FormAA-PERD     GUIB     Earlins giumensis FormAA-PERD	1	Ecclinusa guianensis FormaA-PFRD	GUIA	leg. ign. MO6TN3500-232	PPBIO-BR319
5     Echima guinnenis FormaA-PERD     CUIA     log. fm, MC972500-467     PPBIO-RE19       5     Echimas guinnenis FormaA-PERD     CUIA     log. fm, MC972500-57     PPBIO-RE19       6     Echimas guinnenis FormaA-PERD     CUIA     Asstração 503     NPA       7     Echimas guinnenis FormaA-PERD     CUIA     Castlin L02-000-722     PPBIO-RE19       8     Echimas guinnenis FormaA-PERD     CUIA     Castlin L02-000-722     PPBIO-RE19       10     Echimas guinnenis FormaA-PERD     CUIA     Ferring 57-5     INFA       11     Echimas guinnenis FormaA-PERD     CUIA     Ferring 57-5     INFA       12     Echimas guinnenis FormaA-PERD     CUIB     Curavillo-Schrind 144     INFA       13     Echimas guinnenis FormaB-PERD     CUIB     Curavillo-Schrind 144     INFA       14     Echimas guinnenis FormaB-PERD     CUIB     Curavillo-Schrind 144     INFA       15     Echimas guinnenis FormaB-PERD     CUIB     Davide 15,25     MO       16     Echimas guinnenis FormaB-PERD     CUIB     Marcano-Berti 32     MO       17     Echimas	2	Ecclinusa guianensis FormaA-PFRD	GUIA	leg. ign. MO4TN0500-452	PPBIO-BR319
4     Ecclimess quanteries Forma-APERD     GUIA     Ici, 'gn. MOOTN2500-49     PPBIO-REND       5     Ecclimus quanteries Forma-APERD     GUIA     Assurição 503     INPA       6     Ecclimus quanteries Forma-APERD     GUIA     Castille LO20000-7326     PPBIO-REND       9     Ecclimus quanteries Forma-APERD     GUIA     Castille LO20000-7326     PPBIO-REND       101     Ecclimus quanteries Forma-APERD     GUIA     Forma 57-16     INPA       112     Ecclimus quanteries Forma-APERD     GUIA     Forma 57-16     INPA       113     Ecclimus quanteries Forma-APERD     GUIA     Terre-Armip 1148     Ecclimus quanteries Forma-PERD     GUIB     Bandwork       114     Ecclimus quanteries Forma-PERD     GUIB     Castro 1850     RB       115     Ecclimus quanteries Forma-PERD     GUIB     Davide 16,325     MO       116     Ecclimus quanteries Forma-PERD     GUIB     Davide 16,325     MO       117     Ecclimus quanteries Forma-PERD     GUIB     Davide 16,325     MO       118     Ecclimus quanteries Forma-PERD     GUIB     Marcame-Berl 20,32     <	3	Ecclinusa guianensis FormaA-PFRD	GUIA	leg. ign. MO9TS2500-467	PPBIO-BR319
5     Ecolimus guinnosis Forma-APFRD     GUIA     log. (m. MO2TS200-577     PPBIO-RR12       6     Ecclimus guinnosis Forma-APFRD     GUIA     Castille L02-000-7826     PPBIO-RA19       8     Ecclimus guinnosis Forma-APFRD     GUIA     Castille L02-000-7826     PPBIO-RA19       9     Ecclimus guinnosis Forma-APFRD     GUIA     Ferrin 57-34     INPA       10     Ecclimus guinnosis Forma-APFRD     GUIA     Ferrin 57-34     INPA       11     Ecclimus guinnosis Forma-APFRD     GUIA     Ferrin 57-34     INPA       11     Ecclimus guinnosis Forma-APFRD     GUIB     Earning 1449     Feddovsk       12     Ecclimus guinnosis Forma-PFRD     GUIB     Carrol 531     MO       15     Ecclimus guinnosis Forma-PFRD     GUIB     Carrol 5325     MO       16     Ecclimus guinnosis Forma-PFRD     GUIB     Prive 47,967     IAN       17     Ecclimus guinnosis Forma-PFRD     GUIB     Marcano-Berti 22.     MO       21     Ecclimus guinnosis Forma-PFRD     GUIB     Marcano-Berti 23.     MO       22     Ecclimus guinnosis Forma-PFRD <td>4</td> <td>Ecclinusa guianensis FormaA-PFRD</td> <td>GUIA</td> <td>leg. ign. MO6TN0500-49</td> <td>PPBIO-BR319</td>	4	Ecclinusa guianensis FormaA-PFRD	GUIA	leg. ign. MO6TN0500-49	PPBIO-BR319
6     Ecclimas guinnesis Forma,APERD     GUIA     Assingle 503     INPA       7     Ecclimas guinnesis Forma,APERD     GUIA     Cablin INPA1039     INPA       8     Ecclimas guinnesis Forma,APERD     GUIA     Ferrin 57-16     INPA       10     Ecclimas guinnesis Forma,APERD     GUIA     Ferrin 57-34     INPA       11     Ecclimas guinnesis Forma,APERD     GUIA     Terra-Anajo 1148     Fieldwork       13     Ecclimas guinnesis Forma,APERD     GUIA     Terra-Anajo 1148     Fieldwork       14     Ecclimas guinnesis Forma,APERD     GUIB     Blanca 531     MO       15     Ecclimas guinnesis Forma,APERD     GUIB     Carafla 5927     MO       16     Ecclimas guinnesis Forma,APERD     GUIB     Carafla 5927     MO       16     Ecclimas guinnesis Forma,APERD     GUIB     Frais 2,2977     IAN       17     Ecclimas guinnesis Forma,APERD     GUIB     Marcane-Hert 232     MO       20     Ecclimas guinnesis Forma,APERD     GUIB     Marcane-Hert 232     MO       21     Ecclimas guinnesis Forma,APERD     GUIB	5	Ecclinusa guianensis FormaA-PFRD	GUIA	leg. ign. MO9TS2500-577	PPBIO-BR319
7 Ecclimas guinnesis Forma-PFRD GUIA Castillo L02-000-7826 PPBIO-FRAD   8 Ecclimas guinnesis Forma-PFRD GUIA Formin 57-16 INPA   9 Ecclimas guinnesis Forma-PFRD GUIA Formin 57-34 INPA   11 Ecclimas guinnesis Forma-PFRD GUIA Formin 57-34 INPA   12 Ecclimas guinnesis Forma-PFRD GUIA Formin 57-34 INPA   13 Ecclimas guinnesis Forma-PFRD GUIA Torm-Annip 1148 Fieldwork   14 Ecclimas guinnesis Forma-PFRD GUIB Banno 535 MO   15 Ecclimas guinnesis Forma-PFRD GUIB Davids 164 RB   16 Ecclimas guinnesis Forma-PFRD GUIB Davids 16325 MO   17 Ecclimas guinnesis Forma-PFRD GUIB Davids 16325 MO   20 Ecclimas guinnesis Forma-PFRD GUIB Marane-Detti 322 MO   21 Ecclimas guinnesis Forma-PFRD GUIB Marane-Detti 32 MO   22 Ecclimas guinnesis Forma-PFRD GUIB Marane-Detti 32 MO   23 Ecclimas guinnesis Forma-PFRD GUIB Marane-Detti 32 MO   24 Ecclimas guinnesis Forma-PFRD GUIB Marane-Detti 32 MO	6	Ecclinusa guianensis FormaA-PFRD	GUIA	Assunção 503	INPA
8 Ecclimas guianesis FormaA-PRD GUIA Collin INPA1094 INPA   99 Ecclimas guianesis FormaA-PRD GUIA Ferreira 57-34 INPA   10 Ecclimas guianesis FormaA-PRD GUIA Ferreira 57-34 INPA   11 Ecclimas guianesis FormaA-PRD GUIA Ferreira 57-34 INPA   12 Ecclimas guianesis FormaA-PRD GUIA Terra-Aruigi 1149 Fieldwork   13 Ecclimas guianesis FormaB-PRD GUIB Carlina Guianesis FormaB-PRD GUIB Carlina Guianesis FormaB-PRD GUIB Description 512.5 MO   16 Ecclimas guianesis FormaB-PRD GUIB Description 512.5 MO NO   17 Ecclimas guianesis FormaB-PRD GUIB Description 512.5 MO   18 Ecclimas guianesis FormaB-PRD GUIB Marcan-Berti 52.3 MO   20 Ecclimas guianesis FormaB-PRD GUIB Marcan-Berti 52.3 MO   21 Ecclimas guianesis FormaB-PRD GUIB Marcan-Berti 52.3 MO   22 Ecclimas guianesis FormaB-PRD GUIB Marcan-Berti 52.3 MO   23 Ecclimas guianesis FormaB-PRD GUIB Marcan-Berti 52.3 MO   24 Ecclimas guianesis FormaB-PRD GUIB Marcan	7	Ecclinusa guianensis FormaA-PFRD	GUIA	Castilho LO2-0000–7826	PPBIO-RFAD
9     Ecclimas guianesis FormaA-PRD     GUIA     Ferreira 57-34     INPA       10     Ecclimas guinensis FormaA-PRD     GUIA     Ferreira 57-34     INPA       11     Ecclimas guinensis FormaA-PRD     GUIA     Ferreira 57-34     INPA       13     Ecclimas guinensis FormaA-PRD     GUIA     Terra-Armigi 1149     Fieldwork       14     Ecclimas guinensis FormaB-PRD     GUIB     Carolho 501104     INPA       16     Ecclimas guinensis FormaB-PRD     GUIB     Carolho 501104     INPA       17     Ecclimas guinensis FormaB-PRD     GUIB     Earstone 503     MO       18     Ecclimas guinensis FormaB-PRD     GUIB     Earstone 533     MO       19     Ecclimas guinensis FormaB-PRD     GUIB     Fries 22,977     IAN       21     Ecclimas guinensis FormaB-PRD     GUIB     Marcinensis 60     INPA       22     Ecclimas guinensis FormaB-PRD     GUIB     Marcinensis 60     INPA       23     Ecclimas guinensis FormaB-PRD     GUIB     Marcinensis 60     INPA       24     Ecclimas groress sp. nov.     NERV <t< td=""><td>8</td><td>Ecclinusa guianensis FormaA-PFRD</td><td>GUIA</td><td>Coêlho INPA1094</td><td>INPA</td></t<>	8	Ecclinusa guianensis FormaA-PFRD	GUIA	Coêlho INPA1094	INPA
10 Ecclimas guianesis FormaA-PRD GUIA Ferreira 57-5 INPA   11 Ecclimas guianesis FormaA-PRD GUIA Ferreira 57-5 INPA   12 Ecclimas guianesis FormaA-PRD GUIA Terra-Armijo 1149 Fieldwork   13 Ecclimas guianesis FormaB-PRD GUIB Blanco 531 MO   14 Ecclimas guianesis FormaB-PRD GUIB Carvatho-Sohrinho 1644 INPA   15 Ecclimas guianesis FormaB-PRD GUIB Carvatho-Sohrinho 1644 NO   16 Ecclimas guianesis FormaB-PRD GUIB Evans 3155 MO   17 Ecclimas guianesis FormaB-PRD GUIB Hardwork R8   20 Ecclimas guianesis FormaB-PRD GUIB Marcano-Berti 522 MO   21 Ecclimas guianesis FormaB-PRD GUIB Marcano-Berti 523 MO   22 Ecclimas guianesis FormaB-PRD GUIB Marcano-Berti 523 MO   23 Ecclimas guianesis FormaB-PRD GUIB Marcano-Berti 523 MO   24 Ecclimas guianesis FormaB-PRD GUIB Marcano-Berti 523 MO   25 Ecclimas guianesis FormaB-PRD GUIB Marcano-Berti 524 MO   26 Ecclimas guianesis FormaB-PRD GUIB Marcano-Berti	9	Ecclinusa guianensis FormaA-PFRD	GUIA	Ferreira 57–16	INPA
11   Ecclinus guianesis FormaA-PRD   GUIA   Ferretra 57–5   INPA     12   Ecclinus guianesis FormaA-PRD   GUIA   Terra-Aruigi 1148   Fieldwork     13   Ecclinus guianesis FormaB-PRD   GUIB   Blanco 531   MO     14   Ecclinus guianesis FormaB-PRD   GUIB   Carolho-Sofribal 1644   INPA     16   Ecclinus guianesis FormaB-PRD   GUIB   Danika 16,323   MO     17   Ecclinus guianesis FormaB-PRD   GUIB   Danika 16,323   MO     18   Ecclinus guianesis FormaB-PRD   GUIB   Ecalinus guianesis FormaB-PRD   GUIB   Price 32,377   IAN     21   Ecclinus guianesis FormaB-PRD   GUIB   Hrain 27,867   ECA   NO     22   Ecclinus guianesis FormaB-PRD   GUIB   Marcino- 867   ECA   NO     23   Ecclinus guianesis FormaB-PRD   GUIB   Marcino- 867   ECA   NO     24   Ecclinus guianesis FormaB-PRD   GUIB   Marcino- 867   ECA   NO     25   Ecclinus guianesis FormaB-PRD   GUIB   Marcino- 19   IAN     26   Ecclinus guianesis FormaB-PRD   GUIB <td>10</td> <td>Ecclinusa guianensis FormaA-PFRD</td> <td>GUIA</td> <td>Ferreira 57–34</td> <td>INPA</td>	10	Ecclinusa guianensis FormaA-PFRD	GUIA	Ferreira 57–34	INPA
12 Ecclinus guinnesis FormaA-PFRD GUIA Terre-Arungi 1148 Fieldwork   13 Ecclinus guinnesis FormaB-PFRD GUIB Blanco 53 MO   14 Ecclinus guinnesis FormaB-PFRD GUIB Carloh-Solvinho 1644 INPA   15 Ecclinus guinnesis FormaB-PFRD GUIB Carloh-Solvinho 1644 INPA   16 Ecclinus guinnesis FormaB-PFRD GUIB Carlohe Solvinho 1644 INPA   17 Ecclinus guinnesis FormaB-PFRD GUIB Ecarlohe Solvinho MO   20 Ecclinus guinnesis FormaB-PFRD GUIB Harcano-Berti 262 MO   21 Ecclinus guinnesis FormaB-PFRD GUIB Marcano-Berti 253 MO   22 Ecclinus guinnesis FormaB-PFRD GUIB Marcano-Berti 253 MO   23 Ecclinus guinnesis FormaB-PFRD GUIB Marcano-Berti 262 MO   24 Ecclinus guinnesis FormaB-PFRD GUIB Nascimento 60 INPA   25 Ecclinus guinnesis FormaB-PFRD GUIB Nascimento 60 INPA   26 Ecclinus guinnesis FormaB-PFRD GUIB Nascimento 60 INPA   27 Ecclinus guinnesis FormaB-PFRD GUIB Nascimento 60 INPA   28 Ecclinus guinnesis FormaB-PFRD GU	11	Ecclinusa guianensis FormaA-PFRD	GUIA	Ferreira 57–5	INPA
13 Ecclinus guinnesis Formal-PFRD GUIA Terra Artaujo 1149 Fieldwork   14 Ecclinus guinnesis Formal-PFRD GUIB Blanco 531 MO   15 Ecclinus guinnesis Formal-PFRD GUIB Carvalho-Sobrinio 1644 INPA   16 Ecclinus guinnesis Formal-PFRD GUIB Davids 16,325 MO   17 Ecclinus guinnesis Formal-PFRD GUIB Evarias 3155 MO   18 Ecclinus guinnesis Formal-PFRD GUIB Frais 22,377 IAN   20 Ecclinus guinnesis Formal-PFRD GUIB Marcano-Berti 322 MO   21 Ecclinus guinnesis Formal-PFRD GUIB Marcano-Berti 322 MO   22 Ecclinus guinnesis Formal-PFRD GUIB Marcano-Berti 322 MO   23 Ecclinus guinnesis Formal-PFRD GUIB Marcano-Berti 322 MO   24 Ecclinus guinnesis Formal-PFRD GUIB Nascinento 60 INPA   25 Ecclinus guinnesis Formal-PFRD GUIB Vasconclos 188 Fieldwork   26 Ecclinus guinnesis Formal-PFRD GUIB Vasconclos 188 Fieldwork   27 Ecclinus arros sp. nov. NERV Martins 1301-397 INPA   28 Ecclinus arros sp. nov. NERV Mag	12	Ecclinusa guianensis FormaA-PFRD	GUIA	Terra-Araujo 1148	Fieldwork
14     Lectinus guinnersis Formal-FPRD     CUIB     Carolho-Sobrinko 1644     INPA       15     Ecclinus guinnersis Formal-FPRD     GUIB     Carolho-Sobrinko 1644     INPA       16     Ecclinus guinnersis Formal-FPRD     GUIB     Davidse 16,325     MO       17     Ecclinus guinnersis Formal-FPRD     GUIB     Evaluas 2,3277     IAN       20     Ecclinus guinnersis Formal-FPRD     GUIB     Marcano-Berti 232     MO       21     Ecclinus guinnersis Formal-FPRD     GUIB     Marcano-Berti 233     MO       22     Ecclinus guinnersis Formal-FPRD     GUIB     Marcano-Berti 233     MO       23     Ecclinus guinnersis Formal-FPRD     GUIB     Marcano-Berti 233     MO       24     Ecclinus quinnersis Formal-FPRD     GUIB     Nascimento 60     INPA       25     Ecclinus a prives sp. nov.     NERV     Marcano-Berti 233     PDBFF       26     Ecclinus a prives sp. nov.     NERV     Marcano-Berti 230-375     INPA       26     Ecclinus a prives sp. nov.     NERV     Marcano-Berti 230-375     PDBFF       28     Ecclinus a prives	13	Ecclinusa guianensis FormaA-PFRD	GUIA	Terra-Araujo 1149	Fieldwork
15 Locinus guanciss Formal-FPRD CUIB Carsube-Sormalo (164) INPA   16 Ecclinus guanciss Formal-FPRD CUIB Davidse (16.325) MO   17 Ecclinus guanciss Formal-FPRD CUIB Evais 1550 MO   18 Ecclinus guanciss Formal-FPRD CUIB Evais 3155 MO   20 Ecclinus guanciss Formal-FPRD CUIB Havin 47,967 IAN   21 Ecclinus guanciss Formal-FPRD CUIB Marcano-Berti 222 MO   22 Ecclinus guanciss Formal-FPRD CUIB Marcano-Berti 223 MO   23 Ecclinus guanciss Formal-FPRD CUIB Marcano-Berti 224 MO   24 Ecclinus guanciss Formal-FPRD CUIB Nacionatio 60 INPA   25 Ecclinus guanciss Formal-FPRD CUIB Nacionatio 60 INPA   26 Ecclinus actionesis promati-FPRD CUIB Ribeiro 19 IAN   27 Ecclinus actionesis promati-FPRD CUIB Variancian actionation action actionaction actionaction actionation actionation actionation a	14	Ecclinusa guianensis FormaB-PFRD	GUIB	Blanco 531	MO
16     Ecclinus guinantis formab-PRD     GUIB     Castro 1800     KB       17     Ecclinus guinantis formab-PRD     GUIB     Econs 3155     MO       18     Ecclinus guinantis formab-PRD     GUIB     Econs 3155     MO       20     Ecclinus guinantis formab-PRD     GUIB     Invit 47967     IAN       21     Ecclinus guinantis formab-PRD     GUIB     Marcano-Berti 222     MO       22     Ecclinus guinantis formab-PRD     GUIB     Marcano-Berti 224     MO       23     Ecclinus guinantis formab-PRD     GUIB     Nascimento 60     NPA       25     Ecclinus guinantis formab-PRD     GUIB     Vasconcelos 188     Fieldwork       26     Ecclinus arrosa sp. nov.     NERV     Almadulinis 1301-43     PDBFF       28     Ecclinus arrosa sp. nov.     NERV     Magallás 2206-7173     NPA       30     Ecclinus arrosa sp. nov.     NERV     Magallás 2206-2465     PDBFF       33     Ecclinus arrosa sp. nov.     NERV     Magallás 2206-2467     PDBFF       34     Ecclinus arrosa sp. nov.     NERV     Magallás 22	15	Ecclinusa guianensis FormaB-PFRD	GUIB	Carvalho-Sobrinho 1644	INPA
17 Ecchnuss guinnensis formab-PRD GUIB Eables 315.5 MO   18 Ecchnuss guinnensis formab-PRD GUIB Eraus 315.5 MO   19 Ecchnuss guinnensis formab-PRD GUIB Fries 2.277 IAN   20 Ecchnuss guinnensis formab-PRD GUIB Marcano-Berti 32.3 MO   21 Ecchnuss guinnensis formab-PRD GUIB Marcano-Berti 52.3 MO   22 Ecchnuss guinnensis formab-PRD GUIB Marcano-Berti 52.3 MO   23 Ecchnuss guinnensis formab-PRD GUIB Narcano-Berti 52.3 MO   24 Ecchnuss guinnensis formab-PRD GUIB Nascimento 60 INPA   25 Ecchnuss guinnensis formab-PRD GUIB Vasconcelos 188 Fieldwork   26 Ecchnuss guinnensis formab-PRD GUIB Vasconcelos 188 Fieldwork   27 Ecchnuss guinnensis formab-PRD GUIB Vasconcelos 188 Fieldwork   28 Ecchnuss guinnensis formab-PRD GUIB Vasconcelos 188 Fieldwork   29 Ecchnuss guinnensis formab-PRD NERV Mareas 2206-1736 PDBFF   30 Ecchnuss app. nov. NERV Mareas 2206-1736 PDBFF   31 Ecchnuss app. nov. NERV Marea	16	Ecclinusa guianensis FormaB-PFRD	GUIB	Castro 1850	KB
IB Ecclinus guinnesis formab-PRD GUIB Event 3:55 MO   19 Ecclinus guinnesis formab-PRD GUIB Irvia 4:7967 IAN   21 Ecclinus guinnesis formab-PRD GUIB Marcano-Berti 222 MO   22 Ecclinus guinnesis formab-PRD GUIB Marcano-Berti 222 MO   23 Ecclinus guinnesis formab-PRD GUIB Marcano-Berti 222 MO   24 Ecclinus guinnesis formab-PRD GUIB Nasciento 60 INPA   25 Ecclinus guinnesis formab-PRD GUIB Vasconcolos 188 Fieldwork   26 Ecclinus guinnesis formab-PRD GUIB Vasconcolos 188 Fieldwork   27 Ecclinus arrosa sp. nov. NERV Amartins 1301-48 PDBFF   28 Ecclinus arrosa sp. nov. NERV Amardinia 206-1736 INPA   29 Ecclinus arrosa sp. nov. NERV Marcano-8206-2456 PDBFF   31 Ecclinus arrosa sp. nov. NERV Marcano-8206-2456 PDBFF   32 Ecclinus arrosa sp. nov. NERV Pareza 2206-2445 PDBFF   33 Ecclinus arrosa sp. nov. NERV Pareza 2206-274 PDBFF   34 Ecclinus arrosa sp. nov. NERV Site 2303-6272 PDB	17	Ecclinusa guianensis FormaB-PFKD	GUIB	Daviase 16,325	MO
19     Lectinus guiantesis FormaB-FFRD     GUIB     Frain 47.967     LAN       20     Leclinus guiantesis FormaB-FFRD     GUIB     Marcano-Berti 282     MO       21     Ecclinus guiantesis FormaB-FFRD     GUIB     Marcano-Berti 282     MO       22     Ecclinus guiantesis FormaB-FFRD     GUIB     Marcano-Berti 282     MO       23     Ecclinus guiantesis FormaB-FFRD     GUIB     Marcano-Berti 283     MO       24     Ecclinus guiantesis FormaB-FFRD     GUIB     Niscinento 60     INPA       26     Ecclinus guiantesis FormaB-FFRD     GUIB     Visconclos 188     Fieldwork       27     Ecclinus anterosa sp. nov.     NERV     Martial-Initio 130-3997     INPA       28     Ecclinus anterosa sp. nov.     NERV     Martial-Initio 130-3997     INPA       30     Ecclinus anterosa sp. nov.     NERV     Martial-Initio 130-3997     INPA       31     Ecclinus anterosa sp. nov.     NERV     Martial-Initio 130-3972     PDBFF       32     Ecclinus anterosa sp. nov.     NERV     Metro 230-4574     PDBFF       33     Ecclinus anterosa	18	Ecclinusa guianensis FormaB-PFKD	GUIB	Evans 3155	MO
20     Ecclimisal guinnesis FormaB-FPRD     GUIB     Marcano-Berti     23.00     MO       21     Ecclimisal guinnesis FormaB-FPRD     GUIB     Marcano-Berti     23.2     MO       22     Ecclimisal guinnesis FormaB-FPRD     GUIB     Morial 0.671     INPA       24     Ecclimisal guinnesis FormaB-FPRD     GUIB     Morial 0.671     INPA       25     Ecclimisal guinnesis FormaB-FPRD     GUIB     Niserneto 60     INPA       26     Ecclimisal guinnesis FormaB-FPRD     GUIB     Vasconcelos 188     Fieldwork       27     Ecclimisa nervosa sp. nov.     NERV     Adaptinis 1301-48     PDBFF       28     Ecclimisa nervosa sp. nov.     NERV     Marcano-2671     INPA       29     Ecclimisa nervosa sp. nov.     NERV     Marcano-2672     PDBFF       31     Ecclimisa nervosa sp. nov.     NERV     Merca 2303-5249     PDBFF       32     Ecclimisa nervosa sp. nov.     NERV     Merca 2303-6122     PDBFF       33     Ecclimisa nervosa sp. nov.     NERV     Merca 200-61726     PDBFF       34     Ecclimisa ner	19	Eccunusa guianensis FormaB-PFRD	GUIB	Froes 22,977	IAN
L1     Exclimins guinnesis FormaPFRD     GUIB     MarcanoBerli 22.     NO       22     Ecclimiss guinnesis FormaPFRD     GUIB     MarcanoBerli 52.3     MO       23     Ecclimiss guinnesis FormaPFRD     GUIB     MarcanoBerli 52.3     MO       24     Ecclimiss guinnesis FormaPFRD     GUIB     Niscinento 60     INPA       25     Ecclimiss guinnesis FormaPFRD     GUIB     Visconcelos 188     Fieldwork       26     Ecclimiss quinnesis FormaPFRD     GUIB     Visconcelos 188     Fieldwork       27     Ecclimisa nervosa sp. nov.     NERV     MarcanoBerli 20.2-17.36     INPA       28     Ecclimisa nervosa sp. nov.     NERV     Magalhäes 2206-2465     PDBFF       29     Ecclimisa nervosa sp. nov.     NERV     Megalhäes 2206-2457     PDBFF       21     Ecclimisa nervosa sp. nov.     NERV     Megalhäes 2206-2157     PDBFF       22     Ecclimisa nervosa sp. nov.     NERV     Megalhäes 2206-2574     PDBFF       23     Ecclimisa nervosa sp. nov.     NERV     Megalhäes 2206-21076     PDBFF       24     Ecclimisa nervosa sp. no	20	Ecclinusa guianensis FormaB-PFRD	GUIB	Irwin 47,967 Managana Parti 282	IAN
22 Excliming quinnersis Formal>-FRD GUIB Mori 20.671 INPA   23 Excliming quinnersis Formal>-FRD GUIB Nacimuto 60 INPA   24 Excliming quinnersis Formal>-FRD GUIB Nacimuto 60 INPA   25 Excliming quinnersis Formal>-FRD GUIB Racimuto 60 INPA   26 Excliming quinnersis Formal>-FRD GUIB Waterins 1301-48 PIDBFF   27 Excliming nervosa sp. nov. NERV Martins 1301-48 PIDBFF   28 Excliming nervosa sp. nov. NERV Margulais 2206-1736 INPA   30 Excliming nervosa sp. nov. NERV Margulais 2206-2465 PIDBFF   31 Excliming nervosa sp. nov. NERV Margulais 2303-6172 PDBFF   32 Excliming nervosa sp. nov. NERV Margulais 2303-6172 PDBFF   33 Excliming nervosa sp. nov. NERV Margulais 2303-6172 PDBFF   34 Excliming nervosa sp. nov. NERV Margulais 2303-6172 PDBFF   35 Excliming nervosa sp. nov. NERV Castillo L08-2500-11076 PPBIO-RFAD   36 Excliming nervosa sp. nov. NERV Castillo L08-2500-11198 PPBIO-RFAD   37 Excliming nervosa sp. nov.	21	Eccunusu guunensis FormaD-PFRD	GUID	Marcano Porti 522	MO
24 Excliminas quinnenis FormaB-FFRD GUIB Maximuto 60 INPA   25 Excliminas quinnenis FormaB-FFRD GUIB Ribero 19 IAN   25 Excliminas quinnenis FormaB-FFRD GUIB Ribero 19 IAN   26 Excliminas quinnenis FormaB-FFRD GUIB Vasconcelos 188 Fieldwork   27 Excliminas quinnenis FormaB-FFRD GUIB Vasconcelos 188 PDBFF   28 Excliminas nervosa sp. nov. NERV Annad-Junio 1301-3997 INPA   30 Excliminas nervosa sp. nov. NERV Mandalias 2206-1736 INPA   31 Excliminas nervosa sp. nov. NERV Mandalias 2206-1736 INPA   32 Excliminas nervosa sp. nov. NERV Mandalias 2306-2465 PDBFF   33 Excliminas nervosa sp. nov. NERV Pareira 2303-5249 PDBFF   34 Excliminas nervosa sp. nov. NERV Mandalias 2306-172 PDBFF   35 Excliminas nervosa sp. nov. NERV Mandalias 2306-172 PDBFF   36 Excliminas nervosa sp. nov. NERV Mandalias 2306-172 PDBFF   36 Excliminas nervosa sp. nov. NERV Mandalias 2306-172 PDBFF   37 Excliminas nervosa sp. nov. NER	22	Ecclinusa guianansis FormaB PEPD	CUIB	Mari 20 671	INIDA
2-1Leining guidentis Formab-PFRDGUIBRibeiro 19IAN25Ecclinus guidentis Formab-PFRDGUIBVasconcelos 188Fieldwork26Ecclinus neroses sp. nov.NERVMartins 1301-48PDBFF28Ecclinus neroses sp. nov.NERVMartins 1301-48PDBFF29Ecclinus neroses sp. nov.NERVMagaliaes 2206-1736INPA30Ecclinus neroses sp. nov.NERVMerzes 2206-2465PDBFF31Ecclinus neroses sp. nov.NERVPereira 2303-2157PDBFF32Ecclinus neroses sp. nov.NERVPereira 2303-6172PDBFF33Ecclinus neroses sp. nov.NERVMerzes 2206-2574PDBFF34Ecclinus neroses sp. nov.NERVMerzes 2206-2574PDBFF35Ecclinus neroses sp. nov.NERVGastillo L08-2500-11076PPBIO-RFAD36Ecclinus neroses sp. nov.NERVCastillo L08-2500-11076PPBIO-RFAD37Ecclinus neroses sp. nov.NERVCastillo L08-2500-11076PPBIO-RFAD38Ecclinus neroses sp. nov.NERVTern-Araujo 1325BFieldwork40Ecclinus aprose sp. nov.NERVTern-Araujo 1325BFieldwork41Ecclinus aprose sp. nov.NERVTern-Araujo 1325BFieldwork42Ecclinus aprose sp. nov.NERVTern-Araujo 1325BFieldwork44Ecclinus aprose sp. nov.NERVTern-Araujo 1325BFieldwork45Ecclinus aproliforaPARVGaritr	23	Ecclinusa guianensis FormaB-PERD	GUID	Nascimento 60	INIA
ZLearning guinancis Forma PTRDGUIBVasconclos 188Fieldwork26Ecclinus anerosas sp. nov.NERVMartins 1301-48PDBFF28Ecclinus anerosas sp. nov.NERVMagalhäes 2206-2465INPA30Ecclinus anerosas sp. nov.NERVMagalhäes 2206-2465PDBFF31Ecclinus anerosa sp. nov.NERVMenzes 2206-2465PDBFF32Ecclinus anerosa sp. nov.NERVPreira 2303-2157PDBFF33Ecclinus anerosa sp. nov.NERVPreira 2303-6172PDBFF34Ecclinus anerosa sp. nov.NERVPreira 2303-6172PDBFF35Ecclinus anerosa sp. nov.NERVSilue 2303-2454PDBFF36Ecclinus anerosa sp. nov.NERVSilue 2303-4854PDBFF37Ecclinus anerosa sp. nov.NERVCastilho LO8-2500-11076PPBIO-RFAD38Ecclinus anerosa sp. nov.NERVCastilho LO8-2500-11076PPBIO-RFAD39Ecclinus anerosa sp. nov.NERVCastilho LO8-2500-11076PPBIO-RFAD34Ecclinus anerosa sp. nov.NERVGentry 35586MO40Ecclinus aprolforaPARVVásquez 2032MO41Ecclinus aprolforaPARVVásquez 2032MO42Ecclinus aprilpforaRAMIAnaard 716INPA44Ecclinus aramiforaRAMICalinu 733IAN45Ecclinus aramiforaRAMIAnadoth 281IAN46Ecclinus aramiforaRAMI	2 <del>1</del> 25	Ecclinusa guianensis FormaB-PERD	GUIB	Ribeiro 19	IAN
27Ecclinusa nervosa sp. nov.NERVMartins 1301-48PDBFF28Ecclinusa nervosa sp. nov.NERVMaradi-unior 1301-3997INPA29Ecclinusa nervosa sp. nov.NERVMagaliaise 2206-1736INPA30Ecclinusa nervosa sp. nov.NERVMerzes 2206-2465PDBFF31Ecclinusa nervosa sp. nov.NERVPereira 2303-2157PDBFF32Ecclinusa nervosa sp. nov.NERVPereira 2303-2157PDBFF33Ecclinusa nervosa sp. nov.NERVPereira 2303-6172PDBFF34Eclinusa nervosa sp. nov.NERVMerezes 2206-2574PDBFF35Ecclinusa nervosa sp. nov.NERVMerezes 2206-2574PDBFF36Ecclinusa nervosa sp. nov.NERVCastilho LO8-2500-11076PPBIO-RFAD37Ecclinusa nervosa sp. nov.NERVCastilho LO8-2500-11076PPBIO-RFAD38Ecclinusa nervosa sp. nov.NERVCastilho LO8-2500-11178PPBIO-RFAD39Ecclinusa nervosa sp. nov.NERVTerra-Araujo 1325BFieldwork40Ecclinusa parviforaPARVGenry 36,586MO41Ecclinusa parviforaPARVVisigue 2032MO42Ecclinusa spilophyllaPSILLindeman 390MO43Ecclinusa ramiforaRAMIAmaral 716INPA44Ecclinusa ramiforaRAMIDucke 1073IAN45Ecclinusa ramiforaRAMIDucke 1073IAN46Ecclinusa ramifora </td <td>26</td> <td>Ecclinusa guianensis FormaB-PFRD</td> <td>GUIB</td> <td>Vasconcelos 188</td> <td>Fieldwork</td>	26	Ecclinusa guianensis FormaB-PFRD	GUIB	Vasconcelos 188	Fieldwork
28Ecclinusa nervosa sp. nov.NERVAhmad-Junior 1301-3997INPA29Ecclinusa nervosa sp. nov.NERVMagalhaes 2206-2736INPA30Ecclinusa nervosa sp. nov.NERVMenzes 2206-2465PDBFF31Ecclinusa nervosa sp. nov.NERVPereira 2303-5249PDBFF32Ecclinusa nervosa sp. nov.NERVPereira 2303-6172PDBFF33Ecclinusa nervosa sp. nov.NERVPereira 2303-6172PDBFF34Ecclinusa nervosa sp. nov.NERVSilva 2303-854PDBFF35Ecclinusa nervosa sp. nov.NERVSilva 2303-854PDBFF36Ecclinusa nervosa sp. nov.NERVCastilho L08-2500-11076PPBIO-RFAD37Ecclinusa nervosa sp. nov.NERVCastilho L08-2500-11198PPBIO-RFAD38Ecclinusa nervosa sp. nov.NERVBrito 47INPA39Ecclinusa nervosa sp. nov.NERVGentry 36.566MO41Ecclinusa parvifloraPARVGentry 36.566MO42Ecclinusa parvifloraPARVVásquez 2032MO43Ecclinusa psilophyllaPSILLindeman 789INPA44Ecclinusa ramifloraRAMICable 1758INPA45Ecclinusa ramifloraRAMICable 1758INPA46Ecclinusa ramifloraRAMILindeman 789IAN47Ecclinusa ramifloraRAMILanjouu 2221IAN48Ecclinusa ramifloraRAMIDucke 1073	20	Ecclinusa nervosa sp. pov	NERV	Martins 1301–48	PDBFF
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30Ecclinusa nervos sp. nov.NERVMenezes 2206-2465PDBFF31Ecclinusa nervos sp. nov.NERVPereira 2303-2157PDBFF32Ecclinusa nervos sp. nov.NERVSita 2303-249PDBFF33Ecclinusa nervos sp. nov.NERVPereira 2303-6172PDBFF34Ecclinusa nervos sp. nov.NERVMenezes 2206-2574PDBFF35Ecclinusa nervos sp. nov.NERVMenezes 2206-2574PDBFF36Ecclinusa nervos sp. nov.NERVCastilho LO8-2500-11076PPBIO-RFAD37Ecclinusa nervos sp. nov.NERVCastilho LO8-2500-11076PPBIO-RFAD38Ecclinusa nervos sp. nov.NERVCastilho LO8-2500-11076PPBIO-RFAD39Ecclinusa nervos sp. nov.NERVBrito 47INPA40Ecclinusa nervos sp. nov.NERVBrito 47INPA41Ecclinusa parvifloraPARVGentry 36,586MO42Ecclinusa parvifloraPSILLindeman 390MO43Ecclinusa psilophyllaPSILSaduvith 281RB44Ecclinusa ramifloraRAMIAnaral 716INPA45Ecclinusa ramifloraRAMICoèlho 1958IAN46Ecclinusa ramifloraRAMICoèlho 1958IAN47Ecclinusa ramifloraRAMIMaguire 60.094IAN48Ecclinusa ramifloraRAMIMaguire 60.094IAN51Ecclinusa ramifloraRAMIPareiz 2123IAN	29	Ecclinusa nervosa sp. nov.	NERV	Magalhães 2206–1736	INPA
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34Ecclinusa nervosa sp. nov.NERVMerzes 2206–2574PDBFF35Ecclinusa nervosa sp. nov.NERVSilva 2303–4854PDBFF36Ecclinusa nervosa sp. nov.NERVCastillo LO8-2500–11076PPBIO-RFAD37Ecclinusa nervosa sp. nov.NERVCastillo LO8-2500–11076PPBIO-RFAD38Ecclinusa nervosa sp. nov.NERVBrito 47INPA39Ecclinusa paroifloraPARVGentry 36,586MO41Ecclinusa paroifloraPARVGentry 36,586MO42Ecclinusa paroifloraPARVVásquez 2032MO43Ecclinusa pislophyllaPSILLindeman 390MO44Ecclinusa pislophyllaPSILSandwith 281RB45Ecclinusa pislophyllaPSILSandwith 281RB46Ecclinusa pislophyllaRAMIColho 158INPA47Ecclinusa ramifloraRAMIColho 158INPA48Ecclinusa ramifloraRAMIIngiava 2221IAN49Ecclinusa ramifloraRAMIMaguire 60.94IAN51Ecclinusa ramifloraRAMIPrace 7691INPA52Ecclinusa ramifloraRAMIPrace 7691INPA53Ecclinusa ramifloraRAMISilveira 702INPA54Ecclinusa ramifloraRAMISilveira 702INPA55Ecclinusa ramifloraRAMIPrace 7691INPA56Ecclinusa ramifloraRAMISilveira 724 <td>33</td> <td>Ecclinusa nervosa sp. nov.</td> <td>NERV</td> <td>Pereira 2303–6172</td> <td>PDBFF</td>	33	Ecclinusa nervosa sp. nov.	NERV	Pereira 2303–6172	PDBFF
35Ecclinusa nervosa sp. nov.NERVSilva 2303-4854PDBFF36Ecclinusa nervosa sp. nov.NERVCastilho LO8-2500-1176PPBIO-RFAD37Ecclinusa nervosa sp. nov.NERVCastilho LO8-2500-1198PPBIO-RFAD38Ecclinusa nervosa sp. nov.NERVBrito 47INPA39Ecclinusa parvifloraPARVGentry 36,586MO41Ecclinusa parvifloraPARVGentry 36,586MO42Ecclinusa parvifloraPARVVásquez 2032MO43Ecclinusa psilophyllaPSILLindeman 390MO44Ecclinusa psilophyllaPSILSandwith 281RB45Ecclinusa psilophyllaPSILSandwith 281NPA46Ecclinusa ramifloraRAMIAmaral 716INPA47Ecclinusa ramifloraRAMIDucke 1073IAN48Ecclinusa ramifloraRAMIDucke 1073IAN49Ecclinusa ramifloraRAMIMaguire 60,094IAN51Ecclinusa ramifloraRAMIMonteiro INPA53465INPA52Ecclinusa ramifloraRAMIPrince 7691INPA53Ecclinusa ramifloraRAMISilveira 702IAN54Ecclinusa ramifloraRAMISilveira 702INPA55Ecclinusa ramifloraRAMISilveira 702INPA54Ecclinusa ramifloraRAMISilveira 702INPA55Ecclinusa ramifloraRAMISilveira 702	34	Ecclinusa nervosa sp. nov.	NERV	Menezes 2206–2574	PDBFF
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37Ecclinusa nervosa sp. nov.NERVCastilho LO8-2500–11198PPBIO-RFAD38Ecclinusa nervosa sp. nov.NERVBrito 47INPA39Ecclinusa nervosa sp. nov.NERVTerra-Araujo 1325BFieldwork40Ecclinusa parvifloraPARVGentry 36,586MO41Ecclinusa parvifloraPARVVásquez 2032MO42Ecclinusa psilophyllaPSILLindeman 390MO43Ecclinusa psilophyllaPSILLindeman 789INPA44Ecclinusa ranifloraRAMIAmaria 716INPA45Ecclinusa ranifloraRAMICoèlho 1958INPA46Ecclinusa ranifloraRAMIDucke 1073IAN47Ecclinusa ranifloraRAMILanjouw 2221IAN48Ecclinusa ranifloraRAMIMaguire 60,094IAN50Ecclinusa ranifloraRAMIMoterio INPA53465INPA51Ecclinusa ranifloraRAMIPrizes 702INN52Ecclinusa ranifloraRAMISchulter 20,988IAN53Ecclinusa ranifloraRAMISchulter 20,985IAN54Ecclinusa ranifloraRAMISchulter 20,985IAN55Ecclinusa ranifloraRAMISchulter 702INPA56Ecclinusa ranifloraRAMISchulter 702INPA57Ecclinusa ranifloraRAMISpering 6285MO58Ecclinusa ranifloraRAMISpering 702RB	36	Ecclinusa nervosa sp. nov.	NERV	Castilho LO8-2500–11076	PPBIO-RFAD
38Ecclinusa nervosa sp. nov.NERVBrito 47INPA39Ecclinusa nervosa sp. nov.NERVTerra-Araujo 1325BFieldwork40Ecclinusa paroifloraPARVGentry 36,586MO41Ecclinusa paroifloraPARVVásquez 2032MO42Ecclinusa psilophyllaPSILLindeman 390MO43Ecclinusa psilophyllaPSILSandwith 281RB44Ecclinusa psilophyllaPSILSandwith 281RB45Ecclinusa ramifloraRAMIAmaral 716INPA46Ecclinusa ramifloraRAMIDucke 1073IAN47Ecclinusa ramifloraRAMILoke 1073IAN48Ecclinusa ramifloraRAMILanjouro 2221IAN50Ecclinusa ramifloraRAMIMaguire 60,094IAN51Ecclinusa ramifloraRAMIPrance 7691INPA52Ecclinusa ramifloraRAMIPrance 7691INPA53Ecclinusa ramifloraRAMISchultes 26142AINPA54Ecclinusa ramifloraRAMISilveira 702INPA55Ecclinusa ramifloraRAMISilveira 702INPA56Ecclinusa ramifloraRAMISilveira 702INPA57Ecclinusa ramifloraRAMISilveira 702INPA58Ecclinusa ramifloraRAMISilveira 702INPA59Ecclinusa vanifloraRAMISilveira 702INPA58Ecclinusa v	37	Ecclinusa nervosa sp. nov.	NERV	Castilho LO8-2500–11198	PPBIO-RFAD
39Ecclinusa nervosa sp. nov.NERVTerra-Araujo 1325BFieldwork40Ecclinusa parvifloraPARVGentry 36,586MO41Ecclinusa parvifloraPARVVásquez 2032MO42Ecclinusa psilophyllaPSILLindeman 390MO43Ecclinusa psilophyllaPSILLindeman 789INPA44Ecclinusa psilophyllaPSILSandwith 281RB45Ecclinusa ramifloraRAMIAmaral 716INPA46Ecclinusa ramifloraRAMIDucke 1073IAN47Ecclinusa ramifloraRAMIDucke 1073IAN48Ecclinusa ramifloraRAMIMagure 60,094IAN50Ecclinusa ramifloraRAMIMonteiro INPA53465INPA51Ecclinusa ramifloraRAMIPries 12,988IAN52Ecclinusa ramifloraRAMIPries 12,988IAN53Ecclinusa ramifloraRAMIPries 2025INPA54Ecclinusa ramifloraRAMIPries 12,988IAN55Ecclinusa ramifloraRAMIPries 12,988IAN56Ecclinusa ramifloraRAMISilveira 702INPA57Ecclinusa ramifloraRAMISilveira 702INPA58Ecclinusa ramifloraRAMIEvernark Araujo 740RB57Ecclinusa ramifloraRAMIEvernark 109,285MO58Ecclinusa uleiULEISteyermark 109,285MO59Ecclinu	38	Ecclinusa nervosa sp. nov.	NERV	Brito 47	INPA
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42Ecclinusa psilophyllaPSILLindeman 390MO43Ecclinusa psilophyllaPSILLindeman 789INPA44Ecclinusa psilophyllaPSILSandwith 281RB45Ecclinusa ramifloraRAMIAmaral 716INPA46Ecclinusa ramifloraRAMICoèlho 1958INPA47Ecclinusa ramifloraRAMIDucke 1073IAN48Ecclinusa ramifloraRAMILanjouzo 2221IAN50Ecclinusa ramifloraRAMIMaguire 60,094IAN51Ecclinusa ramifloraRAMIMorteiro INPA53465INPA52Ecclinusa ramifloraRAMIPires 12,988IAN53Ecclinusa ramifloraRAMIPires 12,988IAN54Ecclinusa ramifloraRAMISchultes 26142AINPA55Ecclinusa ramifloraRAMISchultes 26142AINPA56Ecclinusa ramifloraRAMISperling 6285MO57Ecclinusa ramifloraRAMITerra-Araujo 740RB58Ecclinusa uleiULEIBerry 4842MO59Ecclinusa uleiULEISteyermark 109,285MO60Ecclinusa uleiULEISteyermark 109,285MO61Ecclinusa uleiULEISteyermark 107,975MO	41	Ecclinusa parviflora	PARV	Vásquez 2032	MO
43Ecclinusa psilophyllaPSILLindeman 789INPA44Ecclinusa psilophyllaPSILSandwith 281RB44Ecclinusa ramifloraRAMIAmaral 716INPA45Ecclinusa ramifloraRAMICoèlho 1958INPA47Ecclinusa ramifloraRAMIDucke 1073IAN48Ecclinusa ramifloraRAMILanjouw 2221IAN49Ecclinusa ramifloraRAMIMaguire 60,094IAN50Ecclinusa ramifloraRAMIMonteiro INPA53465INPA51Ecclinusa ramifloraRAMIPires 12,988IAN52Ecclinusa ramifloraRAMIPires 7691INPA53Ecclinusa ramifloraRAMISchultes 26142AINPA54Ecclinusa ramifloraRAMISilveira 702INPA55Ecclinusa ramifloraRAMISilveira 702INPA56Ecclinusa ramifloraRAMISperling 6285MO57Ecclinusa ramifloraRAMITerra-Araujo 740RB58Ecclinusa uleiULEIBerry 4842MO59Ecclinusa uleiULEISteyermark 109,285MO60Ecclinusa uleiULEISteyermark 127,975MO61Ecclinusa uleiULEISteyermark 127,975MO62Ecclinusa uleiULEISteyermark 127,975MO	42	Ecclinusa psilophylla	PSIL	Lindeman 390	MO
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Package	Authorship	Identifier
Data preparation		
asdreader	Roudier and Laliberté (2017)	https://doi.org/10.32614/CRAN.package.asdreader
dplyr	Wickham et al. (2023)	https://doi.org/10.32614/CRAN.package.dplyr
EBImage	Pau et al. (2010)	https://doi.org/10.18129/B9.bioc.EBImage
Momocs	Bonhomme and Claude (2023)	https://doi.org/10.32614/CRAN.package.Momocs
Data analysis		1
adegenet	Jombart et al. (2023)	https://doi.org/10.32614/CRAN.package.adegenet
caret	Kuhn et al. (2023)	https://doi.org/10.32614/CRAN.package.caret
ConR	Dauby et al. (2017)	https://doi.org/10.1002/ece3.3704
factoextra	Kassambara and Mundt (2020)	https://doi.org/10.32614/CRAN.package.factoextra
Data visualization		
ggConvexHull	Martin (2017)	https://github.com/cmartin/ggConvexHull
ggplot2	Wickham et al. (2024)	https://doi.org/10.32614/CRAN.package.ggplot2
gridExtra	Auguie and Antonov (2017)	https://doi.org/10.32614/CRAN.package.gridExtra
NIRtools	Perdiz (2021)	https://github.com/ricoperdiz/NIRtools



FIG. S1. Principal Component Analysis (PCA) scatter plot based on geometric morphometrics and spectral dataset. Gray circles refer to the core specimens of *Ecclinusa nervosa* and its similar congeners (*E. guianensis*, *E. parviflora*, *E. psilophylla*, *E. ramiflora*, and *E. ulei*). The size of the gray circles represents the individual contribution regarding PCA.



FIG. S2. Membership probability from Discriminant Analysis of Principal Components (DAPC), where each vertical-colored bar represents an individual specimen and mixture groups refer to the incongruity between membership posterior assignments.



Fig. S3. Comparisons of *Ecclinusa nervosa* and its similar congeners by the first two Linear Discriminant axes (LD1) and (LD2) from Discriminant Analysis of Principal Components (DAPC).