

New Taxa of Lauraceae from South America

Henk van der Werff

Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri 63166-0299, U.S.A.

henk.vanderwerff@mobot.org

ABSTRACT. In this contribution the following new species of Lauraceae are described: *Cinnamomum floccosum* from Peru; five species of *Licaria*, *L. exserta* from Ecuador and *L. subsessilis* from Peru and Ecuador, *L. filiformis* from Peru, *L. sessiliflora* from Venezuela, and *L. rufotomentosa* from French Guiana; two species of *Mezilaurus*, *M. campaucola* from Peru, and *M. manausensis* from Brazil; one species of *Nectandra*, *N. tomentosa* from Ecuador and Peru; five species of *Ocotea*, *O. arenaria* and *O. multinervis* from Peru, *O. brevipetiolata*, *O. hirtostyla* and *O. scalariformis* from Ecuador; and one species of *Pleurothyrium*, *P. arcuatum* from Peru.

Key words: *Cinnamomum*, Lauraceae, *Licaria*, *Mezilaurus*, *Nectandra*, *Ocotea*, *Pleurothyrium*, South America.

Among Lauraceae specimens received as gift for identification or collected by staff of the Missouri Botanical Garden, several novelties were encountered. In this contribution 15 of these new species are published. More are certain to follow. None of the species described here are based on old collections, the oldest having been collected in 1982. Although most of the new species were collected in the Andes of Ecuador and Peru, it seems that new species of Lauraceae can be expected wherever intensive collecting takes place in the wet Neotropics.

1. *Cinnamomum* Schaeffer, Botanica Expeditior 74. 1760.

The Neotropical species of *Cinnamomum* were recently revised by Lorea Hernandez (1996). He recognized three species from Peru: *C. heteranthereum* (Ruiz & Pavón) Kostermans, only known from the type and characterized by its six 4-celled and three 2-celled stamens; the widespread *C. triplinerve* (Ruiz & Pavón) Kostermans; and *C. subsessile* (Meissner) Kostermans, characterized by its subsessile leaves with a rounded to cordate base. The last species was until recently only known from the type collected by Mathews in the 1830s but was re-collected in 2000 not far from the type locality. The new species described below differs markedly

from any of the known species in Peru and Ecuador. *Cinnamomum* includes about 350 species, mostly in tropical Asia; Lorea Hernandez recognized 47 species in the Neotropics.

1. ***Cinnamomum floccosum*** van der Werff, sp. nov. TYPE: Peru. Dept. Cajamarca: prov. San Ignacio, Santuario Nacional Tabaconas-Namballe, Camino al Cerro Coyona, 2500–2600 m, 20 Nov. 1998, C. Díaz, J. Sembrera & L. Adrianzen 10087 (holotype, MO 5593925; isotypes, HBG, K, NY). Figure 1.

A congeneris foliis basi cordatis vel rotundatis, venatione pagina superiori foliorum impressa et indumento floccoso valde recedit.

Trees, to 16 m. Twigs angular, solid, when young with a dense cover of straw-colored hairs, the hairs mostly ascending, the indument wearing off and becoming darker with age; terminal buds densely appressed pubescent. Leaves 5–11 × 3–6.5 cm, coriaceous, broadly elliptic to obovate, alternate and somewhat clustered toward the tips of the branches, the base obtuse to cordate, the margin flat, the apex obtuse or acute, the upper surface moderately floccose pubescent when young, becoming glabrous with age, the lower surface densely floccose pubescent, the hairs matted, the indument less dense with age and eventually becoming glabrous; domatia lacking; midrib and lateral veins and to a lesser degree tertiary venation impressed on the upper surface, raised on the lower surface; the basal 2 or 3 pairs of lateral veins crowded near the base of the lamina; lateral veins 5 to 8 on each side of the leaf; petioles to 5 mm long, with a similar indument to the twigs, shallowly canaliculate above. Inflorescences 5–10 cm, paniculate-cymose, in the axils of leaves, densely to moderately densely gray pubescent, the hairs ascending, the indument becoming sparser with age. Flowers yellow-green, 3–4 mm diam.; pedicels ca. 3 mm, less densely pubescent than the inflorescence axes; tepals 6, equal, 2 mm long, elliptic, glabrous or nearly so on the outer surface, sparsely pubescent on the inner surface, half-erect at anthesis; stamens 9, glabrous, 4-celled, the upper pair of cells sometimes much



MISSOURI
BOTANICAL GARDEN
HERBARIUM
Nº 5593923

Licaria exserta van der Wulff
Described by Hook. & Grev. 1830
Missouri Botanical Garden

LAURACEAE
cf. *Williamodendron* sp. nov.
ECUADOR
Det. W. Palacios (GCNE) 1991
NAPÓ
Estación Tena.
Estación Biológica Jatun Sacha,
8 km al este de Mishualli.
Bosque muy húmedo Tropical.
Bosque primario sobre suelos rojos
volcánicos.
77°36'W 01°04'S 400 m
Arbol de 30 m de altura. Olor muy
esquisito, fuerte y penetrante.
Las flores y frutos están
dispuestos en las axilas y en las partes
de la planta. Hojas subcoriáceas
brillantes. Flores amarillas. Tres
líneas amarillas en el
Walter Palacios & E. Freire 511
11 mayo 1990
MISSOURI BOTANICAL GARDEN HERBARIUM (MO)



MISSOURI
BOTANICAL GARDEN
HERBARIUM
Nº 5593925

PERU
Huasteca
Cinnamomum flaccidum A. Wulff

Cajamarca: San Ignacio
Tabacona. Santuario Nacional
Cayana. "Zona de afortiguamiento,
sector pajonal."
05°17'29"S 079°16'2"W 2500-2600 m
"Arbol 14 m, flores amarillo-verdosas,
ejes de la inflorescencia rojizo."
20 noviembre 1998
"C. Diaz,
J. Seabrera & L. Adrianzen" 10087
MISSOURI BOTANICAL GARDEN HERBARIUM (MO)

smaller and the anther appearing 2-celled, especially the inner 3 anthers, or inner 3 anthers 2-celled, stamens ca. 1.5 mm, the outer 6 with the cells opening introrsely, inner 3 opening extrorsely; filaments of the inner 3 stamens with 2 globose glands near the base, staminodia three, 1 mm, the apex triangular, the filament as wide as the tip, pubescent; pistil glabrous, 2.5 mm long, the ovary 1.5 mm, the style distinct; receptacle cup-shaped, pubescent inside. Tepals persisting and becoming enlarged, to 3 mm long, in old flowers and not dehiscing; fruits unknown.

Flowers in November.

Vegetatively, *Cinnamomum floccosum* is rather similar to *Aiouea dubia* (HBK) Mez, an Andean species known from southern Ecuador. Both species have somewhat tripliveined, obovate leaves; the major veins on the upper leaf surface can be impressed in *A. dubia*, although the tertiary venation is not impressed in the latter. *Aiouea dubia* has 2-celled anthers, although occasionally its anthers have a strongly reduced upper pair of locelli. The two species can be separated as follows: *C. floccosum* has 4-celled anthers (rarely anthers of the inner 3 stamens are 2-celled), floccose indument on leaves and twigs, mostly rounded to cordate leaf bases, and bullate leaves, while *A. dubia* has 2-celled anthers (rarely with rudiments of an upper pair of anther cells), glabrous or sparsely appressed pubescent twigs and leaves, acute to obtuse leaf bases, and the upper leaf surface flat or with impressed major veins.

Paratype. PERU. **Cajamarca:** Prov. San Ignacio, Santuario Nacional Tabaconas-Namballe, Camino al Cerro Coyona, 20 Nov. 1998, Díaz *et al.* 10116 (MO).

II. *Licaria* Aublet, Hist. Pl. Guiane fr. 1: 313. 1775.

The revision of *Licaria* (Kurz, 2000) has greatly increased our understanding of this genus and made a critical examination and identification of the many recent collections possible. It was a surprise to find two new species of the subgenus *Cannela*, thus almost doubling the number of species in this subgenus. *Licaria* is typically characterized by the presence of three 2-celled stamens. One of the species described here, *L. exserta* van der Werff, differs in having two flaps on each of the anther locelli, thus having stamens with four anther

flaps instead of two. This species also has the tepals united at the base and falling off as a unit in older flowers. Most species of *Licaria* have persistent tepals, and the position of *L. exserta* in *Licaria* is still provisional. *Licaria* is endemic to the Neotropics and includes about 50 species.

1. *Licaria exserta* van der Werff, sp. nov. TYPE: Ecuador. Napo Prov.: Jatun Sacha Biological Station, 400 m, 13 May 1990, W. Palacios & E. Freire 5111 (holotype, QCNE 38693; isotypes, AAU, B, CANB, HBG, K, MO, NY, P, TI, US, XAL). Figure 2.

Licariae polyphyllae similis, sed antheris longe exsertis, quadri-valvibus, tepalis patentibus recedit.

Trees, to 30 m. Twigs terete, initially densely appressed pubescent, glabrescent, the indument inconspicuous; terminal buds densely and finely appressed pubescent. Leaves 8–14 × 3–5 cm, elliptic, firmly chartaceous, alternate; base shortly decurrent on the petiole, reflexed, the margin otherwise plane, the apex acute; upper surface glabrous, lower surface very sparsely appressed pubescent or glabrous, midrib slightly raised or immersed, lateral veins and tertiary venation immersed on the upper surface, midrib raised, lateral veins slightly raised or immersed, tertiary venation immersed on lower surface; lateral veins 5 to 7 on each side; petioles 0.8–11.4 cm, glabrous, deeply canaliculate. Inflorescences 4–10 cm, paniculate-cymose, moderately densely appressed pubescent, in the axils of bracts near the tips of the branches. Flowers 3–4 × 1.5 mm, yellow, cylindrical, densely appressed pubescent; tepals 6, equal, 1.5 mm long, the basal 1 mm fused into a tube, the free lobes 0.5 mm long, tepals dehiscing in old flowers and falling off as a unit together with the stamens; tepals initially erect, but spreading in older flowers; stamens 3, 1.5 mm long, free, pressed together in young flowers but diverging in older flowers, the inner surface densely pubescent, the outer surface less so, the filaments as wide as the anthers, 1 mm long, the anthers ca. 0.5 mm exserted, each anther with 2 anther cells, these narrow, ca. 0.4 mm long, extrorse, opening upward, each cell with 2 valves, one attached at the tip of the cell, the other at the middle; staminodia not seen; no glands visible at the base of the filaments; pistil 2.5 mm, glabrous, the ovary 1 mm, turbinate, the style slender, stigma

←

Figures 1, 2. —1 (left). Holotype of *Cinnamomum floccosum* van der Werff. —2 (right). Isotype (MO) of *Licaria exserta* van der Werff. Insert: Detail of flowers.

very small and inconspicuous, receptacle deep, densely pubescent inside. Fruits and cupules unknown.

Flowers in February, May, and June.

Licaria exserta can be readily recognized by its flowers to 4 mm long, with exserted anthers, the dehiscing tepals in old flowers, the anther cells with two valves each, the spreading tepals, and the slightly decurrent leaf bases with an inrolled margin. Although this species can be identified without difficulties, its generic placement is not certain. The new species is described in *Licaria*, based on the shape of the flowers and its three fertile stamens with exserted anthers. However, the anther cells with two valves each and the dehiscing tepals are not found in other species of *Licaria*. The genus *Williamodendron* Kubitzki & H. G. Richter has three stamens with four locelli and four valves each; however, *Licaria exserta* differs from *Williamodendron* in its evenly distributed (not clustered) leaves, its deep (not shallow) receptacle, its cylindrical flowers with exserted anthers (not rounded with included anthers), and the extrorse (not apical) locelli. I do not think that *Licaria exserta* is closely related to *Williamodendron*, although it has three stamens with four valves each. *Williamodendron* is closely related to *Mezilaurus* and differs from that genus only in its anthers with four, rather than two, locelli.

Kurz (2000) recognized three subgenera in *Licaria*; the new species belongs in the subgenus *Licaria* because the locelli are extrorse and open upward. The partly fused tepals and the cylindrical flowers indicate a similarity with *L. quirirafuina* Kostermans and *L. oppositifolia* (Nees) Kostermans, but *L. exserta* has larger flowers (3–4 mm vs. 1–2 mm) with long-exserted anthers, spreading tepals that dehisce in old flowers, and recurved leaf bases. The new species is only known from the Jatun Sacha Biological Station in Ecuador. Three of the four collections came from the same, tagged tree, and it is possible that the fourth collection also came from that tree. One collector mentioned that all parts of the plant were very fragrant.

Paratypes. ECUADOR. **Napo:** Jatun Sacha Biological Station, 16 Feb. 1999, Neill & QCNE Botany Interns 12301, 17 Feb. 1999, Neill 11865, 28 June 1994, Tirado 995 (all MO, QCNE).

2. *Licaria filiformis* van der Werff, sp. nov.

TYPE: Peru. Amazonas: Prov. Bagua, Comunidad Aguaruna Putuim, 600 m, 25 Sep. 1994, C. Díaz, A. Peña & P. Atamain 7238 (holotype, MO 5593922; isotypes, HBG, MO, NY). Figure 3.

A congeneris floribus parvis inflorescentiisque filiformibus et cupulis laevibus recedit.

Shrub or small tree, to 6 m. Twigs terete, solid, slender, glabrous or with a few appressed hairs near the tip; terminal buds slender, finely appressed pubescent. Leaves 6–16 × 2–5 cm, elliptic, narrowly elliptic or oblong, chartaceous, alternate, the base acute, obtuse or rounded, the apex acute or acuminate, the acumen to 1 cm long, glabrous on both surfaces, midrib, lateral veins, and tertiary venation immersed on the upper surface, midrib raised, lateral veins and tertiary venation weakly raised on the lower surface, lateral veins 5 to 7 on each side, petioles 10–15 mm, glabrous, canaliculate. Inflorescences 5–8 cm, in the axils of bracts near the tips of the twigs, racemose or with a few cymose branches, glabrous. Flowers 1–1.2 mm diam., green, pedicels 5–9 mm long, threadlike, glabrous; tepals 6, equal, glabrous, 0.8 mm long, broadly ovate, the outer 3 erect, the inner 3 incurved; stamens 3, 2-celled, the locelli apical and opening outward, the tips of the stamens pressed together and with papillose margins, leaving only a small central pore for the stigma; old staminodia sometimes present on the cupule, 0.7 mm long, 0.5 mm wide near the tip, with some hairs near the base; pistil not studied for lack of sufficient flowers. Fruits ellipsoid, 2.2 × 1.4 cm, cupule deeply cup-shaped, 1 cm high, 1.4 cm diam., smooth, seemingly with a single margin, but a small, inner margin present; tepals sometimes persisting as small teeth on the cupule.

Flowers in August and September; fruits in September.

Licaria filiformis is an inconspicuous and poorly known species. It is readily recognized by its small flowers, slender inflorescences, often obtuse or rounded leaf bases, and the smooth cupule, which appears to have a single margin. It belongs to subgenus *Licaria* (Kurz, 2000); in Kurz's treatment it will key to *L. misantlae* (Brandeggee) Kostermans, a Central American species, with which it shares the

→

long (to 9 mm) pedicels. *Licaria misantlae* differs in its double-margined cupules, larger flowers (to 2.5 mm diam.), and distribution. The two collections of *L. filiformis* both came from a vegetation type locally called campau, forest on sandstone covered by a thick layer of leaf debris, but without a soil layer.

Paratype. PERU. **Amazonas:** Prov. Bagua, km 92 Carretera Bagua–Imacita, Cerros Chinim, 25 Aug. 1996, C. Díaz, A. Peña & M. Roca 7952 (MO).

3. *Licaria rufotomentosa* van der Werff, sp. nov.

TYPE: French Guiana. Carbet Grillon, 80 m, 9 Mar. 1999, B. Dutrève & F. Crozier 7 (holotype, MO; isotypes, CAY, K, NY, P, US). Figure 4.

A ceteris speciebus *Licariae* subgeneris *Cannellae* foliis subtus rufo-tomentosis, obovatis et ramulis juvenalibus rufo-tomentosis recedit.

Trees, 25 m. Twigs terete or ridged, seasonal growth densely dark red-brown tomentose, the surface completely covered; older twigs becoming glabrous; terminal buds densely tomentose. Leaves 8–18 × 3.5–7 cm, elliptic-obovate to obovate, coriaceous, grouped near the tips of the branches, alternate, the base obtuse or cordate, the margin often bent downward, the apex shortly acuminate, the upper surface glabrous except for some tomentose indument on the basal part of the midrib, the lower surface reddish tomentose, completely covered by the indument, the indument darker along the midrib; midrib, lateral veins, and tertiary venation slightly raised on the upper surface, midrib and lateral veins raised, tertiary venation not visible on the lower surface; lateral veins 7 to 10 on each side; petioles 6–10 mm, with a similar indument to the twigs, ± terete. Inflorescences 2 cm long, paniculate-cymose, densely tomentose, the surface completely covered by the indument, in the axils of leaves or bracts. Flowers ca. 2 mm long, globose or ellipsoid, densely tomentellous, the hairs shorter than those on the inflorescence axes, pedicels as long as or slightly longer than the flowers; tepals six, ca. 0.5 mm long, triangular or broadly triangular, equal or the outer 3 slightly larger, much shorter than the receptacle, densely tomentellous outside, glabrous inside, outer 6 stamens staminodial, tepaloid, a little smaller than the tepals, fertile stamens 3, representing whorl III, ca. 1 mm long, the basal part pubescent, the distal part glabrous,

anther cells 2 longitudinal slits, introrse-latrorse, not opening with valves, glands, if present, fused with the broadened base of the stamens and difficult to discern; inner staminodia (whorl IV) not seen; pistil glabrous, 1.3 mm long, the ovary globose, 0.4 mm diam., style slender, stigma not distinct; receptacle deep, brown-pubescent inside. Inflorescences short, excluding fruit to 5 cm, cupule 2.5–3 cm long, 3–3.5 cm diam., 1.5 cm deep, the outer margin spreading, fruit ellipsoid, ca. 3 cm long.

Flowers and fruits in March.

Licaria rufotomentosa is easily recognized by the ferruginous indument on the lower leaf surface, young twigs, and inflorescences. The clustered leaves, the introrse-lateral anther cells, and the large (to 3.5 cm diam.) cupules place the new species in *Licaria* subg. *Cannella*. It is closely related to *L. cannella* (Meissner) Kostermans, a variable species with three varieties (Kurz, 2000). In leaf characters (short petioles, leaf bases obtuse or rounded) the new species resembles the variety *tenuicarpa* (Kostermans) Kurz, but the tomentose indument on leaves and twigs is not known from any species of the subgenus *Cannella*.

The basionym of *Licaria cannella* is *Aydendron cannella* Meissner (Meissner, 1864). Later, Meissner (1866) used the spelling “*canella*” instead of “*cannella*” in the *Flora Brasiliensis* treatment, and this spelling has been used by all later authors. The spelling *cannella* in Meissner (1864) was probably based on the common name (Bois cannelle) cited in the original publication. Because *cannella* does not seem to be a typographical or orthographical error, article 60.1 of the *Code* (Greuter et al., 2000) requires that the original spelling be retained.

4. *Licaria sessiliflora* van der Werff, sp. nov.

TYPE: Venezuela. Estado Amazonas: Río Pasimoni, 4 Nov. 1994, B. Stergios, M. Niño, I. Sikoura, N. Piven, P. Martinez & N. Friederich 16276 (holotype, PORT; isotype, MO). Figure 5.

A congeneris floribus sessilibus tubulosisque, foliis reticulatis differt.

Tree, 8 m. Twigs terete, glabrous; terminal buds glabrous. Leaves 9–12 × 3–4 cm, elliptic or obovate-elliptic, glabrous on both surfaces, alternate or the two distal leaves subopposite, coriaceous, the

→

MISSOURI
BOTANICAL GARDEN
HERBARIUM

Nº 5593919



PERU Holotype
Licaria subsessilis van der Werff

Cajamarca: San Ignacio.

San José de Lourdes. Localidad de
Licaria. Elevación: 2300 m.
04°58'00"S 078°53'1"W. 2250-2300 m

Arbol 14 m. botones blancos.
02 Diciembre 1998

J. Campos, L. Zurita & H. Camilan 5874
MISSOURI BOTANICAL GARDEN HERBARIUM (MO)

MISSOURI
BOTANICAL GARDEN
HERBARIUM

Nº 5593920



Licaria sessiliflora van der Werff
Determined by Henk van der Werff 199
Missouri Botanical Garden

Isotype

PLANTAS DE VENEZUELA
HERBARIO UNIVERSITARIO (PORT)
UNELLEZ GUANARE

NYCTAGINACEAE

Nº 16276

Nicea sp.
Det. A. Liana & M. Nido, 1995

Arbol de 8 m. Botones florales rosados, fragantes.

ESTADO AMAZONAS. Segunda laguna en río Psaron y orillas del mismo.
Misión Proyecto Varidos, Convenio IVC-NEBA-UNELLEZ
4 de noviembre de 1994

Col. B. Stegova, M. Nido, I. Sikora, N. Pivent, P. Martínez y N. Friederich

base acute or cuneate, the apex bluntly acute or obtuse, tertiary venation raised on both surfaces, midrib and lateral veins slightly raised on both surfaces; lateral veins 3 to 5 pairs; petioles 1.3–1.8 cm, strongly canaliculate. Inflorescences in the axils of bracts near the terminal buds, to 6 cm long, panicle-cymose, toward the flowers minutely brown-puberulous. Flowers pink, sessile, the persistent bracts clasping the base of the flowers, tubular, 3–4 mm long; tepals 6, erect, much shorter than the floral tube, ca. 0.5 mm long; stamens 3, 2-celled, exerted at anthesis, the anther cells lateral or lateral-apical, opening sideways; staminodia 6, representing the outer 2 whorls, lanceolate, fragile, 1 mm long or more, just visible inside the flower and reaching the tips of the tepals; staminodia of whorl IV and glands at the base of the filaments of the stamens not seen; pistil glabrous, ca. 2 mm long, receptacle glabrous inside. Fruit unknown.

Flowers in November.

Licaria sessiliflora is a distinct species due to its sessile flowers, persistent bracts, and leaves with raised reticulation. Kurz (2000) recognized three subgenera in his revision of *Licaria*, primarily based on the opening of the anther cells. In the subgenus *Cannella* Kurz the anther cells open by slits and do not have flaps; in subgenus *Armeniaca* Kurz the anther cells open by flaps attached at the base of the anther cells, while in subgenus *Licaria* the anther cells open by flaps attached at the top of the anther cells. This new species does not fit in any of his subgenera: the flaps are attached laterally rather than at the top or bottom of the anther cells. Only one other species has anther cells opening in the same way: *L. debilis* (Mez) Kostermans, but this species has opposite, chartaceous leaves, lacks the raised reticulation, and has globose to ellipsoid flowers. The raised reticulation is shared with *L. puchury-major* (Martius) Kostermans, but the latter species has the anther cells opening by slits and lacks the flaps present in nearly all other species. Thus, the relationships of the new species are not clear.

5. *Licaria subsessilis* van der Werff, sp. nov.

TYPE: Peru. Depto. Cajamarca: Prov. San Ignacio, Distr. San José de Lourdes, Cerro Picorana, 2250–2300 m, 2 Dec. 1998, J. Campos, L. Zurita & M. Camizan 5874 (holotype, MO 5593919; isotypes, HBG, MO, NY, US). Figure 6.

A ceteris speciebus subgeneris *Cannellae* inflorescentiis floribusque tomentosis, foliis subsessilibus, basi rotundatis recedit.

Trees, 15 m. Twigs terete or angular, glabrous, solid, terminal buds glabrous or nearly so. Leaves 5–17 × 3–6.5 cm, coriaceous, alternate and clustered near the tips of the twigs, broadly elliptic to elliptic-obovate, the base rounded, rarely obtuse or cordate, to attenuate, the margins flat or slightly incurved, the apex obtuse or very shortly acuminate; glabrous on both surfaces, the lower surface densely gland-dotted; midrib slightly raised, lateral veins and tertiary venation immersed on the upper surface, midrib, lateral veins, and tertiary venation raised on the lower surface; lateral veins 6 to 10 on each side; petioles to 1 cm long, thick, flat above, glabrous. Inflorescences 2–12 cm long, panicle-cymose, in the axils of leaves, densely red-brown tomentose, the surfaces completely covered. Flowers globose or a little longer than wide, ca. 3 mm diam., pedicels at anthesis about as long as the flowers or slightly shorter, the flowers often nodding; tepals 6, ca. 1.5 mm long, difficult to separate from the receptacle because of the dense indument, equal or nearly so, triangular, tomentose on the outer surface, glabrous on the inner surface, outer 6 stamens staminodial, tepaloid, slightly smaller than the tepals; functional stamens 3, representing whorl III, 1.5 mm long, the anther cells appearing as longitudinal slits on the inner surface of the anthers, glands of the inner stamens lacking or completely fused with the filaments, staminodes of whorl IV not seen; pistil glabrous, 2 mm long, the receptacle deep, pubescent inside. Cupules with coarse warts, ca. 3 cm high, 4 cm diam., the margin 8 mm thick, fruits 3–4 × 3 cm.

Flowers in December and March; fruits in March.

The anther cells opening as introrse slits and the clustered leaves place *Licaria subsessilis* in subgenus *Cannella*. It differs from the other species in this subgenus in its tomentose inflorescences and flowers and its glabrous leaves. The lower leaf surface is densely gland-dotted. Its high-altitude habitat is also uncommon in *Licaria*. Three collections from southern Ecuador (Prov. Zamora Chinchipe, Estación Científica San Francisco, 2100 m alt.) differ from typical *L. subsessilis* in having an attenuate or acute leaf base, obovate-elliptic leaves, and petioles 5–10 mm long. At first I considered these specimens to represent a distinct species closely related to *L. subsessilis*. However, a very recent collection from this locality fits typical *L. subsessilis* perfectly. Because I think it highly unlikely that two closely related species, differing only in leaf characters, occur in the same locality, and because *L. cannella*, a lowland species closely related to *L.*

subsessilis, is quite variable in leaf characters, I provisionally place the specimens with attenuate leaf bases, obovate-elliptic leaves, and distinct petioles in *L. sessilis*. Additional collections may well show that two species are involved, but as long as these collections are not at hand, it seems better to accept that *L. sessilis* is variable in leaf characters.

Paratypes. ECUADOR. **Zamora Chinchipe:** Estación Científica San Francisco, 30 km E of Loja on road to Zamora, 2100 m, (fl, fr), *Chimbo & Chamba* 95 (LOJA, MO, QCNE), (fl), *Homeier & Scheffer* 303 (MO, QCNE), (fr), *Neill & QCNE Botany Interns* 12619, 12620 (MO, QCNE).

III. *Mezilaurus* Taubert, Bot. Centralbl. 50: 21. 1892.

Mezilaurus is a small Neotropical genus with ca. 20 species. It was revised by van der Werff (1987) who accepted 18 species; however, 2 species were later transferred to the new genus *Williamodendron* (Kubitzki & Richter, 1987). The latter genus differed from *Mezilaurus* in its three 4-celled rather than 2-celled stamens. The androecium of *Mezilaurus* is thus similar to that of *Licaria*, but *Mezilaurus* differs from that genus in its clustered (not alternate) leaves and in its fruit, subtended by a small disc and not seated in a deep cupule as in *Licaria*.

1. *Mezilaurus campaucola* van der Werff, sp. nov. TYPE: Peru. Depto. Amazonas: Prov. Condorcanqui, Distr. El Cenepa, Cerro Tutino, 600 m, 24 June 1997, *R. Vásquez, A. Peña, E. Chavez, E. Quiaco & A. Ampam* 24170 (holotype, MO 5593918; isotypes, HBG, K, NY, US). Figure 7.

Foliis apice obtusis, floribus glabris, pedicellatis *Mezilauri navalii* similis, sed foliis latioribus, staminibus dense pubescentibus et floribus latioribus quam longioribus recedit.

Trees to 20 m. Twigs terete, glabrous, with conspicuous scars of fallen leaves near the tips, terminal buds appressed pubescent. Leaves 8–16 × 4–7 cm, obovate or obovate-elliptic, coriaceous, clustered near the tips of the branches, the base attenuate, gradually narrowed into the petiole, the margin flat, the apex obtuse, rounded or emarginate; glabrous on both surfaces; midrib, lateral veins, and tertiary venation weakly raised on the upper surface, midrib raised, lateral veins and tertiary venation weakly raised on the lower surface; lateral veins 7 to 10 on each side; petioles poorly distinguishable due to the decurrent leaf bases, 1–2.5

cm long, glabrous, flat. Inflorescences 3–8 cm, in the axils of bracts near the tips of the branches, paniculate, the flowers clustered at the tips of the secondary axes or a few racemose along the secondary axes; glabrous or with a few appressed hairs. Flowers yellow, ca. 1.5 mm wide, 1 mm long (excluding the exerted anthers), pedicels 2–3 mm long, glabrous; tepals 6, broadly triangular, 0.5 mm wide, wider than long, glabrous on the outer surface, pubescent on the inner surface, erect or slightly incurved at anthesis; stamens 3, ca. 1 mm long, free, the densely pubescent filaments as wide as the glabrous anthers, anthers 2-celled, the cells extrorse, opening back to back, staminodia and glands not seen, pistil glabrous, 1.5 mm, the ovary ca. 1 mm, distinct from the slender style, stigma inconspicuous; receptacle bowl-shaped, glabrous inside. Fruits ± round, 2 cm diam., the tepals persisting and forming a disc with the receptacle, 5 mm diam.; pedicel not swollen in fruit.

Flowers in June, September, October, and November; fruits in June and October.

In the most recent revision of *Mezilaurus* (van der Werff, 1987), *Mezilaurus campaucola* would key to *M. navalium* (Allemão) Taubert ex Mez because of its glabrous leaves with rounded apices and its pedicellate, glabrous flowers. *Mezilaurus navalium* is only known from the Atlantic rain forests in southern Brazil and differs from the new species in its narrow leaves (to 3.5 cm wide vs. 4–7 cm wide in *M. campaucola*), and the shape of its flowers (longer than wide vs. wider than long in *M. campaucola*). It also has chartaceous leaves, while *M. campaucola* has coriaceous leaves. The epithet *campaucola* is derived from campau, the Aguaruna name for the soil type to which this species is restricted. Campau indicates soils not suitable for cultivation; these are mostly shallow soils on sandstone, covered with a thick, spongy humus layer. The vegetation on these soils is generally a low forest. Several species found on sandstone outcrops in the campau show a relationship with the flora of the sandstone mountains in the Venezuelan Guayana, such as *Euceraea nitida* Martius (Flacourtiaceae) and *Aratitiopea* Steyermark & P. E. Berry (Xyridaceae).

The epithet is the deliberate choice of the author (Art. 23.2, St. Louis Code, Greuter et al., 2000) and is not to be regarded as a correctable error.

Paratypes. PERU. **Amazonas:** Prov. Bagua, Comunidad de Kampaenza, 25 Sep. 1994, *Jaramillo et al.* 502 (MO); Comunidad Agauruna de Kusu-Listra, Cerro Apag, 18 Nov. 1996, *Díaz et al.* 8518 (MO); Comunidad de Wawas, Tayu Mujaji, 25 Oct. 1997, *Rojas et al.* 473, 496 (MO).

2. ***Mezilaurus manausensis*** van der Werff, sp. nov. TYPE: Brazil. Amazonas: Mun. de Manaus, Reserva No. 2206 do projeto Dinamica Biologica de Fragmentos Florestais, Tree no. 1745, *Mackenzie e equipe s.n., INPA/WWF 2206.1745* (holotype, MO 5593904). Figure 8.

Mezilauro micranthae similis, sed foliis chartaceis, floribus glabris, supra basin constrictis et indumento gemmarum terminalium ascendenti recedit.

Trees, height unknown; trunks to 18 m. Twigs terete, corky, initially appressed or ascending pubescent, soon becoming glabrous, with conspicuous scars of fallen leaves; terminal buds densely pubescent, the hairs ascending. Leaves 8–27 × 3–8.5 cm, elliptic to elliptic-obovate, chartaceous, clustered near the tips of the twigs, the base gradually narrowed into the petiole, the petiole often slightly winged, the margin flat, the apex acute; the upper leaf surface glabrous, the lower surface glabrous or with some appressed hairs along the major veins; midrib raised, lateral veins slightly raised and tertiary venation immersed on the upper surface, midrib, lateral veins, and tertiary venation raised on the lower surface; lateral veins 7 to 10 on each side; petioles poorly differentiated from the leaf base, 1–1.5 cm long, thickened at the base, terete or flat on the upper side. Inflorescences 3–7 cm, paniculate, glabrous, in the axils of bracts at the tips of the twigs, the flowers clustered at tips of the secondary axes, bracts pubescent, present at the base of the secondary axes and flowers. Flowers glabrous, 1.5 mm long, 2 mm wide, constricted above the base, the tepals erect, pedicels 3–4 mm long. Tepals 6, subequal, the outer 3 a little shorter than the inner 3, broadly triangular, the inner 3 ca. 0.5 mm long, the outer three 0.3–0.4 mm long; stamens 3, 0.8 mm long, the filament as wide as the anther, pubescent on the inner surface, shortly exerted, the anther cells visible above the shorter, outer tepals, anthers 2-celled, the cells extrorse, rather small, opening back to back; staminodia and glands not seen; pistil glabrous, 1.5 mm long, the slender style as long as the ovary; receptacle deeply cup-shaped, pubescent inside. Fruits ellipsoid, 2.5 × 1.3 cm, tepals persisting in fruiting stage, in young fruits clearly recognizable, in mature fruits transformed into a lobed disc, 5 mm diam.

Flowers in May and September; fruits in December and January.

Species of *Mezilaurus* are difficult to recognize due to their similarity in vegetative characters and small flowers. In the key to *Mezilaurus* species in van der Werff (1987), *M. manausense* would key to *M. sprucei* (Meissner) Taubert ex Mez, which differs in its long-pedicellate flowers, or *M. micrantha* van der Werff, which differs in its slightly pubescent flowers that are not constricted above the base, its clearly exerted anthers with large anther cells, and the strictly appressed indument of the terminal buds. Although the differences between *M. micrantha* and the new species are not striking, I describe *M. manausensis* as a new species because of its indument and floral differences from *M. micrantha*. The new species is only known from a number of specimens collected on plots made for the Biological Dynamics of Forest Fragments Project north of Manaus, Brazil.

Paratypes. BRAZIL. **Amazonas:** Mun. de Manaus, Projeto Dinamica Biologica de Fragmentos Florestais, flowering specimens: *Reserva 1301, tree 3221; 3258; 3412; 3587; 4106; Reserva 2303, tree 1707* (all MO); fruiting specimens: *Reserva 1113, tree 35; Reserva 1301, tree 5154; Reserva 3402, tree 971* (all MO).

IV. ***Nectandra*** Rolander ex Rottboell, Acta Lit. Univ. Hafn. 1: 279. 1778.

Nectandra is a rather large genus of about 115 species, recently revised by Rohwer (1993). No flowering material of the species described below was available during the preparation of his revision, and the fruiting specimens that were available were insufficient for a description. Recent flowering collections are the basis for the following description.

1. ***Nectandra tomentosa*** van der Werff, sp. nov.

TYPE: Ecuador. Zamora-Chinchipe: Campamento Miazí along Rio Nangaritza, 900 m, 19 Feb. 1994, *H. van der Werff, B. Gray, E. Freire & M. Tirado 13268* (holotype, QCNE 104809; isotypes, AAU, HBG, MO, QRS). Figure 9.

A congeneris foliis cordatis, ramulis ferrugineo-tomentosis recedit.

Trees, 25 m tall. Twigs angular, ferruginous-tomentose, terminal buds tomentose. Leaves 13–30 × 4–10 cm, alternate, firmly chartaceous, elliptic to oblong, the apex sharply acute to acuminate, acumen to 3 cm long, toward the base gradually narrowed and at the base abruptly cordate; midrib

←

MISSOURI
BOTANICAL GARDEN
HERBARIUM
Nº 5593905



ECUADOR
Isatya
LAURACEAE
Nectandra tomentosa van der Werff
Zamorá-Chinchipe

Campesanto Mazi, in forest and cliffs
along Rio Manganitza. Forest on peaty
soil.
900 m

Tree, 15 m. Flowers white. Fruits
green. Young twigs rusty tomentose.

H. van der Werff, 19 February 1994.
B. Gray, E. Freyre & M. Tirado 13288
MISSOURI BOTANICAL GARDEN HERBARIUM (MO)

MISSOURI
BOTANICAL GARDEN
HERBARIUM
Nº 5593908



PERU
Xyris sp.
LAURACEAE
Xyris sp.
Amazonas

Scrub on sandy soil with rock
outcrops. Utricularia, Eriocaulaceae,
Xyris, Sphagnum present. A few km from
Molinapampa.

Tree, 5 m. Flowers greenish. Pedals
spreading at anthesis. Flowers
pickled, DNA.

14 March 1998

Henk van der Werff,
B. Gray, R. Vasquez & R. Rojas 14941
MISSOURI BOTANICAL GARDEN HERBARIUM (MO)

and lateral veins impressed on the upper surface, prominently raised on the lower surface, tertiary venation immersed on the upper, raised on the lower surface; upper surface glabrous or with some appressed hairs along the major veins, lower surface glabrous or nearly so, but midrib and lateral veins minutely puberulous, the hairs appressed to ascending; axillary tufts of hairs absent; lateral veins 7 to 10. Petioles 5–10 mm long, with a similar indument to the twigs. Inflorescences in the axils of normal leaves, panicle-cymose, to 15 cm long, the main axes tomentose, changing to appressed pubescent on the higher-order axes. Flowers white or green-yellow, 3–4 mm diam.; tepals 6, equal, ca. 1.6 mm long, $\pm$ spreading at anthesis, inside with the base sparsely papillose, the upper half densely so, outside sparsely appressed pubescent; base of tepals united and tepals falling off in old flowers as a unit. Stamens 9, 4-celled, ca. 0.5 mm long, with a distinct filament, a sterile tip lacking, the cells arranged in a shallow arc with the lower pair shifting toward a lateral position; staminodia 3, stipitiform. Pistil glabrous, ca. 1 mm long, the style about as long as the ovary. Receptacle inside basally glabrous, the upper part appressed pubescent. Fruit ellipsoid, 1.8×1.2 cm, cupule shallowly cup-shaped, warty, toward the base narrowed into the swollen pedicel.

Flowers in December, February, and March; fruits in September, December, and January.

Nectandra tomentosa is only known from the valley of the Rio Nangaritza, Ecuador, and adjacent Peru where it is fairly common along rivers and in forests adjoining the rivers on alluvial soil. Diagnostic for this new species is the combination of tomentose twigs and leaves with a cordate base. Floral characters such as stamens with distinct filaments, a relatively long style, and the absence of a sterile tip of the anthers indicate a close relationship to the *N. membranacea* complex of Rohwer (1993). Within this complex it is obviously close to *N. cordata* Rohwer, which has similar leaves with a cordate base. However, *N. cordata* has sparsely appressed pubescent twigs and inflorescences, quite unlike the indument in *N. tomentosa*; it is only known from the type, collected near Balsa-puerto, Loreto, Peru. Fruiting specimens of *N. tomentosa* have been annotated by me previously as *N. cordata* and *N. cuneato-cordata* Mez and may have been distributed under those names.

Paratypes. ECUADOR. **Zamora-Chinchipe:** Rio Nangaritza, 12 Dec. 1990, Neill & Palacios 9718A (MO, QCNE), 6 Dec. 1990, Palacios & Neill 6576 (MO, QCNE), 7 Dec. 1990, Palacios 6602 (MO, QCNE), 7 Dec. 1990, Neill 9577 (MO, QCNE), 28 July 1993, Gentry 80529 (MO), 20 Feb. 1994, van der Werff et al. 13333 (MO, QCNE, QRS). PERU. **Amazonas:** Prov. Condorcanqui, Rio Cenepa, Mamayaque, 20 Feb. 1997, Vásquez et al. 22651 (MO); Prov. Bagua, Dto. Imaza, Kusu-Listra, 19 Sep. 1996, Díaz et al. 8297 (MO); along road Chiriaco-Bagua, 20 Mar. 2001, van der Werff et al. 16242 (CANB, MO); Yamayakat, 6 Nov. 1996, Vásquez et al. 21558 (MO), 20 Jan. 1973, Kayap 192 (MO).

V. *Ocotea* Aublet, Hist. Pl. Guiane 2: 780. 1775.

Ocotea is the largest genus of Lauraceae in the Neotropics, with at least 300 species. A few species occur in Africa, and about 30 are known from Madagascar. Because of its size and lack of recent treatments, *Ocotea* species are difficult to identify or recognize. Additional species will almost certainly need to be described. Rohwer's (1986) synopsis of the genus has been helpful in our understanding of the species, but much work remains to be done, especially on the South American species. The Central American species have been treated by van der Werff (2002). A recent DNA-based phylogeny of Lauraceae (Chanderbali et al., 2001) has indicated that *Ocotea* is polyphyletic and that the species with bisexual flowers need to be separated from the species with unisexual flowers.

1. *Ocotea arenaria* van der Werff, sp. nov.
TYPE: Peru. Amazonas: vicinity of Molinapampa, 14 Mar. 1998, H. van der Werff, B. Gray, R. Vásquez & R. Rojas 14941 (holotype, MO 5593908; isotypes, B, HBG, K, NY, QRS, TI, US). Figure 10.

Ocoteae sericeae similis, sed floribus minoribus, tepalibus intus dense pubescentibus, inflorescentiis late paniculatis recedit.

Small, dioecious trees, to 7 m. Twigs angular or ridged, solid, densely brown-tomentellous, the surface completely covered by the indument, this turning darker with age and finally wearing off; terminal buds densely brown-tomentellous. Leaves 6–11 $\times$ 1.5–2.5 cm, stiffly chartaceous, alternate, lanceolate or narrowly elliptic, the base sharply acute, narrowly decurrent on the petiole, the margin plane or slightly revolute near the base, the apex acute, sometimes bluntly so; midrib, secondary veins, and tertiary venation raised on the upper surface, the

←

Figures 9, 10. —9 (left). Isotype (MO) of *Nectandra tomentosa* van der Werff. Insert: Cupule and fruit. —10 (right). Holotype of *Ocotea arenaria* van der Werff.

tertiary venation forming a fine reticulum, midrib raised, lateral veins and tertiary venation immersed or weakly raised on the lower surface; upper surface glabrous and shiny, on young leaves some short, curly hairs present near the base, lower leaf surface densely appressed pubescent, the surface completely covered, the indument not sericeous, venation lines generally visible on young leaves, but not on older leaves; domatia absent; lateral veins 11 to 14 pairs, weakly developed and difficult to count; petioles 7–13 mm, flat above, with a similar indument to the twigs, the leaf bases often narrowly decurrent on the petioles. Inflorescences 6–14 cm, panicle-cymose, densely tomentellous, the surface not visible, in the axils of leaves. Flowers green, 3–4 mm diam. when tepals erect, 5–6 mm diam. when tepals spreading; staminate flowers: tepals 2 mm long, broadly ovate, spreading at anthesis, densely brown-tomentellous outside, densely pubescent on the inner surface, both surfaces covered by the indument, stamens 9, 4-celled, the outer 6 stamens 1.2 mm, the filament pubescent, much shorter than the anther, anther cells opening introrse, inner 3 stamens 1.5 mm, the filament pubescent, about as long as the anther, glands present at the base of the filament, staminodia not seen, pistillode 1.5 mm, with a well-developed style and a thickened base, receptacle deep, pubescent near the upper rim, otherwise glabrous; pistillate flowers: tepals as in staminate flowers, but erect or half-erect at anthesis, staminodia 9, 0.6 mm, glands present at the base of the inner 3 staminodia, pistil 1.5 mm, the style about as long as the ovary, a stigma well-developed; receptacle deep, glabrous inside. Fruits and cupule unknown.

Flowers in March.

The dense, more or less appressed indument on the lower leaf surface, the venation lines, and the much-branched inflorescences place *O. arenaria* in the *O. guianensis* group of Rohwer (1986). Within this group its closest relative is *O. sericea*, a high-altitude species reported from Venezuela, Colombia, and Ecuador. This species differs from *O. arenaria* in having wider leaves with a sericeous indument and a sharp, almost mucronate apex, tepals ca. 3 mm long and nearly glabrous on the inner surface, and larger stamens and pistil. *Ocotea arenaria* is presently only known from the vicinity of Molinapampa, at an altitude of 2300 m, near Chachapoyas, in the Department of Amazonas,

Peru, where it was found in scrub on sandy soil, with several indicators of poor soils, such as *Utricularia* L., Eriocaulaceae, *Xyris* L., *Sphagnum* L., *Pterozonium brevifrons* (A. S. Smith) Lellinger, and *Doryopteris crenulans* (Fée) H. Christ. A few collections from Colombia, as yet unidentified, are close to *O. arenaria*, but differ in details of the indument. None of these collections have flowers, but two have fruits seated in double-margined cupules. Double-margined cupules are known to occur in two lowland species of the *O. guianensis* group, but had not been reported from Andean species at higher altitudes.

Paratype. PERU. **Amazonas:** a few km from Molinapampa in scrub on nutrient-poor sandstone, 13 Mar. 1998, *van der Werff et al.* 14838 (MO).

2. *Ocotea brevipetiolata* van der Werff, sp. nov.

TYPE: Ecuador. Prov. Zamora-Chinche: along new road Loja-Zamora, 2500 m, 25 Apr. 1987, *H. van der Werff & W. Palacios* 9004 (holotype, QCNE 167077; isotypes, AAU, HBG, K, MO, NY, US). Figure 11.

Ex affinitate *Ocoteae floribundae*, sed petiolis per brevibus, foliis basi rotundatis vel obtusis et floribus dense pubescentibus recedit.

Dioecious shrubs or trees to 20 m. Twigs ridged to clearly angular, glabrous. Terminal buds protected by glabrous bracts, inner bracts sometimes pubescent or with pubescent margins; bracts sometimes persisting as small, leaflike structures, to 2 cm long; scars of fallen bracts not clustered. Leaves 6–10 × 2.5–4 cm, rarely 15 × 8 cm, broadly elliptic to obovate-elliptic, alternate, frequently grouped together near the tips of the branches, coriaceous, glabrous on both surfaces, the base obtuse to rounded, the apex bluntly acute or obtuse; midrib, lateral veins, and tertiary venation immersed on the upper surface, midrib raised, lateral veins immersed and tertiary venation slightly raised on the lower surface; lateral veins 5 to 7 on each side; petioles 1–2 mm long, glabrous, flat above, the leaves nearly sessile. Inflorescences to 7 cm long, panicle-cymose or racemose when small, near the base moderately or sparsely pubescent, the hairs ascending to erect, toward the flowers becoming densely tomentellous, the indument largely or entirely covering the surface; in the axils of leaves or bracts near the tips of the branches, often appearing terminal, but a terminal, vegetative bud al-

→

MISSOURI
BOTANICAL GARDEN
HERBARIUM
Nº 5593910



LAURACEAE
Ocotea microphylla van der Werff
ECUADOR

NAPO
Cantón Tena.
Estación Biológica Jatun Sacha,
Provincia de Napo.
Bosque muy húmedo Tropical.
Bosque primario sobre suelos rojos
de colinas.
77°36'W 01°04'S
400 m
Arbolito delgado de 6 m de altura;
5 cm DAP. Hojas coriáceas, envés con
nervaduras perdas. Flores masculinas
verdes.
13 mayo 1990
Walter Palacios & F. Freire 5100
MISSOURI BOTANICAL GARDEN HERBARIUM (MO)

MISSOURI
BOTANICAL GARDEN
HERBARIUM
Nº 5593916



LAURACEAE
Ocotea brevipetiolata van der Werff
ECUADOR

Prov. ZACRA ORINDIPE: Along new road
Loja-Zamora, high cloud forest on
partly well with Spelman and Turfstrahl
flashes.
2200 m
Small tree, 4 m. Flowers whitish,
visited by small insects.
25 Apr. 1997
H. van der Werff & A. Palacios 9004
MISSOURI BOTANICAL GARDEN HERBARIUM (MO)

ways present. Flowers unisexual, 6–7 mm diam., white, the pedicels 1–1.5 mm long; tepals 3 mm long, rather densely pubescent on the outer surface, moderately pubescent on the inner surface. Staminate flowers with 9 stamens, all 4-celled, the outer 6 stamens 2 mm long, glabrous, the anthers as long as the filaments, the locelli filling the entire anther and opening introrse; inner 3 stamens as outer 6, but the locelli opening extrorse-lateral and the filaments with 2 well-developed glands at the base; pistillode 2–2.5 mm long, pubescent, the style well-developed; receptacle shallow, pubescent inside. Pistillate flowers with 9 staminodes, these 1.5 mm long, with 4 rudimentary locelli each; the filaments slightly longer than the anthers, inner 3 staminodes with 2 glands at the base of the filaments; pistil 2.5–3 mm long, the glabrous ovary as long as the pubescent style, the stigma conspicuous, discoid. Fruits rounded, ca. 1 cm diam., the cupule very shallowly bowl-shaped to plate-like, with a double margin, the tepals persisting on the outer margin.

Flowers in March, April, and May; fruits in December.

Ocotea brevipetiolata is part of the *Ocotea floribunda* group (Rohwer, 1986) by virtue of its unisexual flowers, pubescent pistil, and plate-like cupule with a double margin and persistent tepals. It differs from the other species of this group in its short petioles, leaves with obtuse to rotund bases, glabrous terminal buds (or with at least the outer bracts glabrous), and the rather dense indument of inflorescences and flowers. *Ocotea floribunda* (Swartz) Mez is a widespread and somewhat variable species; it rarely occurs over 1500 m altitude. Rohwer (1986) included two Andean species in his *O. floribunda* group. One is *O. architectorum* Mez, known only from the type collected in Cajamarca, Peru, at 2700–2900 m; the other is *O. caniflora* Mez, known only from the type collected near Cuzco, Peru, at 1700 m. Both of these species have clearly petiolate leaves and cannot be confused with *O. brevipetiolata*. Our knowledge about the distribution of these species is still poor, due to a lack of good collections. Most collections of *O. brevipetiolata* are from southern Ecuador, but there are single collections from Colombia and Peru. A recent collection from the Reserva Maquipucuna in Ecuador belongs to *O. caniflora*, while the distribution of *O. architectorum* is still in question for lack of good specimens.

Paratypes. COLOMBIA. **Depto. del Valle:** Mpio. Tulua, old pistillate fl, *Devia* 1989 (MO). ECUADOR. **Loja:** Carretera Loja–Zamora, cerca al cumbre, 23 Dec. 1991 (fr), *Rubio et al.* 2265 (MO); Parque Nacional Po-

docarpus, along road from Yangana to Cerro Toledo, 29 Apr. 1987 (stam. fl), *van der Werff & Palacios* 9193 (HBG, MO, QCNE), 29 Apr. 1987 (pist. fl), *van der Werff & Palacios* 9194 (HBG, MO, QCNE); pass on the road Loja–Zamora, 9 May 1987 (pist. fl), *van der Werff* 9452 (MO), 9 May 1987 (stam. fl), *van der Werff* 9453 (MO). **Zamora Chinchipe:** along new road Loja–Zamora, 25 Apr. 1987 (fr, buds), *van der Werff & Palacios* 9000 (MO, QCNE); along old trail from Nudo de Sabanillo to Valladolid, 6 May 1987 (pist. fl), *van der Werff & Palacios* 9382 (HBG, MO, QCNE), 6 May 1987 (pist. fl, fr), *van der Werff & Palacios* 9386 (HBG, MO, QCNE). PERU. **Huánuco:** Huánuco–Tingo Maria road, km. 456, 13 Apr. 1977, *Gentry et al.* 19304 (MO).

3. *Ocotea hirtostyla* van der Werff, sp. nov.
TYPE: Ecuador. Prov. Napo: Cantón Tena, Estación Biológica Jatun Sacha, 400 m, 13 May 1990, *W. Palacios & E. Freire* 5100 (holotype, QCNE 38682; isotypes, AAU, HBG, MO, NY, US). Figure 12.

Ocoteae floribundae affinis sed foliis subtus pilosis, ramulis tomentellis recedit.

Dioecious trees to 17 m. Twigs somewhat angular, densely brown-tomentellous, the surface of young twigs completely covered by the indument, becoming glabrous with age. Terminal buds densely brown tomentellous. Leaves 11–26 × 5–12 cm, alternate, broadly elliptic to broadly obovate, firmly chartaceous, the base acute, the apex acuminate, acumen to 2 cm long, but frequently broken off, upper surface glabrous or with some erect hairs along the major veins, lower surface pilose, the hairs soft to the touch, erect and scattered, but denser and becoming tomentellous along the lateral veins and midrib; lateral veins 6 to 9 pairs, venation immersed on the upper surface, midrib and lateral veins raised, tertiary venation weakly raised on the lower surface. Petioles 8–19 mm long, with a similar indument to the twigs. Inflorescences axillary, 5–15 cm long, densely brown tomentellous, panicle-cymose. Flowers green, ca. 7 mm diam., the tepals ca. 3 mm long, ovate-elliptic, spreading, pubescent at both surfaces. Staminate flowers with nine 4-celled stamens, the outer 6 stamens ca. 2.5 mm long, the filaments ca. 1.5 mm long, moderately pubescent, the anther cells introrse, the upper 2 largely overlapping with the lower 2; inner 3 stamens of similar size, but anthers with 2 cells extrorse and 2 cells lateral; base of the filaments of the inner 3 stamens seemingly fused; 2 globose glands present at the base of the inner stamens; staminodia not seen; pistillode slender, ca. 2 mm long, pubescent, stigma present. Pistillate flowers with 9 staminodes, these ca. 1 mm long, the filaments sparsely pubescent or glabrous, glands present at the base of the inner 3 staminodes, pistil 3

mm long, the ovary glabrous, ca. 1.2 mm long, the style in bud folded in an S shape, becoming straight in open flowers, pubescent, receptacle glabrous inside. Fruits round to broadly ellipsoid, ca. 1.3×1.2 cm, seated on a thick, flat, plate-like cupule with a double margin.

Flowers in May; fruits in September–December.

Ocotea hirtostyla is closely related to the widespread *O. floribunda* and its allies, which are characterized by having pubescent styles and plate-like, thick cupules with a double margin and often somewhat persistent tepals on the cupules. *Ocotea hirtostyla* differs from the other species in this group by its tomentellous twigs and the soft, erect hairs on the lower surface of the leaves. It is currently only known from the Napo province in Amazonian Ecuador; all but one collection come from the Jatun Sacha reserve where collecting has been relatively intense. It can be expected elsewhere in Amazonia at the foothills of the Andes.

Paratypes. ECUADOR. **Napo:** Estación Biológica Jatun Sacha, 6 May 1990, *Palacios et al.* 4930 (MO), 13 May 1990 (pist. fl), *Palacios & Freire* 5106 (MO), 14 May 1990 (pist. fl), *Palacios & Freire* 5146 (MO), 14 May 1990 (stam. fl), *Palacios & Freire* 5160 (MO), 8 Sep. 1992 (fr), *Palacios et al.* 10402 (MO), 6 Dec. 1988 (fr), *Palacios* 3286 (MO), Sep. 1988 (fr), *Palacios* 3003 (MO); Río Aranjú, Sola Cocha, Oct. 1995 (fr), *Neill et al.* 6941 (MO); Napo, Cabeceras de la Quebrada Apayacu, 15 Dec. 1992 (fr), *Zuleta* 63 (MO).

4. *Ocotea multinervis* van der Werff, sp. nov.

TYPE: Peru. Dept. Piura: Prov. Morropón, Carretera entre Chalaco y San Miguel, 2000 m, 18 Oct. 1988, *C. Díaz & R. Vásquez* 3030 (holotype, MO 5593912; isotypes, HBG, K, NY, US). Figure 13.

A congeneris nervis lateralibus numerosis et superficiebus ambabus tepalorum dense tomentellis recedit.

Trees, to 35 m. Twigs angular or ridged, 6–10 mm diam. 5 cm below the apex, densely tomentellous, glabrescent with age; terminal buds densely tomentellous. Leaves alternate or grouped near the tips of the branches, 9–17 $\times$ 4.5–8 cm, coriaceous, elliptic or broadly elliptic, the base cordate to obtuse, the apex obtuse, rarely somewhat acute, the upper surface glabrous, the lower surface densely tomentellous, the indument covering the surface completely; midrib immersed, lateral veins (slightly) impressed and tertiary venation not visible on the upper surface, midrib and lateral veins prominently raised, tertiary venation inconspicuously raised or not visible on the lower surface; domatia lacking; lateral veins 14 to 21 on each side; petioles short, to 5 mm long, but leaves often appearing

sessile. Inflorescences in the axils of normal leaves or cataphylls, 5–14 cm long, densely tomentellous, the surface completely covered by the indument, paniculate-cymose. Flowers perfect (or unisexual?), 1 cm diam.; tepals spreading or reflexed at anthesis, elliptic, 3 mm long, densely tomentellous on both surfaces, the surface not visible, stamens 9, all 4-celled, the outer 6 ca. 1 mm long, sessile or nearly so, the upper pair of cells introrse, the lower pair almost latrorse, the anther dorsally pubescent, inner 3 with a short (about half as long as the anther) filament, the lower pair of cells extrorse, the upper lateral; glands at the base in the inner stamens sessile, globose; staminodia minute, stipitiform, with a few hairs; pistil glabrous, 1.5 mm long, receptacle initially rather deep, with some appressed hairs inside, but soon becoming shallow. Fruit ellipsoid, 2 $\times$ 1.5 cm, cupule very shallow, almost plate-like, ca. 1.5 cm diam., the pedicel slightly thickened and abruptly widened into the cupule.

Flowers in May and October; fruits in September.

Ocotea multinervis stands out by its tomentellous leaves with many pairs of lateral veins and by its tepals, densely tomentellous on both surfaces. It is a tall tree in montane forests between 2000 and 3000 m. Its relationships within *Ocotea* are not obvious. The two flowering collections (the type and *Cuamacas* 81) have anthers with open anther cells, but without any pollen grains remaining. Thus, I am not convinced that the flowers are hermaphrodite; it is possible that the flowers are unisexual, pistillate in the two flowering collections and that the staminodia are relatively well developed. Additional collections will show whether this is the case. In some flowers the glands at the base of the inner three stamens are rather strongly enlarged and protrude somewhat between the outer stamens, a character found in *Pleurothyrium*. However, all *Pleurothyrium* species with spreading tepals also have the glands fused in a disc and surrounding the stamens. In the new species the glands are not fused in a disc and therefore I prefer to place it in *Ocotea*, an already variable genus. One of the paratypes (*Cuamacas et al.* 81) was previously identified as *Ocotea arnottiana* (Nees) van der Werff and distributed under that name. A collection from Colombia (*Gentry & Cuadros* 79141, MO) resembles *O. multinervis* in leaf characters, but the young fruits and remnants of the tepals are nearly glabrous. Possibly it represents a related species, but more material is needed to solve its identity.

Paratypes. PERU. **Piura:** Montana de Cuyas, 8 km NE of Ayabaca, 26 Sep. 1991 (fr), *Gentry et al.* 75116 (MO). ECUADOR. **Imbabura:** Caserío Tablachupa, Par-



MISSOURI
BOTANICAL GARDEN
HERBARIUM

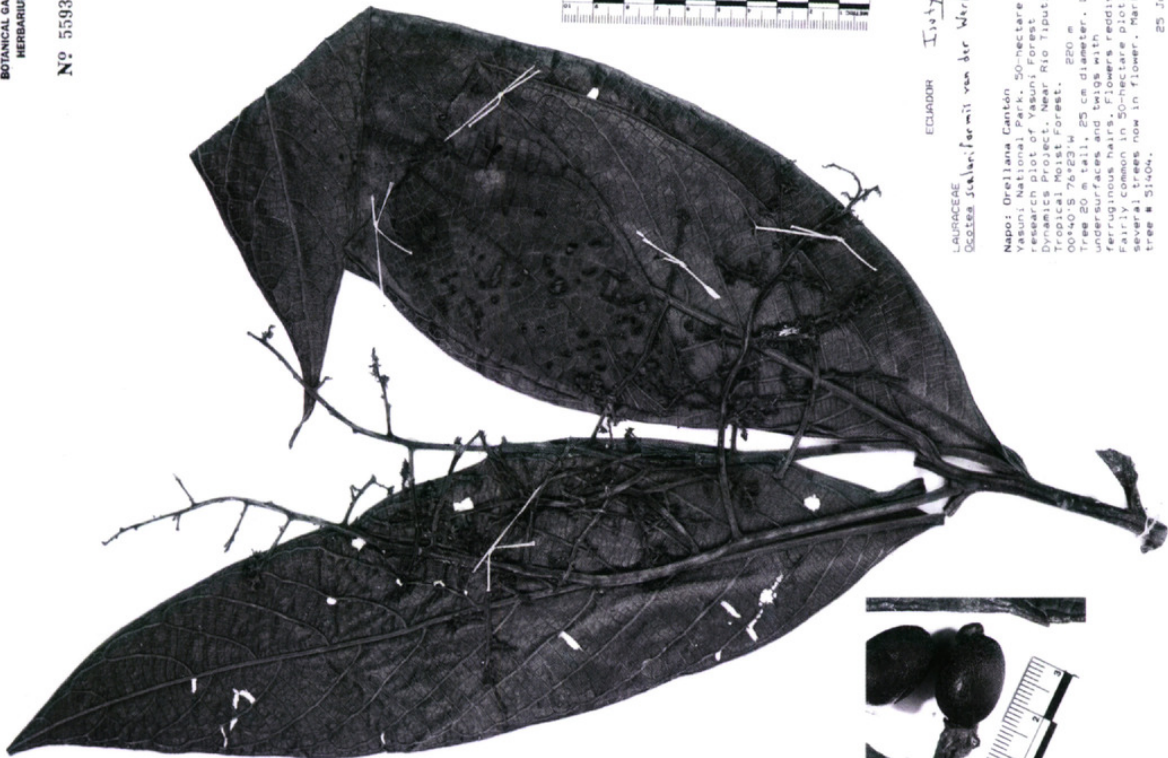
Nº 5593912

LAURACEAE
Ocotea multimeris van der Werff
Holotype
PERU

DURO, PIURA: Prov. Norzongo.
Carretera entre Chilaico y San Miguel.
2000 m

Azobol. 20 m. Flores blancas.

18 octubre 1988
Gastón Díaz y Rodolfo V. ...
MISSOURI BOTANICAL GARDEN HERBARIUM (MO)



LAURACEAE
Ocotea scalariformis van der Werff
Isotype
ECUADOR

Napo: Drellana Canton
Yasuni National Park. 50-hectare
research plot of Yasuni Forest
Dynamics Project. Near Rio Tiputini.
Yasuni National Park. 220 m
00°05' 78N 78°23'W
Tree 20 m tall, 25 cm diameter. Leaf
undersurfaces and twigs with
ferruginous hairs. Flowers reddish.
Fairly common in 50-hectare plot.
Specimens collected from
tree # 5104r.

25 June 1995

David Neill, 1995
MISSOURI BOTANICAL GARDEN HERBARIUM (MO)

roquia Plaza Gutiérrez, 13 May 1992 (fl), *Guamacas et al.* 81 (MO, QCNE). COLOMBIA. **Quindío:** Reserva del Alto Quindío Acaime, 10 July 1990 (fr), *Renjifo* 143 (MO).

5. *Ocotea scalariformis* van der Werff, sp. nov.

TYPE: Ecuador. Napo: Orellana Canton, Yasuni National Park, *D. Neill* 10426 (holotype, QCNE 10426; isotype, MO). Figure 14.

Ocoteae tabacifoliae similis, sed basi foliorum decurrenti, fructibus ovoideis, venatione scalariforme et floribus subsessilibus recedit.

Dioecious trees, to 25 m. Twigs roundly angular to rounded, densely red-brown pubescent, the hairs erect and completely covering the twigs, terminal buds densely red-brown tomentose. Leaves 16–35 × 9–11 cm, alternate, firmly chartaceous, elliptic or broadly elliptic, rarely slightly ovate, the base acute and somewhat decurrent on the petiole, the margin slightly revolute, the apex acuminate, the acumen to 2 cm long, or appearing obtuse (but then probably damaged), the upper surface glabrous but with traces of pubescence on the major veins, the lower leaf surface moderately densely pubescent, the hairs erect, discernable to the touch, most of the surface visible, the indument denser and tomentose along the major veins, domatia lacking, midrib, lateral veins, and tertiary venation impressed on the upper surface, prominently raised on the lower surface, the tertiary veins connecting the lateral veins under an angle of 90°, and forming a regular, ladder-like pattern; lateral veins 12 to 15 on each side, petioles 1–1.5 cm, with a similar indument to the twigs, canaliculate. Inflorescences 20–30 cm, panicle-cymose, red-brown tomentose, the surface completely covered, in the axils of leaves. Flowers 4–5 mm diam., moderately to densely puberulous outside, unisexual; pedicels 1–1.5 mm, shorter than the flowers, bracts subtending the flowers often persistent at anthesis and sometimes even after flowers have fallen off; tepals 6, equal, 2 mm long, elliptic, moderately to densely puberulous outside, ± spreading at anthesis, moderately pubescent on the inner surface. Staminate flowers: stamens 9, all 4-celled, ca. 1 mm, the filament ca. 0.1 mm, very short, pubescent, the anther glabrous, rectangular, the cells arranged in 2 pairs, introrse; inner 3 stamens 1.5 mm, the filament ca. 0.4 mm, pubescent, the anther glabrous, cells ± lateral; base of the filament with 2 small, globose glands; staminodia not seen; pistillode 1.2 mm, gla-

brous, the base swollen and containing an ovule-like body, pistillode with a small stigma, reaching in the flower as high as the base of the anthers; receptacle bowl-shaped, glabrous inside. Pistillate flowers: tepals as in staminate flowers; staminodia 9, ca. 0.5 mm, the short filament pubescent, otherwise glabrous, glands present at the base of the inner 3 staminodes; pistil 1.5 mm, glabrous, style ca. 0.6 mm, stigma platelike, a little wider than the style; receptacle deeply cup-shaped, with some appressed hairs inside. Fruits 20 × 13 mm, ellipsoid to ovoid, the cupule small, platelike, scarcely more than an undulating margin of the thickened pedicel.

Flowers in June and July; fruits in December.

Ocotea scalariformis can be confused with *O. tabacifolia* (Meissner) Rohwer. Both species have large, pubescent leaves with erect hairs, tomentose twigs, and have been reported from the Amazon lowland rain forest. However, *O. scalariformis* differs in its leaf bases, which are decurrent on the petiole (obtuse to rounded in *O. tabacifolia*), in its impressed venation on the upper leaf surface, in the prominently raised, scalariform venation on the lower leaf surface, in the ellipsoid to ovoid fruits (rounded in *O. tabacifolia*), and in the pistillode with a distinctly swollen base (pistillode threadlike in *O. tabacifolia*). The pistillode with a swollen base and the shape of the fruits do not suggest a close relationship with *O. tabacifolia*, but point to the *O. minarum* group of Rohwer (1986). The species of this group are vegetatively variable, but all share clearly pistillate and seemingly bisexual (fertile stamens and a pistil or pistillode with a swollen base) flowers and ellipsoid fruits seated on a small, platelike cupule. None of the species in this group resembles *O. scalariformis* vegetatively, but I feel that, based on flower and fruit characters, the new species belongs in the *O. minarum* group.

Paratypes. ECUADOR. **Francisco de Orellana:** Yasuni Scientific Station, 2 Dec. 1997 (fr), *Romoleroux et al.* 3028 (MO), 15 July 2000 (pist. fl), *Villa* 378 (MO).

VI. *Pleurothyrium* Nees, in Lindley, Nat. Syst. Bot. 442. 1836.

Pleurothyrium is a Neotropical genus recently revised by van der Werff (1993) who included 40 species in the genus. It is easily recognized by the enlarged glands at the base of the inner stamens.

←

Figures 13, 14. —13 (left). Holotype of *Ocotea multinervis* van der Werff. —14 (right). Isotype of *Ocotea scalariformis* van der Werff. Insert: Cupule and fruit.



Figure 15. Holotype of *Pleurothyrium arcuatum* van der Werff.

Often the glands protrude between the outer stamens and form a disc enclosing the stamens. Several species, including the one described below, have a pronounced brochidodromous venation.

1. *Pleurothyrium arcuatum* van der Werff, sp. nov. TYPE: Peru. Depto. Amazonas: Prov. Bagua, Yamayakat, 320 m, 11 Oct. 1995, *N. Jaramillo & D. Chamik 850* (holotype, MO 5593914; isotypes, HBG, K, NY, US). Figure 15.

A congeneris foliis glabris, alternis, apice acuminatis, venatione brochidodroma, ramulis solidis, juvenalibus castaneo-tomentellis recedit.

Small tree, 6 m. Twigs terete, solid, the apical

part with the inflorescences densely brown tomentellous, the older parts glabrous, with a pale bark; terminal buds densely brown tomentellous. Leaves 10–20 × 4.5–7 cm, elliptic, coriaceous or firmly chartaceous, alternate, evenly distributed, the base acute or obtuse, the margin flat, the apex acuminate or acute, the acumen 1 cm long, glabrous on both surfaces except for some remnants of the tomentellous indument along the midrib, midrib immersed or slightly raised, lateral veins impressed, tertiary venation immersed on the upper surface, midrib and lateral veins raised, tertiary venation slightly raised on the lower surface; lateral veins conspicuously loop-connected, 8 to 12 on each side; petioles 1.5–2 cm, with a similar indument to the twigs, flat on the upper side. Inflorescences 4–10 cm,

moderately to densely brown-tomentellous, panicle-cymose, in the axils of bracts near the tips of the branches. Flowers 7–8 mm diam., yellow, pedicels 2–3 mm long; tepals 6, ca. 3 mm long, elliptic, equal or the inner 3 slightly narrower than the outer 3, spreading in older flowers, the outer surface brown tomentellous, distally becoming papillose, inner surface papillose, stamens 9, 4-celled, the outer 6 with the anthers bent inward and the cells lateral, the inner 3 with the anther bent toward the outside and the cells lateral; the 2 cells on each side of the anther opening back to back; glands enlarged and forming a ring surrounding the stamens and obscuring the filaments; staminodia not seen; pistil ca. 2 mm, with a few hairs, the style short, ca. 0.5 mm; receptacle deeply cup-shaped, pubescent inside. Fruits and cupules not known.

Flowers in October.

In the key of van der Werff (1993), *P. arcuatum* would key to the last four species, based on its enlarged glands surrounding the stamens, glabrous, alternate leaves, and the papillose inner surface of the tepals. The conspicuously loop-connected lateral veins immediately set the new species apart in this group. *Pleurothyrium arcuatum* is only known from the type collection, made in the vicinity of the Mara  n in northern Peru. The epithet *arcuatum* refers to the arcuate, loop-connected lateral veins.

Acknowledgments. Fieldwork by the author was supported by National Geographic Society grant #3480-86 and by a grant from the Mellon Foundation; their support is gratefully acknowledged. I

also thank my colleagues who have sent me gifts for identification during the past two decades. Fred Keusenkothen kindly provided the images of the new species.

Literature Cited

- Chanderbali, A. S., H. van der Werff & S. Renner. 2001. Phylogeny and historical biogeography of Lauraceae: Evidence from chloroplast and nuclear genomes. *Ann. Missouri Bot. Gard.* 88: 104–134.
- Greuter, W., J. McNeill, F. T. Barrie, H. M. Burdet, V. Demoulin, T. S. Filgueiras, D. H. Nicolson, P. C. Silva, J. E. Skog, P. Trehane, N. J. Turland & D. L. Hawksworth (editors). 2000. International Code of Botanical Nomenclature (Saint Louis Code). *Regnum Veg.* 138.
- Kubitzki, K. & H. G. Richter. 1987. *Williamodendron* Kubitzki & Richter, a new genus of Neotropical Lauraceae. *Bot. Jahrb. Syst.* 109: 49–58.
- Kurz, H. 2000. Revision der Gattung *Licaria* (Lauraceae). *Mitt. Inst. Allg. Bot. Hamburg* 28/29: 89–221.
- Lorea Hernandez, F. G. 1996. A Systematic Revision of the Neotropical Species of *Cinnamomum* Schaeffer (Lauraceae). Ph.D. Thesis, University of Missouri, St. Louis.
- Meissner, C. F. 1864. Lauraceae. In: A. de Candolle (editor), *Prodromus systematis naturalis regni vegetabilis* 15(1): 1–260.
- . 1866. Lauraceae. In: C. F. P. von Martius (editor), *Flora Brasiliensis* 5(2): 138–295.
- Rohwer, J. G. 1986. *Prodromus einer Monographie der Gattung Ocotea* Aubl. (Lauraceae) sensu lato. *Mitt. Inst. Allg. Bot. Hamburg* 20: 1–278.
- . 1993. *Nectandra*. *Fl. Neotrop.* 60: 1–333.
- van der Werff, H. 1987. A revision of *Mezilaurus* (Lauraceae). *Ann. Missouri Bot. Gard.* 74: 153–182.
- . 1993. A revision of the genus *Pleurothyrium* (Lauraceae). *Ann. Missouri Bot. Gard.* 80: 39–119.
- . 2002. A synopsis of *Ocotea* (Lauraceae) in Central America and southern Mexico. *Ann. Missouri Bot. Gard.* 89: 429–451.



Werff, Henk van der. 2003. "New taxa of Lauraceae from South America." *Novon a journal of botanical nomenclature from the Missouri Botanical Garden* 13, 337–357. <https://doi.org/10.2307/3393271>.

View This Item Online: <https://www.biodiversitylibrary.org/item/14673>

DOI: <https://doi.org/10.2307/3393271>

Permalink: <https://www.biodiversitylibrary.org/partpdf/25166>

Holding Institution

Missouri Botanical Garden, Peter H. Raven Library

Sponsored by

Missouri Botanical Garden

Copyright & Reuse

Copyright Status: In copyright. Digitized with the permission of the rights holder.

License: <http://creativecommons.org/licenses/by-nc-sa/3.0/>

Rights: <https://biodiversitylibrary.org/permissions>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.