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CONTENTS

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THE ALGAE OF NEW JERSEY (U.S.A.) X. BACILLARIOPHYTA (DIATOMS). A. FRAGILARIALES

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This is the tenth paper in the series examining the distribution of algae in the state of New Jersey. The genera are listed alphabetically and the collection dates chronologically within them. Further ecological data may be obtained from the original sources. Publication was made possible by a Faculty Development Grant, College of Mt. St. Vincent.

DIVISION BACILLARIOPHYTA DIATOMS

Fragilariales

Asterionella glacialis Costracane
northern shore (8)

Asterionella ralfsii var americana
Egg Harbor Stream (9)

Diatoma anceps (Ehr) Kirchn
Budd Lake (1); New Brunswick (4)

Diatoma hiemale (Roth) Heiberg
Mullica Hill, Blackwood, Kirkwood, Marlton (1); Oyster Creek (7)

Diatoma hiemale var mesodon (Ehr) Grun
Metlars Brook (5)

Diatoma tenue var elongatum Lyngb
Lake Hopatcong (10); Hackensack River (11)

Diatoma vulgare Bory
Mullica Hill, Marlton, Drakesville deposit (1); New Brunswick (4); Metlars Brook (5)

Diatoma vulgare var linearis VH
Lake Hopatcong (10)

Fragilaria bicapitata A. Mayer
Egg Harbor Stream (9)

Fragilaria brevistrata Grun
Delaware/Raritan Canal (D/R Canal) (3); Lake Hopatcong (10); Hackensack River (11)

Fragilaria brevistrata var inflata (Pant) Hust
Lake Hopatcong (10)

Fragilaria capucina Desm
Camden, Kirkwood, Woodstown, Sharptown, Marlton, Hamburg, Andover, Culvers Gap (1); New Brunswick (4); Lake Hopatcong (10); Hackensack River (11)

Fragilaria capucina var mesolepta Rabh
Lake Hopatcong (10)

Fragilaria constructa Ehr
Egg Harbor Stream (9)

Fragilaria constricta var trinodes
Egg Harbor Stream (9)

Fragilaria construens (Ehr)Grun
Hamburg, Andover, Waterloo, Drakesville deposit (1); New Brunswick (4); Egg Harbor Stream (9); Hackensack River (11)

Fragilaria construens var binodes (Ehr) Grun
Absecon Pond (1); Lake Hopatcong (10)

Fragilaria construens var pumile Grun
Lake Hopatcong (10)

Fragilaria construens var subsalina Hust
Egg Harbor Stream (9)

Fragilaria construens var venter (Ehr) Grun
Lake Hopatcong (10)

Fragilaria crotonensis Kitton
D/R Canal (3); Barnegat Bay (6); northern shore (8); Lake Hopatcong (10); Hackensack River (11)

Fragilaria cylindrus Grun
Barnegat Bay (6)

Fragilaria floridiana Hanna
Oyster Creek (7); Egg Harbor Stream (9)

Fragilaria lapponica Grun
Metlars Brook (5)

Fragilaria leptostauron (Ehr) Hust
Lake Hopatcong (10); Hackensack River (11)

Fragilaria leptostauron var dubia (Grun) Hust
Lake Hopatcong (10)

Fragilaria investiens (W Sm) A Cl
Oyster Creek (7)

Fragilaria nitzschoides Grun
Lake Hopatcong (10)

Fragilaria oceanica Cl
Cape May (2)

Fragilaria pinnata Ehr
northern shore (8); Lake Hopatcong (10); Hackensack River (11)

Fragilaria strangulata
Egg Harbor Stream (9)

Fragilaria vaucheriae (Kutz) Peters
Lake Hopatcong (10); Hackensack River (11)

Fragilaria virescens Ralfs
springs and brooks (1); D/R Canal (3); New Brunswick (4); Metlars Brook (5); Oyster Creek (7); Egg Harbor Stream (9); Lake Hopatcong (10)

Meridion circulare (Grev) Ag
Marlton, Woodstown, Sharptown, Blackwood, Kirkwood, Lake Como, Andover (1); New Brunswick (4); Metlars Brook (5); northern shore (8); Hackensack River (11)

Meridion circular var constrictum (Ralfs) VH
freshwater (1); Metlars Brook (5); Hackensack River (11)

Opephora martyii Herib
Oyster Creek (7); Lake Hopatcong (10); Hackensack River (11)

Opephora marina (Greg) Petit
northern shore (8)

Opephora pacifica (Grun) Petit
Oyster Creek (7)

Synedra acus Kutz
D/R Canal (3); New Brunswick (4); Lake Hopatcong (10); Hackensack River (11)

Synedra amphicephala Kutz
Lake Hopatcong (10)

Synedra capitata Ehr
Hewitts Pond, Drakesville deposit (1)

Synedra delicatissima W Sm
Lake Hopatcong (10); Hackensack River (11)

Synedra fasciculata (Ag) Kutz
Barnegat Bay, Cape May marshes (1); New Brunswick (4); northern shore (8); Oyster Creek (7); Hackensack River (11)

Synedra fulgens (Grev) W Sm
Shark River, Manasquan River, Shrewsbury River, Barnegat Bay (1); Atlantic City (2)

Synedra gaillonii (Bory) Ehr
Oyster Creek (7)

Synedra incisa 2
Metlars Brook (5); Hackensack River (11)

Synedra parasitica (W Sm) Hust
Culvers Gap (1); Lake Hopatcong (10); Hackensack River (11)

Synedra parasitica var subconstricta (Grun) Hust
Lake Hopatcong (10)

Synedra pulchella Ralfs ex Kutz
Lake Como, Andover, Marlton (1); Metlars Brook (5); Oyster Creek (7); northern shore (8); Lake Hopatcong (10)

Synedra pulchella var saxonica (Kutz) Grun
marine, common along coast (1)

Synedra radians kutz
Mullica Hill, Marlton, Lake Hopatcong, Hamburg (1); D/R Canal (3); Hackensack River (11)

Synedra rumpens Kutz
Metlars Brook (5); Lake Hopatcong (10); Hackensack River (11)

Synedra rumpens var familiaris (Kutz) Hust
Metlars Brook (5)

Synedra rumpens var fragilariodes Grun
Metlars Brook (5); Hackensack River (11)

Synedra rumpens var meneghiniana Grun
Egg Harbor Stream (9)

Synedra socia Wallace
Metlars Brook (5)

Synedra ulna (Nitz) Ehr
state (1); D/R Canal (3); New Brunswick (4); Metlars Brook (5); Lake Hopatcong (10); Hackensack River (11)

Synedra ulna var chaseana Thomas
Lake Hopatcong (10)

Synedra ulna var contracta Ostr
Metlars Brook (5)

Synedra ulna var ramesi (Herib) Hust
Metlars Brook (5)

Tabellaria binalis (Ehr) Grun
Egg Harbor Stream (9)

Tabellaria fenestrata (Lyngb)
cedar swamps (1); Pine Barrens (2); D/R Canal (3); Metlars Brook (5); Egg Harbor Stream (9)

Tabellaria flocculosa (Roth) Kutz
state (1); Pine Barrens (2); Oyster Creek (7); Egg Harbor Stream (9); Lake Hopatcong (10); Hackensack River (11)

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THE ALGAE OF NEW JERSEY (U.S.A.) XI. BACILLARIOPHYTA (DIATOMS). B. EUNOTIALES AND ACHNANTHALES

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This is the eleventh paper in the series examining the distribution of algae in the state of New Jersey. The genera are listed alphabetically and the collection dates chronologically within them. Further ecological data may be obtained from the original sources. Publication was made possible by a Faculty Development Grant, College of Mt. St. Vincent.

DIVISION BACILLARIOPHYTA DIATOMS

Eunotiales

Eunotia arcus Ehr
Kirkwood, Mullica Hill, Hammonton, Absecon (1); Oyster Creek (7); Lake Hopatcong (11)

Eunotia arcus var bidens Grun
Metlars Brook (5)

Eunotia bactriana Ehr
Tom's River (2)

Eunotia bidentula W Sm
May's Landing, Tom's River (2); Oyster Creek (7); Egg Harbor Stream (9)

Eunotia carolina Patr
Egg Harbor Stream (9)

Eunotia cordillera Hohn & Hellerman
Metlars Brook (5)

Eunotia curvata (Kutz) Lagerst
White Hall, Marlton, Lake Hopatcong, Kirkwood, Sharptown, Lake Como (1); New Brunswick (4); Egg Harbor Stream (9); Lake Hopatcong (11); Hackensack River (12)

Eunotia denticulata var genuina A Cl
Hammonton Pond (1)

Eunotia diodan Ehr
common in ponds and brooks (1)

Eunotia elegans Ostr
Egg Harbor Stream (9)

Eunotia exigua (Breb ex Kutz) Rabh
Absecon, Hammonton, Toms River, Kirkwood, Mullica Hill (1); Oyster Creek (7); Egg Harbor Stream (9)

Eunotia fallax A Cl
Absecon Pond (1); Egg Harbor Stream (9)

Eunotia flexuosa Breb ex Kutz
Hammonton Pond (1); New Brunswick (2); Oyster Creek (7); Egg Harbor Stream (9)

Eunotia formica Ehr
Egg Harbor Stream (9); Lake Hopatcong (11)

Eunotia glacialis Meist
Kirkwood, Camden, Marlton, Hammonton, Mullica Hill (1)

Eunotia gracilis var mayeri A Cl
cranberry bogs near Ancora (1)

Eunotia incisa W Sm ex Greg
Mays Landing, Pavonia (1); Egg Harbor Stream (9); Lake Hopatcong (11)

Eunotia indica Grun
Lake Hopatcong (11)

Eunotia lapponica Grun ex A Cl
Oyster Creek (7)

Eunotia luna Ehr
freshwater (2)

Eunotia maior (W Sm) Rabh
Camden, Lake Hopatcong, Culver's Gap (1)

Eunotia microcephala Krasske ex Hust
Egg Harbor Stream (9)

Eunotia monodon Ehr
common in ponds and meadow ditches (1); Egg Harbor Stream (9)

Eunotia monodon var constricta Cl-Eul
Egg Harbor Stream (9)

Eunotia naegeli Migula
Egg Harbor Stream (9)

Eunotia pectinalis (O F Muller) Rabh
Hammonton, Sharptown, Culver's Gap (1); cedar swamps (2);

New Brunswick (4); Metlars Brook (5); Oyster Creek (7); Egg Harbor Stream (9)

Eunotia pectinalis var minor Rabh
Metlars Brook (5); Oyster Creek (7); Egg Harbor Stream (9); Lake Hopatcong (11)

Eunotia pectinalis var recta A Mayer ex Patr
Egg Harbor Stream (9)

Eunotia pectinalis var undulata (Ralfs) Rabh
Ancora, Mays Landing Hammonton, Absecon, Sharptown, Budd Lake, Lake Hopatcong (1); cedar swamps (2); Egg Harbor Stream (9); Lake Hopatcong (11)

Eunotia pectinalis var ventricosa Grun
Mays Landing (2)

Eunotia praerupta Ehr
Mullica Hill, Kirkwood, Hammonton, Absecon (1); Metlars Brook (5); Oyster Creek (7)

Eunotia praerupta var bidens (Ehr) Grun
Egg Harbor Stream (9)

Eunotia pseudopectinalis Hust
Oyster Creek (7)

Eunotia repens var arcuata (Naeg) A Cl
Oyster Creek (7)

Eunotia rostellata Hust ex Patr
Metlars Brook (5); Oyster Creek (7)

Eunotia septentrionales Ostr
Egg Harbor Stream (9)

Eunotia serra Ehr
Ancora, Kirkwood, Toms River, Culver Gap (1); New Brunswick (4); Oyster Creek (7); Egg Harbor Stream (9); Hackensack River (12)

Eunotia serra var diadema (Ehr) Patr
Metlars Brook (5); Egg Harbor Stream (9)

Eunotia soleirolii (Kutz) Rabh
Moorestown (2)

Eunotia sudetica O Mull
Egg Harbor Stream (9)

Eunotia tautoniensis Hust ex Patr
Egg Harbor Stream (9)

Eunotia tenella (Grun) Cl
Metlars Brook (5); Egg Harbor Stream (9); Lake Hopatcong (11)

Eunotia triodon Ehr
Toms River, Hammonton, Andover, Culvers Gap, Cape May Point (1)

Eunotia vanheurckii Patr
Egg Harbor Stream (9)

Eunotia vanheurckii var intermedia (Krass ex Hust) Patr
Egg Harbor Stream (9)

Eunotia zygodon Ehr
Toms River (2); Egg Harbor Stream (9)

Peronia fibula (Breb ex Kutz) Ross
Metlars Brook (5)

Achnanthales

Achnanthes biasolettiana (Kutz) Grun
Manahawkin salt marsh (10)

Achnanthes controversa Hust
Oyster Creek (7)

Achnanthes exigua var constricta (Grun) Hust
Lake Hopatcong (11)

Achnanthes fimbriata (Grun) Ross
Oyster Creek (7)

Achnanthes gibberula Grun
New Brunswick (4)

Achnanthes orientalis Hust
Egg Harbor Stream (9)

Achnanthes submarina Hust
Manahawkin salt marsh (10)

Achnanthes stenera Hust
northern shore (8)

Cocconeis costata Greg
northern shore (8)

Cocconeis dirupta var flexella (Jan) Rabh
rare in Manasquan River (1)

Cocconeis disculoides Hust
Oyster Creek (7)

Cocconeis disculus (Schum) Cl
Oyster Creek (7); Hackensack River (12)

Cocconeis fluvitilis Wallace
Hackensack River (12)

Cocconeis molesta (Kutz) Grun
Culver's Gap (1)

Cocconeis ornata Greg
Atlantic City (2)

Cocconeis pediculus Ehr
abundant, statewide (1); Delaware/Raritan Canal (3)

Cocconeis placentula Ehr
fresh water (1); Metlars Brook (5); Oyster Creek (7); Hackensack River (12)

Cocconeis placentula var euglypta (Ehr) Cl
Metlars Brook (5); Manahawkin salt marsh (10); Oyster Creek (7); Egg Harbor Stream (9)

Cocconeis placentula var intermedia (Her & Per) Thist
Oyster Creek (7)

Cocconeis placentula var lineata (Ehr) Cl
Dennis Creek (1); Metlars Brook (5); Lake Hopatcong (11); Hackensack River (12)

Cocconeis pseudodiruptoides Foged
Oyster Creek (7)

Cocconeis quarnerensis (Grun) A S
northern shore (8)

Cocconeis scutellum Ehr
salt and brackish water (1); northern shore (8); Oyster Creek (7)

Cocconeis scutellum f parva Grun
Oyster Creek (7); Manahawkin salt marsh (10)

Cocconeis scutellum var speciosa (Greg) A Cl
Oyster Creek (7)

Cocconeis scutellum var stauroneiformis W Sm
Oyster Creek (7); Manahawkin salt marsh (10)

Rhoicosphenia curvata (Kutz) Grun ex Rabh
Absecon, Pleasantville (1); New Brunswick (4); Metlars Brook (5); northern shore (8); Hackensack River (12)

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THE ALGAE OF NEW JERSEY (U.S.A.) XII. THE OCCURRENCE OF CYLINDROTHECA GRACILIS (BREB EX KUTZ) GRUN IN THE HACKENSACK RIVER ESTUARY

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Abstract

A 16-month survey of a 15 km stretch of the upper Hackensack River estuary in New Jersey yielded 131 specimens of the pennate diatom Cylindrotheca gracilis (Breb ex Kutz) Grun. Correlation coefficients indicate a strong positive correlation between C. gracilis and elevated amounts of silica, nitrates and water temperature.

Introduction

Cylindrotheca gracilis (Breb ex Kutz) Grun is a weakly silicified and spindle shaped pennate diatom of the Family Nitzchiaceae. This species has been reported in Maryland, Ohio and Iowa (1) and Arizona (2) in the United States. Marine littoral samples from Texas, Georgia, North Carolina, California and Lousiana and seawater samples for Massachusetts, Long Island Sound and Sandy Hook, New Jersey have yielded specimens of Cylindrotheca gracilis (3). It has been reported as a salt or brackish water form (4;5). Lowe (6) considers this taxon to be alkaliphilous, eutrophic, mesohalobic to halophilous, and euplanktonic or periphytic. Czarnecki and Blinn (2) found C. gracilis had its best development in the psammon with a preference for moderate to high conductivity, high alkalinity and periphytic habitats. However, relatively little information is available about the ecology of this species.

The Hackensack River, lying approximately 10 km west of Manhattan Island, begins near Haverstraw, New York and extends south to Newark Bay, a linear distance of nearly 45 km. A 16-month survery of the upper Hackensack River estuary in New Jersey yielded 131 specimens of this taxon, making it one of the 30 most abundant species collected. Cylindrotheca gracilis achieved its greatest abundance at a sample site 5.7 km south of the reservoir dam (site #3) and was never encountered in the freshwater segment of the river (site #1). This paper provides more information concerning the ecology and distribution of Cylindrotheca gracilis.

Sample Sites

The section of the river investigated covered an area from the Oradell Reservoir Dam to just above Overpeck Creek. Site #1 was northernmost and site #5 is most bayward. Site #2 received run-off from a parking lot and also drainage from a duckpond. A bridge at the point where Coles Brook and French Creek enter the river was site #3 and the footbridge at Fairleigh Dickinson University, site #4. Site #5 was a bridge in the city of Hackensack, slightly upstream from an oil depot.

Materials and Methods

Grab samples of whole plankton were taken along a 15 km segment of the Hackensack River from July 1980 to October 1981. Chemical analyses of the samples were done using a Hach model DR-EL Portable Water Engineer's Laboratory Kit as outlined in the Hach Methods Manual (7). Salinity was assessed using the Mohr method of titration with silver nitrate (3). Temperature was determined *in situ* with a mercury thermometer in the field. Samples were prepared by the incineration technique (9) and cleaned material was mounted in the high refractive medium, Hyrax, as described by Foote (10). The slides were examined with a Bausch and Lomb stereoscopic microscope equipped with 100X aprochromatic oil immersion objective and 10X occulars. Counts of 250-500 individuals were done for each collection. Niche breadth values were calculated using the formula of McIntire and Overton (11) and correlation coefficient with physiochemical data were computed.

Results and Discussion

Table 1 lists the mean values for some physio-chemical parameters of the Hackensack River, the number of frustules of *Cylindrotheca gracilis* encountered at each site during the course of the study and the niche breadth value, Bi. The correlation coefficient values are given in Table 3.

A review of the sparse literature concerning this taxon indicates that there is only one specific mention of the diatom being frequent in fresh water but that most researchers have classified it as a frequent estuarine form (1). An extensive review of the diatom flora lists over the last century for the state of New Jersey indicate that *C. gracilis* has never been reported for this area. The data presented in Table 1 indicate that *C. gracilis* was found in a slightly, rather than strongly mesohaline brackish (3-10 ppt) environment.

Comparing station #3, where this species achieved its greatest abundance, with the next lower estuarine site, #4, one notices in Table I that there is little difference in temperature and alkalinity but greater differences in the values of salinity, sulfate, magnesium, total hardness, calcium and chloride. This appears to support the

conclusions of Christensen and Reimer (1) that this diatom should not be considered to be a salt water form and that conductivity and concentrations of sulfate, magnesium and calcium, or some combination of factors, may be more critical to this taxon's growth and distribution than chloride or sodium ions.

When the niche breadth values are calculated for seasons, rather than sample sites, it is found that C. gracilis grew best in the autumn and winter (5 October 1980 to 22 February 1981). The average values for physio-chemical parameters in the estuarine portion of the river (sites #2-#6) for this period are given in Table 2. The data in this table are somewhat misleading, however, because the river was frozen from sites #2-#4 throughout much of January and this prevented collecting in the upper and middle estuary. The values given in Table 2, therefore, are probably slightly elevated, based primarily on lower estuarine collections.

Correlation coefficients listed in Table 3 show a strong positive correlation between Cylindrotheca gracilis and elevated amounts of silica, nitrate and water temperature at site #3, the site where most of the specimens were collected.

It appears that C. gracilis is a species capable of withstanding mesohaline brackish water but it is not a true marine species. Cylindrotheca gracilis also appears to be able to withstand high concentrations of chloride, sulfate, alkalinity, calcium, magnesium and total hardness.

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TABLE 1. Mean chemical and physical parameter values for the Hackensack River estuary and collection data. Values are mg/l unless noted otherwise.

STATION	1	2	3	4	5	6
distance from dam, km	0.07	3.2	5.7	7.9	10.8	14.6
salinity, ppt	0.11	1.6	2.9	4.2	5.5	7.26
temperature, C	16.2	15.9	17.4	16.8	17.3	20.4
alkalinity	74	98	109	121	128	144
chloride	41	947	1152	2122	2961	4153
hardness	121	390	594	881	1133	1498
magnesium	29	238	408	547	826	1154
calcium	95	152	192	242	274	345
sulfate	28	132	175	285	354	458
number of cells	0	33	49	42	3	5
niche breadth value	—	5.2	6.6	7.6	3	1.9

TABLE 2. Mean chemical and physical values for the Hackensack River estuary from 5 October 1980 to 22 February 1981.

salinity	5.12 ppt
temperature	8.18 C
alkalinity	120 mg/l
chloride	1130 mg/l
hardness	1160 mg/l
magnesium	653 mg/l
calcium	295 mg/l
sulfate	382 mg/l

TABLE 3. Correlation coefficients for Cylindrotheca gracilis and 7 hydrographic variables.

	STATION NUMBER				
PARAMETER	2	3	4	5	6
phosphate	0.17	0.02	-0.05	0.05	-0.12
sulfate	0.001	0.02	0.03	0.005	-0.05
silica	0.14	0.64	-0.05	-0.02	-0.12
dissolved oxygen	0.001	0.02	0.03	0.004	-0.04
salinity	0.11	0.02	-0.03	0.004	-0.12
nitrate	0.14	0.72	-0.05	-0.02	-0.09
water temperature	0.13	0.52	0.25	0.005	-0.03

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NOMENCLATURA PLANTARUM AMERICANARUM V. LAURACEAE

Alicia Lourteig

Muséum National d'Histoire Naturelle, Paris.

PLUMIER describió el género Borbonia, dedicado al Príncipe de Borbon quien además de otras virtudes poseía el amor a la Botánica. el cual fué adoptado por Linné dándole el nombre de Laurus. Bajo ese nombre describió varias especies, otros autores lo imitaron y antes de un siglo vistos los caracteres dispares de las especies incluídas, se separaron varios grupos en diversos géneros.

Plumier ilustró y describió tres especies, pero en su Catálogo de Géneros, al describir Borbonia, sólo citó dos (p.4):

Borbonia fructu oblongo nigro, calyce coccineo que corresponde al MSS 6: Ic. 98

Borbonia fructu globoso nigro calyce e viride rubente que corresponde al MSS 6: Ic.99

la otra es:

Borbonia fructu ex auro virescente, calyce corallino y corresponde al MSS 6: Ic. 97

Burmann (Edit.) Plant. Americanarum, fasc. 3. 1756 en pág. 50 cita el primer protólogo de Plumier, luego las obras de Linné que no corresponden a ninguna especie de Plumier, da una descripción que es una mezcla de especies (de América del Norte y de Antillas) y publica la lámina 60 en la cual los detalles A – D copiados del Catálogo de Géneros de Plumier no corresponden a la planta ilustrada por el hábito; en ésta las hojs presentan 5 nervaduras secundarias, como en el Icón original de Plumier (4 ó 5) pero, quizás por fantasía del grabador aceptada por Burmann, agrega unas raras nerveduras terciarias que no existen y falsean el Icón. Esto fué observado por Urban (Rep. Sp. Nov.Beihefte 5: 40,OBS.I).

Linné en su Systema,1759 y en Species Plant.ed. 2. cita para Laurus Borbonia el primer protólogo de Plumier y la lámina 60 de Burmann, que no corresponde.

Lamarck, Encyc. p. 450 bajo Laurus Borbonia L. distingue la especie antillana de Plumier como var.β para el protólogo de Plumier pero cita también el Icón 60 de Burmann que corresponde a otro (MSS 6: 98). En p. 451 cita Laurus globosus Aublet y tipifica ese binomio (cuyo protólogo fué citado por Aublet) con el Icón MSS 6: 99 que es el que corresponde, reproducido por Burmann en lámina 60 (sólo el hábito con fructificaciones) excluyendo los detalles A – D. Esta especie es de las Islas Antillas La descripción de Lamarck es la traducción francesa de la latina de Plumier inédita.

Nees, 1836, p. 318, coloca este binomio en la sinonimia de Nectandra sanguinea Roland ex Rotboell (1778), citando además, Lamarck y Persoon, acompañado al final por un ? y reafirma la relación con el protólogo y el Icón MSS Plumier. Al mismo tiempo sinonimiza Laurus Borbonia var.β que es otra especie. Expone sus dudas en p. 320 Adnotatio.

Meissner in Candolle, 1864, ignora el binomio de Aublet y describe Nectandra antillana, citando especímenes de las Antillas.

Mez, 1889, p. 415, hace la combinación Nectandra globosa (Aublet) Mez, citando el basónimo y la obra de Lamarck, pero curiosamente todo el material así como la sinonimia son extra-antillanos, correspondiento a una especie guayanesa. A pesar de citar Lamarck parece que no lo ha laído. En p. 425 vuelve a citar el binomio en Lamarck pero como sinónimo, esta vez, de N. antillana Meissn. Una de las inconsistencias de la obra de Mez.

Urban, 1920, acepta N.antillana pero, como dije más arriba, señala los errores de Burmann en cuanto al uso de los MSS de Plumier y sinonimiza con ? Laurus globosa Lamarck, etc.

Rohwer, 1985, fiel a Mez, no ha percibido el problema de N. globosa. Cita un "holotype BM n.v." inexistente, puesto que Aublet ni vió ni citó material alguno, y Lamarck fué quien tipificó el binomio con la ilustración del protólogo citado por Aublet. Este autor sólo puso el protólogo de Plumier en nomenclatura binomial (V. Phytologia, 53 (4): 245-246. 1983).

De esta situación confusa, resulta evidente que Nectandra globosa(Aublet) Mez no es aplicable al material de la región guayanesa citado por Mez, sino al de Antillas, lo que correspondería a Nectandra antillana Meissner. El material citado, de Guayana tendrá que llamarse quizás, según alguno de los sinónimos citados por Mez u otro binomio prioritario.

La nomenclatura es como sigue:

Borbonia fructu globoso nigro, calyce ex viridi rubente Plumier, Gen. 4, MSS 6: 99, reproducido por Burmann, l.c. excl. detalles A - D.
Laurus globosa Aublet, Fl. Guiana Franç. 1: 364. 1775. Lamarck, Encyc. Méthod.3: 451. 1792.
Persea globosa (Aublet) Sprengel, Systema 2: 269. 1825.
Nectandra globosa (Aublet) Mez, Bot. Jahrb. 5: 415. 1889 excl. descr., sinón. y material. Rohwer, Mitteil. Inst. Allgem. Bot. Hamburg 20: 51. 1985.

Sinónimos: Nectandra antillana Meissner in Candolle, Prodromus 15 (1): 153 . 1864. Mez, l.c. 425. Urban, Symb. Antill. 8:233. 1920 et l.c. Adams, Flowering Pl. Jamaica 253. 1972. Fournet, Fl. Illustrée Phanér. Guadeloupe et Martinique 492 - 493. 1978. Rohwer, l.c. 52 - 53 (in syn.).

MUTANT WEEDS OF IOWA: FASCIATION IN *Taraxacum officinale*

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Fasciation in plants causes a wide variety of flattened, coalesced and malformed morphological changes in vascular plants. These include a widening or broadening of shoot axis parts, enlargements of plant parts and a fusing of vegetative and reproductive parts. These changes can affect single plant parts or the entire plant. Fasciation is common in many families of vascular plants (White, 1945, 1948). This trait is often inherited but can occur with environmental, or exogenous chemical, stimuli (Gorter, 1965; Scheibe and Wöhrmann-Hillmann, 1957; and White, 1948).

The purpose of this report is to describe the recent finding (May, 1987) of fasciation in dandelion (*Taraxacum officinale*). Ten to 15 plants were observed in an abandoned pasture in Douglas Township, Boone Co., Iowa. The plants were localized in an area about 30 m by 20 m. They were the only fasciated members of about 20,000 - 30,000 plants in a local community with, primarily, Kentucky bluegrass (*Poa praetense*). The fasciation took two forms, both confined to the reproductive portions of the plant. Plant tissue in all cases appeared healthy with normal coloration. Of multiple peduncle stalks, the central peduncles were fused together to form a broad (1-2 cm) flower stalk. Only a single, central, fasciated peduncle appeared in a single plant. Individual stems were visible in the fused stalk, often 2-4 peduncles appeared together. The second evidence of fasciation was in multiple flower heads. Flower heads (2-4) were fused at their base and formed a longitudinal organ. Flower color and seed production appeared normal. All other plant parts appeared normal: leaves and taproots. Seed and asexual organs were collected for further studies. This report represents the first of a series of reports on naturally occurring mutants of the Iowa flora.

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Scheibe, A. and B. Wöhrmann-Hillmann. 1957. Gene-controlled developmental processes in the stem structure of pea. Z. Bot. 45:97-121.

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ECHINOCEREUS NICHOLII (L. BENSON) PARFITT, STAT. NOV. (CACTACEAE)

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For the past 43 years the yellow-spined southern Arizona hedgehog with the pale pink flowers has been known as a variety of Echinocereus engelmannii. Recent studies have shown it to be a genetically isolated, morphologically distinct species.

Echinocereus nicholii (L. Benson) Parfitt, stat. nov.
Basionym: Echinocereus engelmannii (Parry ex Engelm.) Lemaire var. nicholii L. Benson. 1944. Proc. Calif. Acad. Sci. ser. 4, 25:258.
Type: Arizona, Pima County, Silver Bell Mountains. 28 March 1941. L. Benson 19720 (ARIZ 24989).

During an ongoing survey of chromosome numbers in the Cactaceae of the western United States, E. nicholii was found to be diploid, 2n=22 (Appendix 1), whereas all varieties of E. engelmannii for which chromosome numbers are known are tetraploid, 2n=44 (Parfitt 1978; Pinkava & McLeod 1971; Pinkava & Parfitt 1982; Pinkava et al. 1977, 1985, unpubl.). This difference in ploidy level represents more than a diagnostic character; it represents a reproductive barrier between the two taxa. Any hybridization that may occur between them would result in a sterile triploid (2n=3x=33), effectively blocking the flow of genes between the parent taxa.

The discovery that E. nicholii is diploid led to a closer examination of the morphological differences between it and the tetraploids. Although they are similar in size and in the presence of a downward-pointing flattened spine, E. nicholii may be readily separated from E. engelmannii by a greater distance between the areoles on each rib, flowers pale pink instead of medium magenta, basal portion of the floral cup green instead of colored, and smaller seeds with large, distinct papillae instead of low, coalescent papillae.

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Pinkava, D.J. & M.G.McLeod. 1971. Chromosome numbers in some cacti of western North America. Brittonia 23(2):171-176.

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Appendix 1. Documentation for chromosome number determinations in Echinocereus nicholii: n=11 AZ, Pima County: TYPE LOCALITY, SW side of Silver Bell Mountains, elev. 2680 ft., Parfitt 3570 and 3573 with A. Zimmerman (ASU). All determinations are from meiotic anther material prepared according to the methods of Pinkava & McLeod (1971).

DIAGNOSIS OF HAWAIIAN SPECIES OF STENOGYNE (LABIATAE)

Hawaiian Plant Studies 139

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A lengthy study by the author of Hawaiian Stenogyne has produced a large manuscript. Since this is not ready to publish, it is logical to print the diagnoses of the new species and varieties, in order to make them available. The types, unless otherwise located, are in the Bishop Museum, Honolulu.

Stenogyne acuta sp. nov.

Ramulis puberulis, petioles 5-8 mm longis, laminis 4.5-6 cm longis ellipticis, calycibus 8.5-10.2 mm longis, corollis 21 mm longis pilosis, loba infera 4.5 mm longa, ovata. Typus: Hawaii I., Volcano, F. R. Warshauer 1,938.

S. adpressa sp. nov.

Ramulis pilosulis, petioles 10-17 mm longis pilosis, laminis 2-4 cm longis anguste ellipticis infra pilosulis, nodis 18-22-floriferis, calycibus 10-12 mm longis. Typus: Hawaii I., C. N. Forbes 183.H., in part.

S. adscendens sp. nov.

Ramulis hirsutulis, petiolis 15-30 mm longis hirsutulis, laminis 4-6.5 mm longis ellipticisinfra in nervis hirsutis, nodis 2-floriferis, calycibus 5 mm longis, corollis 12 mm longis puberulis, loba infera 1 mm longa ovata. Typus: Hawaii I., L. W. Cuddihy 893.

S. alakaiensis sp. nov.

Ramulis pilosulis, petiolis 6-13 mm longis pilosulis, laminis 3.5-6.5 cm longis lanceolatis, nodis 6- (4)-floriferis, calycibus 9 mm longis puberulis, corollis 26 mm longis puberulis, loba infera 5 mm longa ovata. Typus: Kauai I., R. Gustafson 1,061.

S. alba, sp. nov.

Ramulis pilosulis, petiolis 5-8 mm longis pilosulis, laminis 3.5-4.7 cm longis ellipticis infra pilosulis, nodis 4-6-floriferis, calycibus 9-10 mm longis pilosulis, corollis 15 mm longis pilosulis, loba infera 1.6 mm longa ovata. Typus: Hawaii I., W. Hillebrand 397.

S. albimontis sp. nov.

Ramulis glabris, petiolis 8-15 mm longis ciliatis, laminis 1.5-4.3 cm longis ovatis, glabris, nodis 6-floriferis, calycibus 13 mm longis puberulis, corollis 19 mm longis puberulis, loba infera 3.3 mm longa suborbiculari. Typus: Hawaii I., C. N. Forbes 469.H.

S. alternans sp. nov.

Ramulis cum valleculis alternatis pilosulis, petiolis 5-8 mm longis pilosis, laminis 22-43 mm longis ovatis infra nervis pilosulis, nodis 6-floriferis, calycibus 6-8 mm longis, corollis 17 mm longis, loba infers

3 mm longa, ovata. Typus: Hawaii I., H. McEldowney 19.

S. ambiobtuta sp. nov.

Ramulis pilosulis, petiolis 12-19 mm longis pilosulis, laminis 5-6 cm longis ellipticis infra pilosulis, nodis 6-floriferis, calycibus 10-11 mm longis pilosulis, corollis 18 mm longis pilosulis. Typus: Hawaii I., S. Anderson 489.

S. angularis sp. nov.

Ramulis hirsutis, petiolis 6-20 mm longis hirsutis, laminis 18-40 mm longis ovatis hirsutis, nodis 6-floriferis, calycibus 11-12.5 mm longis hirsutis. Typus: Hawaii I., E. R. Warshauer 1,996.

S. bracteosa sp. nov.

Ramulis pilosulis, petiolis 6-11 mm longis ciliatis, laminis 17-27 mm longis ovatis, glabris, nodis 6-floriferis, calycibus 5.5-6.5 mm longis glabris, corollis 22-23 mm longis pilosulis, loba infera 3.3 mm longa ovata. Typus: Hawaii I., J. Davis 946.

S. calaminthoides A. Gray, var. kulaniensis, var. nov.

Calycibus 8-9 mm longis puberulis, nodis 8-10-floriferis, ramulis pilosulis, petiolis pilosulis. Typus: Hawaii I., H. St.John 25,320.

S. calvata sp. nov.

Ramulis in lateribus pilosulis, petiolis 3-7 mm longis ciliatis, laminis 1.9-3.9 cm longis ovatis infra in nervis pilosis, nodis 6-floriferis, calycibus 6.5-7 mm longis pilosis, corollis 15.5 mm longis pilosis, loba infera 3 mm longa ovata. Typus: Hawaii I., G. Clarke 109.

S. ciliata sp. nov.

Ramulis pilosulis, petiolis 3-7 mm longis ciliatis, laminis 10-13 mm longis elliptici-ovatis infra pilosulis, nodis 2-floriferis, calycibus 8-8.5 mm longis puberulis, corollis 22 mm longis puberulis, loba infera 3.5 mm diametri suborbiculari. Typus: Hawaii I., H. St. John 26,962.

S. conscandens sp. nov.

Ramulis in angulis pilosis, petiolis 3-7 mm longis ciliatis, laminis 5-10 mm longis ovatis ciliatis, nodis 2-floriferis, calycibus 7.5 mm longis ciliolatis, corollis 18-19 mm longis pilosulis, loba infera 3 mm longa ovata. Typus: Hawaii I., K. M. Nagata 1,689.

S. coriacea sp. nov.

Ramulis glabris, petiolis 6-8 mm longis pilosulis, laminis 28-37 mm longis ellipticis glabris, nodis 3-4-floriferis, calycibus 11-12.5 mm longis puberulis, corollis 13 mm longis. Typus: Hawaii I., C. Wakida 326.

S. Davisae sp. nov.

Ramulis pilosulis, petiolis 6-9 mm longis ciliatis, laminis 18-27 mm longis ovatis glabris, nodis 4-6-floriferis, calycibus 6.5-7 mm longis glabris, corollis

23 mm longis pilosis, loba infera 5 mm longa. Typus: Hawaii I., J. Davis 490.

S. decumbens sp. nov.

Ramulis puberulis, petiolis 3-8 mm longis ciliatis, laminis 1.3-2.7 cm longis ellipticis glabris, nodis 6-floriferis, calycibus 7-8 mm longis pilosulis, corollis 12-14 mm longis puberulis, loba infera 3.3 mm longa elliptica. Typus: Hawaii I., H. McEldowney 20.

S. deltoidea sp. nov.

Ramulis hirsutulis, petiolis 7-13 mm longisciliatis, laminis 2-3.8 cm longis ovatis, glabris, nodis 6-floriferis, calycibus 9-10 mm longis; corollis 35 mm longis pilosulis, loba infera 5 mm longa elliptica. Typus: Hawaii I., C. N. Forbes 676.H.

S. diantha sp. nov.

Ramulis pilosulis, petiolis 5-9 mm longis ciliatis, laminis 4.5-5.8 cm longis ellipticis glabris, nodis 2-floriferis, calycibus 9-10 mm longis pilosulis, corollis 20 mm longis pilosulis. Typus: Hawaii I., F. R. Warshauer 1,938.

S. Douglasii sp. nov.

Internodis glabris, petiolis 8-18 mm longis ciliatis, laminis 1.8-6.2 cm longis ellipticis infra in nervis pilosulis, nodis 10-14-floriferis, calycibus 7.5 mm longis puberulis, corollis 16 mm longis puberulis, loba infera 2 mm diametro suborbiculari. Typus: Sandwich Is. D. Douglas 22 (K).

S. earina sp. nov.

Internodis glabris, petiolis 2-10 mm longis glabris, laminis 25-40 mm longis eliptici-lanceolatis glabris, nodis 3-6-floriferis, calycibus 8.5-9 mm longis puberulis, corollis 17-18 mm longis puberulis, loba infera 1.8 mm longa ovata. Typus: Hawaii I., C. Wakida 325.

S. elliptica sp. nov.

Ramulis hispidulis, petiolis 2-4 mm longis ciliatis, laminis 2.2-3.1 cm longis ovatis infra hispidulis, nodis 2-6-floriferis, calycibus 10-12 mm longis hispidis, corollis 22-28 mm longis hispidulis, loba infera 3-4.5 mm longa ovata vel suborbiculari. Typus: Sandwich Is., D. Nelson (BM).

S. elliptilobata sp. nov.

Nodis 6-floriferis, calycibus 16-17 mm longis pilosulis, corollis 40 mm longis pilosulis, loba infera 5.5 mm longa oblate orbiculari. Typus: Hawaii I., J. Jacobi 360.

S. flava sp. nov.

Ramulis in valleculis alternatis pilosulis, ramis lateralibus cum petiolis 6-12 mm longis ciliatis, laminis 2.5-5 cm longis ellipticis infra in nervis pilosulis, nodis 6-floriferis, calycibus 11-12 mm longis pilosulis, corollis 19-20 mm longis pilosulis, loba infera 1.5 mm longa ovata. Typus: Hawaii I. J. Davis 555.

S. Forbesii (Sherff) comb. nov.
S. purpurea H. Mann, var. Forbesii Sherff, Am. Journ. Bot. 21: 701, 1934.

S. fruticosa sp. nov.
Ramulis pilosulis, petiolis 6-7 mm longis ciliatis, laminis 16-26 mm longis lancei-ovatis infra in nervis pilosis, nodis 6-4-floriferis, calycibus 8.5-9 mm longis pilosulis, corollis 15 mm longis pilosulis, loba infera 3 mm longa ovata. Typus: Hawaii I., O. & I. Degener 34,639. (G).

S. fusca sp. nov.
Internodis glabris, petiolis 10-21 mm longis glabris vel puberulis, laminis 4-7 cm longis elliptici-lanceolatis glabris, nodis 6-floriferis, calycibus 6-8 mm longis, subglabris, corollis 15 mm longis puberulis, loba infera 2.6 mm longa ovata. Typus: Hawaii I., F. R. Warshauer 3,131.

S. gracilis (Sherff) comb. nov.
S. macrantha Benth., var. gracilis Sherff, Bot. Gaz. 96: 140, 1934.

S. hamakuaensis sp. nov.
Ramulis glabris, petiolis 10-22 mm longis ciliatis, laminis 4-6 cm longis ellipticis infra in nervis hirsutis, nodis 8-6-floriferis, calycibus 8-9.5 mm longis puberulis, corollis 26-28 mm longis puberulis, loba infera 7 mm longa ovata. Typus: Hawaii I., W. Hillebrand 344A (K).

S. hawaiiensis sp. nov.
Ramulis glabris, petiolis 9-17 mm longis laminis 4-5.5 cm longis ovatis infra glabris, nodis 6-floriferis, caycibus 13 mm longis puberulis, corollis 32 mm longis pilosis, loba infera 6 mm longa semiorbiculari. Typus: Hawaii I., J. Remy 377 (P).

S. hemidasys sp. nov.
Lateribus alternatis ramularum pilosis, petiolis 2-3 mm longis ciliatis, laminis 5-11 cm longis ovatis, nodis 2-floriferis, calycibus 6-6.6 mm longis pilosulis, corollis 12-13 mm longis pilosulis, loba infera 2 mm longa ovata. Typus: Hawaii I., S. Anderson 439.

S. hiloensis sp. nov.
Ramulis pilosis, petiolis 7-12 mm longis pilosulis, laminis 2.5-3.7 cm longis ovatis infra puberulis, nodis 10-8-floriferis, calycibus 6-7 mm longis, corollis 34 mm longis puberulis, loba infera 4.5 mm longa reniformi. Typus: Hawaii I., J. Davis 670.

S. Hosakae spl nov.
Herbis glabris, petiolis 8-15 mm longis, laminis 3-5 cm longis, nodis 2-floriferis, calycibus 7.5-8 mm longis, corollis 15-18 mm longis puberulis, loba infera 2.5 mm longa elliptica. Typus: Hawaii I., E. Y. Hosaka 2,221.

S. huluhuluensis sp. nov.
Ramulis pilosis, petiolis 2-4 mm longis pilosulis, laminis 3-7 mm longis ovatis infra pilosulis, nodis 2-floriferis, calycibus 7.5-8 mm longis pilosulis, corollis 20-21 mm longis, loba infera 3 mm longa ovata. Typus: Hawaii I., L. W. Cuddihy 912.

S. humululaensis sp. nov.
Internodis glabris, petiolis 5-25 mm longis, laminis 2-8.5 cm longis ellipticis infra glabris, nodis 6-4-floriferis, calycibus 7.5-9 mm longis ciliatis. Typus: Hawaii I., F. R. Warshauer 3,125.

S. integra sp. nov.
Ramulis glabris, petiolis 0.5-2 mm longis, laminis 2-3.5 cm longis elliptis glabris, nodis 2floriferis, calycibus 11-12 mm longis puberulis, corollis 20 mm longis pilosulis, Typus: Maui I., C. N. Forbes 2,437.M.

S. kaalae Wawra, var. Obatae var. nov.
Ramulis glabris, petiolis ciliatis, laminis in basi rotundatis, nodis 2-floriferis, calycibus 13 mm longis puberulis. Typus: Oahu I., J. Obata.

S. kaalae Wawra, var. Pearsallii var. nov.
Ramulis glabris, calycibus 9 mm longis glabris. Typus: Oahu I., G. Pearsall.

S. Kamehamehae Wawra, forma albiflora (Sherff) comb. nov. S. Kamehamehae Wawra, var. albiflora Sherff, Bot. Gaz. 96: 139, 1934.

S. kauaiensis sp. nov.
Ramulis pilosis, petiolis 5-9 mm longis pilosis, laminis 4-5.8 cm longis ovatis infra in nervis pilosulis, nodis 6-8-floriferis, calycibus 10-12 mm longis puberulis, corollis 40 mm longis pilosulis, loba infera 7 mm longa ovata. Typus: Hawaii I., J. Davis 662.

S. kilaueae sp. nov.
Ramulis pilosulis, petiolis 8-10 mm longis pilosulis, laminis 3.5-5 cm longis ellipticis infra in nervis pilosulis, calycibus 6-7 mm longis pilosulis, corollis 17 mm longis pilosulis, loba infera 2 mm longa ovata. Typus: Hawaii I., O. Degener 5,456.

S. kipahuluensis sp. nov.
Ramulis pilosis, petiolis 10-23 mm longis pilosis, laminis 2.2-5 cm longis ovatis infra in nervis pilosis, calycibus 12 mm longis puberulis, corollis 5.7 cm longis puberulis, loba infera 7 mm longa semiorbiculari. Typus: Maui I., C. A. Russell 545,

S. konaensis sp. nov.
Ramulis pilosis, petiolis 8-16 mm longis pilosis, laminis 23-40 mm longis ovatis infra pilosulis, nodis 6-4-floriferis, calycibus 7-9 mm longis pilosis, corollis 28-30 mm longis pilosis, loba infera 4-4.5 mm longa ovata. Typus: Hawaii I., F. R. Warshauer 2,011.

S. kukuiensis sp. nov.
Internodis glabris, petiolis 1.5-2.5 mm longis hirsutis, laminis 2.2-2.5 cm longis ellipticis glabris, nodis 2-floriferis, calycibus 12 mm longis hirsutulis, corollis 22 mm longis pilosulis, loba infera 3.3 mm longa rotundate oblonga. Typus: Maui I., R. Hobdy 2,231.

S. kulaensis sp. nov.
Ramulis hirsutis, petiolis 1-2 mm longis hirsutis, laminis 4-7 mm 4-7 mm longis ellipticis hirsutis, nodis 2-floriferis, calycibus 4.3-5 mm longis pilosulis, corollis 16 mm longis pilosis, loba infera 3 mm longa deltoidea. Typus: Maui I., R. Hobdy 2,231.

S. lactea sp. nov.
Ramulis hirsutulis, petiolis 30 mm longis hirsutis, laminis 5.2-8.5 cm longis ovatis infra puberulis, nodis 6-floriferis, calycibus 16-19 mm longis pilosis, corollis 36 mm longis pilosulis, loba infera 6 mm longa orbiculari. Typus: Hawaii I., J. D. Jacobi 360.

S. laculata sp. nov.
Ramulis pilosulis, petiolis 10-25 mm longis ciliatis, laminis 25-55 mm longis ovatis infra pilosulis, nodis 6-4-floriferis, calycibus 6-8 mm longis pilosulis, corollis 23-25 mm longis pilosulis, loba infera 10 mm longa ovata. Typus: Hawaii I., F. R. Warshauer 1,857.

S. laevis sp. nov.
Ramulis glabris, petiolis 7-22 mm longis ciliatis, laminis 5-10.5 cm longis lanceolatis infra midnervo subhirsuto, nodis 6-floriferis, calycibus 8-9 mm longis pilosulis, corollis 21 mm longis pilosulis, loba infera 2.5 mm longa subovata. Typus: Hawaii I., H. St. John 18,453.

S. lanceolata sp. nov.
Ramulis puberulis, petiolis 2-5 mm longis ciliatis, laminis 25-27 mm longis lanceolatis glabris, nodis 2-4-floriferis, calycibus 7-8 mm longis puberulis, corollis 16 mm longis pilosulis, loba infera 2 mm longa suborbicularis. Typus: Hawaii I., F. R. Warshauer 3,153.

S. latisepala (Sherff) comb. nov.
S. kaalae Wawra, var. latisepala Sherff, Occas. Papers B. P. Bishop Mus. 20: 16, fig. 7, 1949.

S. leptophylla (Sherff) comb. nov.
S. purpurea H. Mann, var. leptophylla Sherff, Bot. Gaz. 96: 142, 1934.

S. leptophylla (Sherff) St. John, var. retrorsa, var. nov.
Petiolis retrorse pilosulis, laminis infra in nervis pilosulis, calycibus 10-11 mm longis puberulis, labia supera corollae 7 mm longa. Typus: Kauai I., J. F. Rock 5,744.

S. lehuensis sp. nov.
Internodis in linea unica hirsutulis, petiolis 2-4 mm longis hirsutis, laminis 2-3 cm longis ovatis

subglabris, nodis 2-floriferis, calycibus 11 mm longis hirsutulis, corollis 22 mm longis hirsutis, loba infera 4 mm longa cordata. Typus: Maui I., R. Hobdy 517.

S. linearis sp. nov.

Ramulis hirsutis, petiolis 4-8 mm longis ciliatis, laminis 4.5-10 cm longis lanceolatis glabris, nodis 6-floriferis, calycibus 10.5-11 mm longis hirsutulis, corollis 16 mm longis hirsutis, loba infera 2.5 mm longa suborbiculari. Typus: Kauai I., W. Takeuchi 2,100.

S. longiloba sp. nov.

Ramulis hirsutulis, petiolis 5-12 mm longis ciliatis, laminis 3-9.7 cm longis glabris, nodis 2-floriferis, calycibus 15-17 mm longis hirsutulis, corollis 10 mm longis hirsutulis, loba infera 2.5 mm longa ovata. Typus: Hawaii I., J. D. Jacobi 1,104.

S. lutea sp. nov.

Ramulis glabris, petiolis 10-17 mm longis glabris, laminis 2.5-4.5 cm longis glabris, nodis 4-6-floriferis, calycibus 9-10.5 mm longis glabris, corollis 17 mm longis pilosis. Typus: Hawaii I., C. N. Forbes 469.H.

S. mamanecola sp. nov.

Internodis glabris, petiolis 6-12 mm longis ciliatis, laminis 15-25 mm longis ovatis glabris, nodis 6-floriferis, calycibus 6-7 mm longis pilosulis, corollis 22 mm longis pilosulis, loba infera 3 mm longa ovata. Typus: Hawaii I., S. Anderson 440.

S. Meeboldii (Sherff) comb. nov.

S. angustifolia A. Gray, var. Meeboldii Sherff, Bull. B. P. Bishop Mus. 136: 72, fig. 25, 1935.

S. mollissima (Skottsb.) comb. nov.

S. rugosa Benth., var. mollis Sherff, f. mollissima Skottsb., Bot. Notis. 1943: 368, 1943.

S. montana sp. nov.

Internodis glabris, petiolis 4-9 mm longis ciliatis, laminis 7-18 mm longis ellipticis glabris, nodis 2-floriferis, calycibus 7-8 mm longis glabris, corollis 16 mm longis pilosulis, loba infera 4 mm longa elliptica. Typus: Hawaii I., H. McEldowney 1.

S. montideae sp. nov.

Ramulis glabris, petiolis 12-25 mm longis hirsutulis, laminis 4-6.5 cm longis lanceolatis infra in nervis pilosulis, nodis 2-4-floriferis, calyxibus 7-10 mm longis pilosulis. Typus: Hawaii I., Dec. 1955, J. F. Rock.

S. multiflora sp. nov.

Ramis glabris, petiolis 5-13 mm. longis ciliatis, laminis 3.5-5.3 cm longis elliptis glabris, nodis 10-12-floriferis, calycibus 6-10 mm longis glabris, corollis 18 mm longis puberulis, loba infera 3 mm longa suborbiculari. Typus: Hawaii I., C. N. Forbes 334.H.

S. oxyodonta (Sherff) comb. nov.
S. calaminthoides A. Gray, var. oxyodonta Sherff, Am. Journ. Bot. 21: 701, 1934.

S. pedunculata sp. nov.
Ramulis glabris, petiolis 10-26 mm longis glabris, laminis 5-8.6 cm longis glabris lancei-ovatis, nodis 8-20-floriferis, calycibus 9-13 mm longis puberulis. Typus: Hawaii I., Wailuku R., L. W. Bryan.

S. pilosa sp. nov.
Ramulis pilosis, petiolis 7-15 mm longis pilosis, laminis 4.3-7.5 cm longis ovatis infra in nervis pilosulis, nodis 8-floriferis, calycibus 9 mm longis pilosis. Typus: Hawaii I., O. Degener 5,393.

S. pubicostata sp. nov.
Ramulis hirsutulis, petiolis 4-9 mm longis puberulis, laminis 3.5-6.2 cm longis lanceolatis infra glabris, nodis 2-floriferis, calycibus 6.5-7 mm longis hirsutulis, corollis 15-16 mm longis pilosulis, loba infera 2.8 mm longa ovata. Typus: Hawaii I. F. R. Warshauer 2,000.

S. recta sp. nov.
Ramulis pilosis, petiolis 7-10 mm longis pilosis, laminis 2/3-3/8 cm longis ovatis infra in nervis pilosis, nodis 6-floriferis, calycibus 9-10 mm longis subglabris, corollis 19 mm longis, loba infera 4 mm longa ovata. Typus: Maui I., P. K. Higashino 9,129.

S. Remyi (Sherff) comb. nov.
S. scrophularioides Benth., var. Remyi Sherff, Bot. Gaz. 96: 740, 1934.

S. repens sp. nov.
Ramulis setosis, petiolis 6-;4 mm longis ciliatis, laminis 1.3-2.7 cm longis ovatis glabris, nodis 6-floriferis, calycibus 5.5-6 mm longis subglabris, corollis 19-21 mm longis pilosulis, loba infera 4.5-5 mm longa elliptica. Typus: Hawaii I., J. F. Rock 8,314 (A).

S. retrorsa sp. nov.
Ramulis pilosis, petiolis 7-9 mm longis pilosis, laminis 15-25 mm longis ovatis infra in nervis pilosulis, nodis 6-floriferis, calycibus 7-8.5 mm longis pilosulis, corollis 23-25 mm longis pilosulis, loba infera 4.5 mm longa ovata. Typus: Maui I., F. R. Warshauer 2,543.

S. rhuakos sp. nov.
Ramulis pilosulis, petiolis 5-14 mm longis glabris, laminis 17-34 mm longis ovatis infra in nervis pilosulis, nodis 2-floriferis, calycibus 8-10 mm longis pilosulis, corollis 8.5 mm longis pilosulis, loba infera 3 mm longa ovata. Typus: Hawaii I. U. S. Exped., sheet 57,505.

S. nahukuensis sp. nov.

Ramulis pilosulis, petiolis 7-12 mm longis ciliatis, laminis 23-40 mm longis ovatis infra in nervis hirsutulis, nodis 6-floriferis, calycibus 6-9 mm longis puberulis, corollis 22-26 mm longis puberulis, loba infera 3.5 mm longa ovata. Typus: Maui I., F. R. Warshauer 2,530.

S. nigra sp. now.

Ramulis hirsutis, petiolis 6-10 mm longis ciliatis, laminis 20-30 mm longis ovatis glabris, nodis 8-14-floriferis, calycibus 5-6 mm longis glabris, corollis 17-18 mm longis pilosulis, loba infera 3 mm longa suborbicularis. Typus: Hawaii I., J. Davis 404.

S. novalimontis sp. nov.

Ramulis hirsutulis, petiolis 7-14 mm longis ciliatis, laminis 2-3.7 cm longis ovatis infra puberulis, nodis 6-floriferis, calycibus 6-7 mm longis glabris. Typus: Hawaii I., F. R. Warshauer 1,415.

S. oblonga (Sherff) comb. nov.

S. rotundifolia A. Gray, var. oblonga Sherff, Am. Journ. Bot. 21: 701, 1934.

S. ohiascandens sp. nov.

Internodis glabris, petiolis 7-17 mm longis glabris, laminis 11-32 mm longis ovatis glabris, nodis 2-4-floriferis, calycibus 5-6 mm longis glabris, corollis 14 mm longis, loba infera 1.5 mm longa suborbicularis. Typus: Hawaii I., N. Balakrishnan 931.

S. olaaensis sp. nov.

Ramulis pilosulis, petiolis 10-23 mm longis ciliatis, laminis 3-8 cm longis ovatis infra in nervis pilosulis, nodis 6floriferis, calycibus 7-8 mm longis pilosulis. Typus: Hawaii I., N. Balakrishnan 773.

S. olowaluensis sp. nov.

Ramulis glabris, petiolis 2-5 mm longis glabris, laminis 1.7-4.8 cm longis ovatis glabris, nodis 2-6-floriferis, calycibus 6-8 mm longis puberulis, corollis 19 mm longis pilosulis, loba infera 4 mm longa suborbicularis. Typus: Maui I., C. N. Forbes 2,436.M.

S. oonoides sp. nov.

Ramulis pilosulis, petiolis 8-12 mm longis pilosis, laminis 3-5.5 cm longis ovatis infra in nervis puberulis, nodis 3-floriferis, calycibus 8-9 mm longis pilosulis, corollis 23-25 mm longis pilosulis, loba infera 4-4.5 mm in diametro suborbicularis. Typus: Hawaii I., Kona, F. R. Warshauer.

S. ovata sp. nov.

Ramulis pilosulis, petiolis 10-17 mm longis ciliatis, laminis 3-4.3 cm longis ellipticis infra puberulis, nodis 6-floriferis, calycibus 10-13 mm longis puberulis, corollis 35 mm longis pilosulis. Typus: Hawaii I., O. & I. Degener 27,557.

S. Rockii sp. nov.

Ramulis hirsutulis, petiolis 6-18 mm longis hirsutulis, laminis 1.5-3.7 cm longis ellipticis infra in nervis hirsutulis, nodis 6-floriferis, calycibus 10-11 mm longis glabris, corollis 32-37 mm longis pilosulis, loba infera 3 mm longa transverse elliptica. Typus: Hawaii I., J. F. Rock 8,307.

S. rotundifolia A. Gray, var. salebrosa var. nov.

Ramulis in angulis retrorse villosis, petiolis 5-14 mm longis villosis, nodis 6-floriferis, calycibus 6-8 mm longis pilosulis, corollis 22 mm longis pilosis, loba infera 4 mm longa ovata. Typus: Maui I., C. N. Forbes 1,114.M.

S. rubra sp. nov.

Ramulis puberulis, petiolis 8-15 mm longis, laminis 0.8-3.2 cm longis glabris, nodis 6- (4)-floriferis, calycibus 9-10 mm longis, corollis 36 mm longis pilosulis, loba infera 6 mm longa suborbiculari. Typus: Hawaii I., G. E. Olson 1,099.

S. rugosa Benth., subsp. subulata (Sherff) St. John, var. subulata.

S. rugosa Benth., var. subulata Sherff, Bot. Gaz. 96: 142, 1934.

S. rugosa Benth., subsp. subulata (Sherff) St. John, var. imberbis var. nov.

Ramis glabris, petiolis 12-19 mm longis, laminis 4-7 cm longis lancei-ovatis glabris, nodis 4-6-floriferis, calycibus 11-12 mm longis glabris, corollis 18 mm longis, loba infera 3.5 mm longa elliptici-oblonga. Typus: Hawaii I., E. Bailey.

S. rugosa Benth, subsp. subulata (Sherff) St. John, var. monticola var. nov.

Ramis glabris, petiolis 12-14 mm longis, laminis 2.2-7 cm longis lanceolatis varie ovatis glabris, nodis 8-12-floriferis, calycibus 9 mm longis pilosulis, corollis 17-18 mm longis. Typus: Hawaii I., ESP 038.

S. rugosa Benth., subsp. subulata (Sherff) St. John, var. pubens var. nov.

Internodis glabris, petiolis 6-15 mm longis ciliatis, laminis 3.5-7.5 cm longis lanceolatis glabris, nodis 4-6-floriferis, calycibus 10-12 mm longis hirsutulis, corollis 15-17 mm longis, loba infera 2 mm longa elliptica. Typus: Hawaii I., G. O. Fagerlund. 15.

S. rugosa Benth., subsp subulata (Sherff) St. John, var. pubinervis var. nov.

Internodis glabris, petiolis 10-18 mm longis hirsutis, laminis 3-9 cm longis lanceolatis infra in nervis hirsutulis, nodis 4-6-floriferis, calycibus 10-12 mm longis hirsutulis, corollis 18 mm longis puberulis. Typus: Hawaii I., G. O. Fagerlund 1,063.

S. rugosa Benth., subsp. subulata (Sherff) St. John, var. punaensis var. nov.

Internodis hirsutulis, laminis 3-4.5 cm longis ellipticis infra puberulis, nodis 4-6-floriferis, calycibus 8-9 mm longis hirsutulis, corollis 19 mm longis hirsutulis, loba infera 2 mm longa elliptica. Typus: Hawaii I., Wilkes Expedition, sheet 57,704.

S. rugosa Benth., subsp. subulata (Sherff) St. John, var. remota var. nov.

Petioles 13-25 mm longis ciliatis, laminis infra in nervis puberulis, nodis 4-floriferis. Typus: Hawaii I., W. Gagne 614.

S. semipilosa sp. nov.

Ramulis in valleculis alternatis pilosulis, petiolis 3-6 mm longis ciliatis, laminis 15-20 mm longis ovatis infra midnervo pilosulo, nodis 6-floriferis, calycibus 7-10 mm longis pilosulis, corollis 17 mm longis puberulis, loba infera 2.7 mm longa ovata. Typus: Hawaii I., K. M. Nagata 1,709.

S. septentrionalis sp. nov.

Ramulis pilosis, petiolis 5-7 mm longis pilosis, laminis 4.2-5 cm longis ellipticis infra pilosis, nodis 6-floriferis, calycibus 8-11 mm longis pilosulis, corollis 22 mm longis pilosulis, loba infera 3.3 mm diametro suborbiculari. Typus: Hawaii I. F. R. Warshauer 1,830.

S. serrata sp. nov.

Internodis glabris, petiolis 1-2.4 mm longis ciliatis, laminis 2.5-10 cm longis ellipticis infra in nervis pilosulis, nodis 10-floriferis, calycibus 9-11 mm longis pilosulis, corollis 15 mm longis pilosulis, loba infera 1.5 mm longa ovata. Typus: Hawaii I., L. W. Cuddihy 871.

S. serrulata sp. nov.

Laminis 3-6 cm longis ovatis, calycibus 15-17 mm longis lobis serratis, corollis 28 mm longis. Typus: Hawaii I., H. St. John 26,818.

S. sessilis Benth., var. hanaulaensis var. nov.

Internodis glabris, petiolis 1.5-3 mm longis ciliatis, laminis 2-3.5 cm longis ovatis glabris, nodis 2-floriferis, calycibus 11-12 mm longis puberulis, corollis 21 mm longis pilosulis, loba infera 4 mm longa suborbiculari. Typus: Maui I., R. Hobdy 1,256.

S. sessilis Benth., var. lanceolata var. nov.

Laminis ovatis acutis, lobis calycis plus minusve serrulatis lanceolatis. Typus: Hawaii I., D. Herbst 2,004.

S. sessilis Benth., var. pilosa var. nov.

Caulibus foliisque pilosis, pedicellis calycisque pilosulis, calycibus 11 mm longis, lobis inferis 4-5 mm longis lanceolatis. Typus: Hawaii I., Papaloa, O. Degener.

S. sessilis Benth., var. wailukuensis var. nov.
Herbis glabris, petiolis 2-4 mm longis, laminis 2-3.3 cm longis ovatis, nodis 2-floriferis, calycibus 11-12 mm longis puberulis, corollis 20 mm longis puberulis. Typus: Maui I., C. N. Forbes 2,437.M.

S. subsessilis sp. nov.
Ramulis in valleculis pilosis, petiolis 1-1.5 mm longis ciliatis, laminis 2.5-7 cm longis ovatis glabris, nodis 2-floriferis, calycibus 17-19.5 mm longis pilosis, corollis 30 mm longis pilosulis, loba infera 3.5 mm longa suborbiculari. Typus: Maui I., C. N. Forbes 2,351.M.

S. teres sp. nov.
Ramulis pilosis, petiolis 10-17 mm longis pilosis, laminis 4.2-6.2 cm longis ellipticis pilosis, nodis 6-floriferis, calycibus 12 mm longis pilosis, corollis 40 mm longis pilosulis, loba infera 7 mm longa reniformi. Typus: Hawaii I., S. Anderson 481.

S. triangularis sp. nov.
Ramulis pilosis, petiolis 7-12 mm longis pilosis, laminis 2.4-4 cm longis ovatis infra in nervis pilosulis, nodis 6-floriferis, calycibus 8-9.5 mm longis puberulis, corollis 30 mm longis pilosis, loba infera 5 mm longa suborbiculari. Typus: Maui I., P. K. Higashino 9,129.

S. villosa sp. nov.
Ramulis villosis, petiolis 15-23 mm longis villosis, laminis 5.7-7.3 cm longis ovatis villosis, nodis 4-floriferis, calycibus 16 mm longis villosis, corollis 33 mm longis pilosulis, loba infera 4.5 mm longa reniformi. Typus: Hawaii I., J. Davis 666.

S. viridialba sp. nov.
Ramulis pilosulis, petiolis 4-12 mm longis ciliatis, laminis 1.6-3.9 cm longis ovatis infra midnervo hirsutulo, nodis 8-floriferis, calycibus 4-4.5 mm longis ciliatis, corollis 14-16 mm longis pilosis, loba infera 3 mm diametro suborbiculari. Typus: Hawaii I., F. R. Warshauer 295.

S. volanica sp. nov.
Ramulis hirsutis, petiolis 7-16 mm longis ciliatis, laminis 1.5-3.4 cm longis ovatis glabris, nodis 4-floriferis, calycibus 4.5-5 mm longis glabris, corollis 24-25 mm longis pilosis, loba infera 3 mm longa ovata. Typus: Hawaii I., Jacobi 386.

S. waimeana (Sherff) comb. nov.
S. calaminthoides A. Gray, var. waimeana Sherff. Am. Journ. Bot. 21: 701, 1934.

S. Warshaueri sp. nov.
Ramulis pilosulis, petiolis 18-45 mm longis puberulis, laminis 6-8.5 cm longis ovatis infra puberulis, nodis 6-floriferis, calycibus 6-7 mm longis pilosulis,

corollis 22-25 mm longis pilosulis, loba infera 4-4.5 mm longa elliptica. Typus: Hawaii I., F. R. Warshauer 1,972.

S. Wilkesii (Sherff) comb. nov.

S. sessilis Benth., var. Wilkesii Sherff, Bull. B. P. Bishop Mus. 136: 87, fig. 34, 1935.

DIAGNOSES OF PHYLLOSTEGIA SPECIES (LABIATAE)

HAWAIIAN PLANT STUDIES 140

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The author has been doing research on Phyllostegia for a long time and has produced a lengthy manuscript. In order to make the new taxa available, their diagnoses are herein printed. Unless otherwise located, the types are in the Bishop Museum, Honolulu.

P. adenophora sp. nov.
Ramulis puberulis, petiolis 2-5 cm longis puberulis, racema terminali, nodis 6-floriferis, calycibus 5.5 mm longis glandulose puberulis, tubo corollae 11 mm longo pilosulo, labia infera 8.5-9 mm longa. Typus: Kauai I., J. F. Rock 17,313.

P. alba sp. nov.
Ramulis puberulis, petiolis 2-3.5 cm longis puberulis, laminis 6-9 cm longis ellipticis infra pilosulis, racema terminali, nodis 6-floriferis, calycibus 8-9.5 mm longis puberulis, tubo corollae 22-23 mm longo puberulo, loba infera 11-12 mm longa. Typus: Maui I., C. N. Forbes 363.M.

P. arenicola sp. nov.
Ramulis pilosis, petiolis 4-14 mm longis pilosulis, laminis 2-5.3 cm longis ovatis infra pilosulis, racema terminali, nodis 4-floriferis, calycibus 5 mm longis hirsutulis, lobis corollae 9 mm longis hirsutulis, labia infera 6 mm longa. Typus: Midway Atoll, E. L. Caum 25.

P. atomifera sp. nov.
Ramulis glandulose atomiferis, petiolis 10-23 mm longis glandulosis, laminis 3-6.3 cm longis ovatis infra glandulose atomiferis, racema terminali, calycibus 4.5-5 mm longis puberulis et glandulosis, labia infera 2 mm longa. Typus: Oahu I., B. H. Gagne.

P. axillaris sp. nov. Ramulis pilosulis, petiolis 2-4 cm longis pilosulis, laminis 6.5-17.5 cm longis ellipticis infra subglabris, racema terminali, nodis 2-floriferis, calycibus 5 mm longis glandulose pilosulis, tubo corollae 6 mm longo resinifero, labia infera 4 mm longa. Typus: Hawaii I., S. Anderson 488.

P. brevicalycis sp. nov.
Ramulis puberulis, petiolis 6-21 mm longis puberulis, laminis 3.5 cm longis ellipticis, infra in nervis pilosulis, racema terminali, nodis 8-floriferis, calycibus 4-5 mm longis puberulis, tubo corollae 7.5 mm longo, labia infera 3 mm longa. Typus: Maui I., C. N. Forbes 2,446.M.

P. brevilobata sp. nov.
Ramulis pilosulis, petiolis 1.8-3.7 cm longis puberulis, laminis 6.5-9.5 cm longis ovatis infra puberulis, racema terminali, nodis 8-10-floriferis, calycibus 3-4 mm longis puberulis, tubo corollae 10 mm longo, labia infera 6 mm longa. Typus: Maui I., C. N. Forbes 502.M.

P. brevis sp. nov.
Ramulis pilosulis, petiolis 5-55 mm longispilosulis, laminis 2-10 cm longis ovatis infra puberulis, racema terminali, nodis 8-floriferis, calycibus 3.5-4 mm longis puberulis, tubo corollae 8 mm longo pilosulo, loba infera 6 mm longa. Typus: Maui I., Wawra 1,915 (W).

P. Brighamii sp. nov.
Ramulis puberulis, petiolis 20-23 mm longis puberulis, laminis 3.7-5 cm longis ovatis infra in nervis puberulis, racema termiali, nodis 8-10-floriferis, calycibus 3-4 mm longis atomiferis, tubo corollae 8 mm longopuberulo, labia infera 2.5 mm longa. Typus: Maui I., W. T. BRigham 405 (GH).

P. Bryanii (Sherff) comb. nov.
P. racemosa Benth., var. Bryanii Sherff, Am. Journ. Bot. 21: 699, 1934.

P. capitata sp. nov.
Ramulis glandulose pilosulis, petiolis 1.5-4 cm longis pilosulis, laminis 8-11 cm longis lanceolatis infra hirsutulis, racema terminali, calycibus 6.5-7 mm longis glandulose pilosulis, tubo corollae 12 mm longo, labia infera 7 mm longa. Typus: Kauai I., J. H. R. Plews 80;

P. catenulata sp. nov.
Ramulis catenulate hirsutulis, petiolis 27-36 mm longis catenulate hirsutis, laminis 9.5-11 cm longis ovatis pilosis racema terminali, calycibus 7 mm longis hirsutis, tubo corollae 10 mm longo hirsuto, labia infera 6 mm longa. Typus: Hawaii I., J. F. Rock 3,439.

P. cernua sp. nov.
Ramulis pilosulis, petiolis 1.5-4.5 cm longis pilosulis, laminis 6.5-11 cm longis ovatis infra hirsutulis, racema terminali, calycibus 4 mm longis pilosulis, tubo corollae 9-10 mm longo pilosulo, labia infera 7-8 mm longa. Typus: Hawaii I., L. W. Cuddihy 770.

P. chartacea sp. nov.
Ramulis puberulis, petiolis 1-4 cm longis puberulis, laminis 5-10 cm longis lanceolatis infra puberulis, racema terminali, nodis 4-floriferis, calycibus 10-11 mm longis puberulis, loba infera 17-18 mm longa. Typus: Maui I., J. F. Rock.

P. cordata sp. nov.
Ramulis pilosis, petiolis 2-3 cm longis pilosis, laminis 4-5.8 cm. longis ovatis infra in nervis pil-

osulis, racema terminali, calycibus 5-5.5 mm longis pilosulis. Typus: Kauai, Kokee, collector unknown.

P. Cowanii sp. nov.

Ramulis pilosis, petiolis 25-55 mm longis pilosis, laminis 7-11 cm longis ovati-lanceolatis infra in nervis puberulis, racema terminali, nodis 4-floriferis, calycibus 5 mm longis puberulis, corollis hirsutulis. Typus: Oahu, R. S. Cowan 808.

P. curta sp. nov.

Ramulis pilosulis, petiolis 3.5-7.5 cm longis pilosulis, laminis 11-14 cm longis ellipticis infra puberulis, racemis axillaribus, nodis 6-floriferis, calycibus 4-4.5 mm longis pilosulis, tubo corollae 8 mm longo, labia infera 6 mm longa. Typus: Hawaii I., Macrae (GH).

P. decemiflorifer sp. nov.

Ramulis pilosulis, petiolis 17-28 mm longis pilosulis, laminis 8-10.5 cm longis lanceolatis infra pilosulis, racema terminali, calycibus 6 mm longis pilosulis. Typus: Hawaii I., F. R. Warshauer 1,649.

P. decumbens sp. nov.

Ramulis pilosulis, petiolis 8-17 mm longis pilosis, laminis 3-4 cm longis lanceolatis infra pilosis, racema terminali, nodis 14-20-floriferis, calycibus 8-10 mm longis pilosulis, tubo corollae 8 mm longo puberulo, loba infera 8 mm longa. Typus: Hawaii I., C. N. Forbes 183.H in part.

P. deltoidea sp. nov.

Ramulis pilosulis, petiolis 2-6 cm longis pilosulis, laminis 7-14.5 cm longis ovatis infra pilosulis, racema terminali, nodis 6-floriferis, calycibus 3.5 mm longis pilosulis, tubo corllae 10 mm longo, labia infera 5.5 mm longa. Typus: Molokai I., J. F. Rock 6,127.

P. elliptica sp. nov.

Ramulis puberulis, petiolis 7-15 mm longis ciliatis, laminis 3-6.5 cm longis ellipticis infra midnervo puberulo, racema terminali, nodis 6-floriferis, calycibus 8-11 mm longis puberulis, tubo corollae 13 mm longo pilosulo, loba infera 13 mm longa. Typus: Maui I., B. Harrison 257.

P. Fagerlindii (Sherff) comb. nov.

P. mollis Benth., var. Fagerlindii Sherff, Occas. Papers, B. P. Bishop Mus., 20: 13, fig. 5, 1949.

P. Fayi sp. nov.

Ramulis glandulose puberulis, petiolis 1.3-4 cm longis puberulis, laminis 5-12.5 cm longis lanceolatis infra in nervis puberulis, racema terminali, nodis 6-floriferis, calycibus 6.5-7 mm longis glandulose puberulis, tubo corollae 11-12 mm longo pilosulo, labia infera 6.5-7 mm longa. Typus: Kauai I., J. Fay 555.

P. foliosa sp. nov.
Ramulis hirsutis, petiolis 2.2-2.5 cm longis, laminis 5-6 cm longis ovatis infra hirsutis, nodis 10-floriferis, calycibus 8-9 mm longis hirsutulis, tubo corollae 11-12 mm longo hirsutulo, labia infera 13-14 mm longa. Typus: Hawaii I., J. F. Rock 4,314.

P glabriuscula (A. Gray) comb. nov.
P. parviflora (Gaud.) Benth., var. glabriuscula A. Gray, Proc. Am. Acad. Arts 5: 344, 1862, in part.

P. glandulosa sp. nov.
Ramulis pilosis, petiolis 2.5-4 cm longis pilosis, laminis 6-10 cm longis lanceolatis infra in nervis pilosis, nodis 10-floriferis, calycibus 4-5 mm longis pilosulis, tubo corollae 7-8 mm longo pilosulo, loba infera 5 mm longa. Typus: Hawaii I.,, Kona, J. F. Rock.

P. grandiflora (Gaud.) Benth., var. majoricalycis var. nov.
Pedicellis 8-11 mm longis, calycibus 10-13 mm longis puberulis. Typus: Woahoo [=Oahu I.] Macrae (GH).

P. heterodoxa (Sherff) comb. nov.
P. brevidens A. Gray, var. heterodoxa Sherff, Am. Journ. Bot. 21: 700, 1934.

P. hiati sp. nov.
Ramulis hirsutis, petiolis 1-2.5 cm longis hirsutis, laminis 4.5-7.5 cm longis ovatis infra pilosis, nodis 8-10-floriferis, calycibus 5.5 mm longis hirsutis, corollis hirsutulis. Typus: Maui I., R. Hobdy 762,

P. Hitchcockii (Sherff) comb. nov.
P. stachyoides A. Gray, var. Hitchcockii Sherff, Am. Journ. Bot. 21: 700, 1934.

P. Hobdyi sp. nov.
Ramulis catenulate pilosis, petiolis 2.5-4 cm longis pilosis, laminis 8.5-12.5 cm longis cordatis infra pilosis, nodis 6-floriferis, calycibus 6.5-7 mm longis pilosulis, tubo corollae 11-12 mm longo, labia infera 11-12 mm longa. Typus: Kauai I., R. W. Hobdy 109.

P. hualalaiensis sp. nov.
Ramulis pilosulis, petiolis 2-4 cm longis ciliatis, laminis 6-11 cm longis ovatis infra puberulis, nodis 18-22-floriferis, calycibus 5-6 mm longis pilosulis, tubo corollae 7 mm longo pilosulo, labia infera 7 mm longa. Typus: Hawaii I., H. St. John 11,355.

P. imminuta (Sherff) comb. nov.
P. Helleri Sherff, var. imminuta Sherff, Am. Journ. Bot. 21: 699, 1934.

P. insignis sp. nov.
Ramulis puberulis, petiolis 17-19 mm longis puberulis, laminis 5.5-7.5 cm longis ovatis, infra puberulis, nodis 6-floriferis, calycibus 8-9 mm longis puberulis, tubo corollae 13-17 mm longo pilosulo, labia infera 15-18 mm longa. Typus: Maui I., A. Medeiros.

P. interrupta sp. nov.
Nodis 8-floriferis, calycibus 4 mm longis pilosulis, nucibus siccis 3-3.5 mm longis. Typus: Iles Sandwich [=Hawaiian Is.], Voy. Uranie, C. Gaudichaud (P).

P. kaalaensis sp. nov.
Plantis glabris, petiolis 2-6 cm longis , laminis 5-13 cm longis ovatis, nodis 6-floriferis, calycibus 5 mm longis glabris, tubo corollae 11 mm longo glabro, labia infera 7 mm longa. Typus: Oahu I., J. Obata 77-315.

P. kahiliensis sp. nov.
Ramulis pilosis, petiolis 2.5-5.5 cm longis puberulis, laminis 8.5-9.5 cm longis ovatis infra pilosis, nodis 6-floriferis, calycibus 4.5-5 mm longis hirsutulis, tubo corollae 8-9 mm longo pilosulo, labia infera 7 mm longa. Typus: Kauai I., J. J. Fay 156.

P. kamokuensis sp. nov.
Ramulis puberulis, petiolis 7-16 mm longis puberulis, laminis 3-6 cm longis ovatis infra in nervis puberulis, nodis 6-floriferis, calycibus 3-3.5 mm longis puberulis, tubo corollae 7-8 mm longo pilosulo, labia infera 3 mm longa. Typus: Molokai I., J. F. Rock 6,119.

P. kauaiensis sp. nov.
Ramulis pilosulis, petiolis 10-18 mm longis pilosulis, laminis 3-5.3 cm longis ovatis cordatis infra in nervis pilosulis, nodis 6-floriferis, calycibus 4 mm longis pilosulis, tubo corollae 8.3 mm longo pilosulo, labia infera 3.5 mm longa. Typus: Kauai, H. Wawra (W).

P. kauensis sp. nov.
Ramulis pilosulis, petiolis 2.5-3 cm longis pilosis, laminis 7-10 cm longis ovatis infra pilosis, nodis 10-12-floriferis, calycibus 5.5-6 mm longis pilosulis, tubo corollae 14 mm longo pilosulo, loba infera 10 mm longa. Typus: Kauai I., Jacobi 722.

P. kilaueaensis sp. nov.
Ramulis pilosis, petiolis 1.5-3 cm longis pilosis, laminis 6-9.8 cm longis ovatis infra pilosis, nodis 6-8-floriferis, calycibus 7 mm longis pilosis, tubo corollae 11-12 mm longo piloso, labia infera 8.5 mm longa. Typus: Hawaii I., Kilauea For. Res., F. R. Warshauer & R. L. Stemmermann.

P. kohalaensis sp. nov.
Ramulis hirsutis, petiolis 2-3.2 cm longis, laminis 4.5-8 cm longis ovatis infra hirsutulis, nodis 10-14-floriferis, calycibus 7 mm longis hirsutis, tubo corollae 12 mm longo hirsutulo, loba infera 12 mm longa. Typus: Hawaii I., J. F. Rock 8,377.

P. konaensis sp. nov.
Ramulis pilosulis, petiolis 2.5-4 cm longis pilosulis, laminis 7-10 cm longis infra puberulis, nodis 12-14-floriferis, calycibus 8-9 mm longis pilosulis, tubo corollae 10 mm longo, loba infera

8 mm longa. Typus: Hawaii I., C. N. Forbes 183a.H.

P. lanaiensis (Sherff) comb. nov.

P. glabra (Gaud.) Benth., var. lanaiensis Sherff, Bot. Gaz. 96: 136, 1934.

P. lantanoides Sherff, var. konahuanuiana var. nov.

Petiolis pilosulis, laminis infra in nervis pilosis, calycibus 3.5-4 mm longis. Typus: Oahu I., H. St. John 11,506.

P. laxior (Deg. & Sherff in Deg.) comb. nov.

P. hirsuta Benth., var. laxior Deg. & Sherff in Deg., Fl. Haw. 316: 10/12/34.

P. LeBishopii sp. nov.

Ramulis puberulis, petiolis 15-25 mm longis puberulis, laminis 8-12.5 cm longis infra puberulis, nodis 5-floriferis, calycibus 8-10 mm longis puberulis, tubo corollae 12-13 mm longo, labia infera 10 mm longa. Typus: Maui I., L. E. Bishop 0471113.

P. lehuaensis sp. nov.

Ramulis pilosulis, petiolis 3-4.7 cm longis pilosulis, laminis 6-11 cm longis lanceolatis infra pilosulis, nodis 4-6-floriferis, calycibus 5 mm longis, tubo corollae 10 mm longo puberulo, labia infera 4.2 mm longa. Typus: Hawaii I., Pulehua, J. F. Rock.

P. leukantha sp. nov.

Ramulis puberulis, petiolis 12-16 mm longis glabris, laminis 4-7 cm longis ellipticis infra in nervis puberulis, nodis 6-floriferis, calycibus 10-11 mm longis puberulis, tubo corollae 17-18 mm longo, labia infera 15-17 mm longa. Typus: Maui I., Hanaula, R. Hobdy 802.

P. longitubata sp. nov.

Ramulis villosis, petiolis 1.5-5 cm longis villosis, laminis 7-9 cm longis ellipticis infra villosis, nodis 6-floriferis, calycibus 8-10 mm longis villosis, tubo corollae 15 mm longo, labia infera 21 mm longa. Typus: Molokai I., R. Hobdy 802.

P. Lydgatei (Sherff) comb. nov.

P. mollis Benth., var. Lydgatei Sherff, Am. Journ. Bot. 21: 43, fig. 11, 1935.

P makawaoensis sp. nov.

Ramulis pilosis, petiolis 1.5-6 cm longis pilosulis, laminis 7-15 cm longis ellipticis infra puberulis, nodis 6-floriferis, calycibus 2.5 mm longis 20-nervosis, lobis 0.3 mm longis ovatis, Typus: Maui I., W. Hillebrand & J. M. Lydgate.

P. manoana sp. nov.

Ramulis hirsutis, petiolis 3.7-6.7 cm longis, hirsutis, laminis 13.5-15 cm longis ovatis infra hirsutulis, nodis 6-floriferis, calycibus 3-3.8 mm longis glandulose puberulis, tubo corollae 10-11 mm longo, loba infera 10-12 mm longa. Typus: Oahu I., C. N. Forbes 1,306.O.

P. micrantha sp. nov.

Ramulis puberulis, petiolis 3.2-3.4 cm longis puberulis, laminis 6-10 cm longis ellipticis hirsutulis, nodis 6-8-floriferis, calycibus 2.5-2.7 mm longis puberulis, tubo corollae 7.5 mm longo, loba infera 4.5 mm longa. Typus: Oahu I., C. N. Forbes 1,589.0.

P. molokaiensis sp. nov.

Ramulis puberulis, petiolis 1-6 cm longis puberulis, laminis 4-10.5 cm longis ellipticis infra puberulis, nodis 8-6-floriferis, calycibus 5.2 mm longis puberulis, tubo corollae 9 mm longo puberulo, labia infera 5.5 mm longa. Typus: Molokai I., O. Degener 22,202 (W).

P. moniliformis sp. nov.

Ramulis hirsutis, petiolis 25-27 mm longis hirsutis, laminis 5.5-10.3 cm longis ovatis vel ellipticis infra hirsutulis, nodis 16-18-floriferis, calycibus 6-6.5 mm longis hirsutulis, tubo corollae 12-13 mm longo hirsutulo, loba infera 8.5 mm longa. Typus: Hawaii I., J. D. Jacobi 722.

P. montana sp. nov.

Ramulis pilosulis, petiolis 8-34 mm longis pilosulis, laminis 1.4-9 cm longis ovatis infra in nervis puberulis, nodis 6-floriferis, calycibus 5-5.5 mm longis pilosulis. Typus: Molokai I., F. R. Warshauer 2,408.

P. multiflora sp. nov.

Ramulis hirsutis, petiolis 3-4.2 cm longis hirsutis, laminis 6.5-11 cm longis ovatis infra hirsutulis, nodis 10-12-floriferis, calycibus 14-16 mm longis hirsutis, tubo corollae 17 mm longis, labia infera 20 mm longa. Typus: Hawaii I., J. F. Rock 8,312.

P. oahuensis sp. nov.

Ramulis puberulis, petiolis 6-11 mm longis ciliatis, laminis 15-25 mm longis lanceolatis infra atomiferis, nodis 6-floriferis, calycibus 4.5 mm longis puberulis, tubo corollae 6-7 mm longo pilosulo, loba infera 4 mm longa. Typus: Oahu I., B. H. Gagne.

P. Obatae sp. nov.

Ramulis puberulis, petiolis 2.5-9 cm longis puberulis, laminis 8-18 cm longis lanceolatis varie ovatis infra in nervis puberulis, nodis 6-floriferis, calycibus 3 mm longis puberulis, tubo corollae 9 mm longo, labia infera 6-6.5 mm longa. Typus: Oahu I., J. Obata 354.

P. occidentalis sp. nov.

Ramulis puberulis, petiolis 2.5-5.4 cm longis puberulis, laminis 7.5-11 cm longis ovatis infra in nervis puberulis, nodis 6-10-floriferis, calycibus 7 mm longis puberulis, tubo corollae 7 mm longo, labia infera 4 mm longa. Typus: Maui I., H. St. John 25,696.

P. odorata sp. nov.

Ramulis puberulis, petiolis 13-45 mm longis glabris, laminis 6-9 cm longis ellipticis infra in nervis puberulis, nodis 6-floriferis, calycibus 6-7 mm longis puberulis, tubo corollae 25 mm longo puberulo, labia infera 18 mm longa. Typus: Maui I., R. Hobdy 775.

P. olokeleensis sp. nov.

Ramulis pilosulis, petiolis 1-2.3 cm longis pilosulis, laminis 4-8 cm longis ovatis infra pilosulis, nodis 6-floriferis, calycibus 5.5 mm longis pilosulis, tubo corollae 9-10 mm longo pilosulo, loba infera 7 mm longa. Typus: Kauai, J. M. Lydgate 15.

P. olokuiensis sp. nov.

Ramulis puberulis, petiolis 2-5.5 cm longis puberulis, laminis 6-11 cm longis ellipticis infra in nervis puberulis, nodis 8-floriferis, calycibus 5 mm longis puberulis, tubo corollae 7 mm longo. Typus: Molokai I., H. St. John 23,246.

P. orientalis sp. nov.

Ramulis pilosulis, petiolis 3.5-6 cm longis pilosulis, laminis 10-13 cm longis ovatis infra pilosulis, nodis 10-18-floriferis, calycibus 9 mm longis pilosulis, tubo corollae 11-13 mm longo, labia infera 16 mm longa. Typus: F. R. Warshauer 2,535.

P. ovata sp. nov.

Ramulis subhirsutulis, petiolis 2-3.7 cm longis, laminis 7-12 cm longis ellipticis infra pilosulis, nodis 10-8-floriferis, calycibus 6-7 mm longis pilosulis, tubo corollae 6-7 mm longo pilosulo, labia infera 7 mm longa. Typus: Hawaii I., G. Clarke 3.

P. phytolaccoides (Sherff) comb. nov.

P. macrophylla (Gaud.) Benth., var. phytolaccoides Sherff, Bot. Gaz. 96: 137, 1934.

P. phytolaccoides (Sherff) St. John, var. salebrosa var. nov.

Laminis adpresse pilosulis infra nervis principalibus salebrose pilosulis. Typus: Maui I., F. R. Warshauer 2,876.

P. pilosa sp. nov.

Ramulis pilosis, petiolis 5-20 mm longis pilosulis, laminis 2.8-5.5 cm longis ovatis infra in nervis pilosulis, tubo corollae 7 mm longo puberulo, labia infera 4 mm longa. Typus: Maui I., Ukulele, J. F. Rock.

P. pilosicincta sp. nov.

Ramulis pilosis, petiolis 2.3-5 cm longis pilosis, laminis 7.5-11 cm longis ovatis infra in nervis pilosulis, nodis 8-10-floriferis, calycibus 4-6 mm longis pilosis. Typus: Maui I., E. Smith.

P. pilosula sp. nov.
Ramulis pilosulis, petiolis 2-3.8 cm longis pilosulis, laminis 6.5-7.5 cm longis ellipticis infra in nervis pilosulis, nodis 8-floriferis, calycibus 5.5 mm longis. Typus: Molokai I., F. R. Warshauer 2,438.

P. pluriflora sp. nov.
Ramulis glabris, petiolis 3.5-5 cm longis ciliatis, laminis 5.5-9.6 cm longis ellipticis infra glabris, nodis 8-10-floriferis, calycibus 7-7.5 mm longis puberulis. Typus: Hawaii I., I. M. Tomich 4,005.

P. plurinodosa sp. nov.
Ramulis pilosulis, petiolis 1-3.3 cm longis hirsutulis, laminis 6-10 cm longis ovatis infra hirsutulis, nodis 8-10-floriferis, calycibus 5-5.5 mm longis hirsutulis, tubo corollae 9 mm longo pilosulo, labia infera 8 mm longa. Typus: Hawaii I., F. R. Warshauer 2.495.

P. polyantha sp. nov.
Ramulis puberulis, petiolis 1-2 cm longis ciliatis, laminis 5-8 cm longis ellipticis infra pilosulis, nodis 18-20-floriferis, calycibus 6-7.5 mm longis puberulis, tubo corollae 7.5-8 mm longo puberulo, labia infera 10 mm longa. Typus: Hawaii I., G. Clarke 574.

P. pubens sp. nov.
Ramulis villosis, petiolis 1-2.5 cm longis villosis, laminis 6-9.5 cm longis ovati-lanceolatis infra pilosis, nodis 10-12-floriferis, calycibus 7-8 mm longis villosis, tubo corollae 12.1 mm longo pilosulo, labia infera 8 mm longa. Typus: Hawaii I., F. R. Warshauer 2,477.

P. reflexa sp. nov.
Ramulis piosulis, petiolis 18-45 mm longis pilosulis, laminis 5.5-9 cm longis ovatis infra in nervis pilosulis, nodis 10-14-floriferis, calycibus 4-4.5 mm longis pilosulis, corollis 12-14 mm longis pilosulis. Typus: Hawaii I., J. Davis 598.

P. Remyi (Sherff) comb. nov.
P. macrophylla (Gaud.) Benth., var. Remyi Sherff, Bot. Gaz. 96: 136, 1934.

P. repanda sp. nov.
Ramulis pilosulis, petiolis 12-25 mm longis pilosulis, laminis 4-5.8 cm longis ovatis infra pilosulis, nodis 8-floriferis, calycibus 7 mm longis pilosulis. Typus: Hawaii I., L. Stemmermann 3,976.

P. retrorsa sp. nov.
Ramulis pilosulis, petiolis 12-28 mm longis, pilosulis, laminis 3.5-9 cm longis lancei-ellipticis infra in nervis puberulis, nodis 26-floriferis, calycibus 4 mm longis pilosulis, tubo corollae 9-12 mm longo, labia infera 9 mm longa. Typus: Hawaii I., Hilo Forest, J. F. Rock.

P. rhuakos sp. nov.

Ramulis pilosulis, petiolis 6-18 mm longis pilosulis, laminis 3-3.8 cm longis ellipticis infra pilosulis, nodis 6-10-floriferis, calycibus 5-5.5 mm longis pilosulis, tubo corollae 6-7 mm longo pilosulo, labia infera 4 mm longa. Typus: Hawaii I., C. N. Forbes 983.H.

P. rubescens sp. nov.

Ramulis pilosulis, petiolis 2-9 cm longis pilosulis, laminis 7-15.5 cm longis pilosulis, nodis 6-floriferis, calycibus 5 mm longis puberulis, tubo corollae 9-10 mm longo pilosulo, labia infera 8-9 mm longa. Typus: Hawaii I., J. Davis 685.

P. rubritincta sp. nov.

Herbis glabris, petiolis 2-4 cm longis, laminis 3.3-9 cm longis lanceolatis, nodis 6-floriferis, pedunculis 2-3.5 mm longis, calycibus 5-5.5 mm longis glabris, tubo corollae 11-13 mm longo glabro, labia infera 5-6 mm longa. Typus: Lanai I., 3/10/15, G. C. Munro.

P. secunda sp. nov.

Ramulis pilosis, petiolis 3.3-8.6 cm longis pilosis, laminis 9-13 cm longis ovatis infra pilosis, nodis 14-26-floriferis, calycibus 3-3.5 mm longis glandulose hirsutulis, tubo corollae 12 mm longo piloso, labia infera 5.2 mm longa. Typus: Kauai I., Kaholuamano, J. F. Rock.

P. serrata sp nov.

Ramulis hispidis, petiolis 2-4 cm longis hispidis, laminis 11-15.5 cm longis ovatis infra hirsutulis, nodis 10-floriferis, calycibus 15 mm longis hirsutis, tubo corollae 10 mm longo hirsutulo, labia infera 8 mm longa. Typus: Hawaii I., F. R. Warshauer 2,490.

P. sexiflora sp. nov.

Ramis hirsutis, petiolis 4.5-6.2 cm longis hirsutis, laminis 13-17 cm longis ellipticis infra hirsutulis, nodis 6-floriferis, calycibus 19-20 mm longis hirsutis, lobis superis 8-10 mm longis lanceolatis serratis. Typus: Hawaii I., F. R. Warshauer 1,405.

P suaveolens sp. nov.

Ramulis glabris, petiolis 15-20 mm longisciliatis, laminis 5.8-9.2 cm longis ellipticis glabris, nodis 12-18-floriferis, calycibus 4-5 mm longis puberulis, tubo corollae 9 mm longo puberulo, labia infera 7 mm longaa. Typus: Hawaii I., J. Davis 276.

P. Swezeyi sp. nov.

Ramulis velutinis, petiolis 2.5-5.4 cm longis velutinis, laminis 6-10 cm longis ovatis supra pilosulis, nodis 4-6-floriferis, calycibus 2.8-3.5 mm longis puberulis, tubo corollae 8-10 mm longo pilosulo, labia infera 7 mm longa. Typus: Oahu I., O. Swezey.

P. ternaria sp. nov.

Ramulis hirsutis, petiolis 12-62 mm longis hirsutis, laminis 5.5-12.3 cm longis ovatis infra hirsutis, nodis 8-14-floriferis, calycibus 4-4.3 mm longis hirsutis, tubo corollae 9 mm longo pilosulo, loba infera 6 mm longa. Typus: Oahu I., J. Obata 441.

P. tongaensis sp. nov.

Ramulis pilosulis, petiolis 2-5 cm longis pilosulis, laminis 4-10 cm longis ovatis infra pilosulis, nodis 6-floriferis, pedicellis 3-4 mm longis pilosulis, calycibus 4-4.5 mm longis pilosis, lobis 2 mm longis ovatis, corollis 13 mm longis albis pilosis, tubo 7 mm longo, labia infera 7 mm longa. Typus: Tonga, Ata I., Nov. 11, 1958, E. Soakai 226 (K).

P. triangularis sp. nov.

Ramulis pilosis, petiolis 12-20 mm longis pilosis, laminis 2.5-7 cm longis ovatis infra pilosulis, nodis 6-10-floriferis calycibus 3.8-4 mm longis pilosulis, tubo corollae 9-10 mm longo pilosulo, labia infera 7 mm longa. Typus: Molokai I., J. F. Rock 7,023.

P. triquetra sp. nov.

Ramulis puberulis, petiolis 10-37 mm longis pilosulis, laminis 6-8 cm longis ellipticis infra pilosulis, nodis 8-10-floriferis, calycibus 3.5-4 mm longis puberulis, tubo corollae 7.5-8 mm longo puberulo, loba infera 6 mm longa. Typus: Maui I., H. Mann & W. T. Brigham 404.

P. velutina (Sherff) comb. nov.

P. macrophylla (Gaud.) Benth., var. velutina Sherff, Bot. Gaz. 96: 137, 1934.

P. waianaeensis sp. nov.

Ramulis pilosis, petiolis 3.3-6 cm longis pilosis, laminis 7-10.5 cm longis ovatis infra pilosulis, nodis 6-8-floriferis, calycibus 5-6 mm longis pilosulis, tubo corollae 10 mm longo piloso, labia infera 8-9 mm longa. Typus: Oahu I., R. L. Wilbur 609.

P. Warshaueri sp. nov.

Ramulis villosis, petiolis 0.7-10 cm longis villosis, laminis 4.7-20 cm longis lancei-ovatis infra villosis, nodis 8-10-floriferis, caycibus 18-22 mm longis villosis, lobis 10-12 mm longis lanceolatis serrulatis. Typus: Hawaii I., F. R. Warshauer 1,405.

DIAGNOSES OF NEW HAWAIIAN SPECIES OF TOUCHARDIA (URTICACEAE)

HAWAIIAN Plant Studies 141

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The holotypes are all in the Bishop Museum, Honolulu.

Toucharida Christensenii sp. nov.
Frutex masculus est, ramulis hirsutulis stipulis 3-3.5 cm longis puberulis, petiolis 9-14 cm longis puberulis, laminis 16.4-23 cm longis lanceo-ovatis, cymulis 2-5 cm longis, capitulis 13-22 mm diametro, calycibus 3 mm longis lobis 2.3 mm longis ellipticis, filamentis 2.5 mm longis, antheris 0.7mm longis. Typus: Kauai I., Kamooloa Stream, C. Christensen 83.

T. glabra sp. nov.
Frutex masculis est, ramulis glabris, petiolis 3-10.5 cm longis glabris, laminis 23 cm longis late ovatis, cymis 5 cm longis, capitulis 13 mm diametro, calycibus 2 mm longis. Typus: Maui I., Puu Kukui, G. R. Ewart III & O. H. Swezey 56.

T. haupuensis sp. nov.
Frutex masculus est, ramis puberulis, petiolis 11-12.5 cm longis hirsutulis, laminis 17.3-20.3 cm longis ovatis, cymis 4-6 cm longis, capitulis 10-15 mm diametro, calycibus 2.3 mm longis lobis 2 mm longis ellipticis, filamentis 4 mm longis, antheris 1 mm longis. Typus: Kauai I., Hii Mts., C. N. Forbes 657.K.

T. iaoensis sp. nov.
Frutex masculis est, ramis hirsutulis, petiolis 8.4 cm longis, laminis 35.3-39 cm longis lanceolatis, cymis 6.8-12.7 cm longis, capitibus 15-17 mm diametro, calycibus 3.5 m longis lobis 2 mm longis ovatis, filamentis 3 mm longis, anthers 0.6mm longis. Typus: Maui I., Iao, R. Hobdy 1,831.

T. konaensis sp. nov.
Frutex masculus est, caulibus hirsutulis, stipulis 7.4 cm longis lineari-lanceolatis puberulis, petiolis 6-12.5 cm longis puberulis, laminis 19-29 cm longis ellipticis acuminatis, cymis 7-11 cm longis, calycibus 2.5 mm longis lobis 2.5 mm longis lanceolatis, filamentis 2.5 mm longis, antheris 0.6-0.7 mm longis. Typus: Hawaii I., Kaumalumalu, D. Herbst 1,646.

T. lanaiensis sp. nov.
Frutex femineus est, caule glabro, petiolis 19 cm longis in apice pilosulis, laminis 22.5 cm longis late ovatis acuminatis cordatis, cymis 1.5-2.5 cm longis glabris, capitulis 5-7 mm diametro, calycibus 1.6 mm longis lobis 1 mm longis anguste lanceolatis. Typus: Lanai I., R. Hobdy 751.

T. molokaiensis sp. nov.

Frutex masculus est, ramulis adpresse hirsutis, stipulis 7.5 cm longis lineari-lanceolatis, in basi adpresse hirsutis, petiolis 4.5-7 cm longis hirsutis, laminis 24-29 cm longis ovatis acutis, cymes 3-3.5 cm longis, capitibus 10-11 mm diametro, calycibus 2.5 mm longis lobis 1.5 mm longis ovatis subacutis, filamentis 2.5 mm longis, antheris 0.6 mm longis. Typus: Molokai I., Waikolu Stream, H. St. John 23,455.

T. nana sp. nov.

Frutex masculus est, ramulis hirsutis, petiolis 12-16 cm longis hirsutis, laminis 19.5-22 cm longis ovatis acuminatis, cymis 3.8 cm longis, capitibus 10-18 mm diametro, calycibus 2.7 mm longis lobis 2 mm longis oblancei-trullatis, filamentis 2.5 mm longis, antheris 1 mm longis. Typus: Maui I., Keopuka, E. Y. Hosaka 2,673.

T. napaliensis sp. nov.

Frutex masculus est, ramulis adpresse hirsutis, stipulis 7.5 cm longis lineari-lanceolatis glabris, petiolis 7-8.5 cm longis ad apicem hirsutulis, laminis 27-29 cm longis lanceolatis, cymis 3.5 cm longis, capitibus i.8-2 mm diametro, calycibus 2.5 mm longis lobis 2 mm longis obovatis concavis, filamentis 1.5 mm longis, antheris 0.5 mm longis. Typus: Kauai I., Hanakapiai, C. Christensen 196.

T. occidentalis sp. nov.

Frutex masculus est, caule hirsuto, stipulis 4-5 cm longis, petiolis 7-10.5 cm longis in apice hirsutis, laminis 18-23 cm longis ovatis acuminatis, cymis 5-7 cm longis, capitibus 10-15 cmm diametro, calycibus 1.9 mm longis ellipticis acutis, filamentis 2 mm longis, antheris 0.6 mm longis. Typus: Maui I., Honokohau, H. St. John 21,357.

T. wailauensis sp. nov.

Frutex masculis est, ramulis hirsutulis, stipulis 6 cm longis lineari-lanceolatis in basi adpresse puberulis, petiolis 12-14 cm longis in apice hirsutulis, laminis 23-28 cm longis ovatis acutis, cymis 3 cm longis, capitibus 8-10 mm diametro, calycibus 3 mm longis lobis 2 mm longis oblongi-lanceolatis, filamentis 2 mm longis, antheris 0.8-0.9 mm longis. Typus: Molokai I., Wailau, H. St. John 23,349.

T. wainihaensis sp. nov.

Frutex masculus est, ramulis puberulis, petiolis 8.5-13.5 cm longis puberulis, laminis 18.2-26.5 cm longis elliptici-lanceolatis infra in nervis hirsutulis, cymis 3.5 cm longis, capitibus 1.7-2 cm diametro, calycibus 2.5 mm longis lobis 2 mm longis ovatis, filamentis 2 mm longis, antheris 0.6-0.7 mm longis. Typus: Kauai I., Maunahina, E. Earle 47.

DIAGNOSES OF NEW SPECIES OF CLADOCARPA (CUCURBITACEAE)

HAWAIIAN PLANT STUDIES 142

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Unless otherwise located, the type specimens are in the Bishop Museum, Honolulu, Hawaii

Cladocarpa capitata sp. nov.

Laminis 11-13.5 cm longis reniformibus vadosiore palmatim lobatis, floribus masculis cum lobis corollae 1.2 mm longis, floribus femineis cum lobis corollae 1.5 mm longis ovatis, nucibus cum corporibus 5 mm longis ovoideis. Typus: Hawaii I., Puu Anahulu, D. Herbst 5,393,

C. discoidea sp. nov.

Laminis 7-8.7 cm longis cordatis suborbicularibus vadosiore palmatim lobatis, floribus masculis in gemma 2 mm diametro, nucibus 7-8 mm longis corporibus 6-7 mm longis obovoideis puberulis seminibus 4.2 mm longis ellipsoideis. Typus: Maui I., O. Degener 9,893 (NY).

C. Harrisonae sp. nov.

Laminis 2.2-2.5 cm diametro cordate suborbicularibus 1/3 lobatis, floribus masculis cum lobis corollae 2 mm longis ovati-deltoideis, nucibus cum corporibus 7-8 mm longis ellipsoideis puberulis, seminibus 2.9-4 mm longis late ellipsoideis. Typus: Molokai I., Kalaupapa, B. Harrison.

C. Herbstii sp. nov.

laminis 8-10.5 cm longis cordate suborbicularibus 1/4-lobatis, floribus masculis cum lobis corollae 2.5 mm longis ovatis acutis, floribus femineis cum lobis corollae 1.3-1.5 mm longis ovatis subacutis, nucibus 7-8.5 mm longis ovoideis acutis puberulis, seminibus 4.5 mm longis ellipsoideis. Typus: Kauai, Barking Sands, D. Herbst 5,691.

C. Julesii sp; nov.

Laminis 5-7 cm diametro suborbicularibus non lobatis, floribus masculis cum lobis corollae 2-2.5 mm longis ovatis subacutis, floribus femineis cum lobis corollae 0.6-0.7 mm longis ovatis subacutis. Typus: Kauai I., J. Remy 542. (P).

C. kawelaensis sp. nov.

Lamninis 3.7 cm longis cordate suborbicularibus vadosiore lobatis, floribus masculis cum lobis corollae 1.3-1.5 mm longis ovatis, floribus femineis cum lobis corollae 1.2 mm longis ovatis, nucibus 7-7.5 mm diametro hemisphaericis puberulis, seminibus 4 mm longis suborbicularibus. Typus: Molokai I., Kawela,

C. lanaiensis sp. nov.

Laminis 6-11 cm longis cordate suborbicularibus vadosiore lobatis, floribus masculis cum lobis corollae 2 mm longis deltoideis, floribus femineis cum lobis corollae 0.7 mm longis ovatis acutis, nucibus 5-6 mm longis obovoideis puberulis, seminibus 2 mm longis late ellipsoideis. Typus: Lanai I., Maunalei, J. D. Jacobi 1,979.

C. lehuaensis sp. nov.

Laminis 3.2-8 cm latis late cordatis minime lobatis, floribus masculis cum lobis corollae 1.7 mm longis late ovatis subacutis, floribus femineis cum lobis corollae 0.8 mm longis ovatis acutis, nucibus 7 mm diametro late ellipsoideis pilosulis, seminibus 4 mm longis ellipsoideis. Typus: Lehua I., W. King 3,017 (HAW).

C. Munroi sp. nov.

Laminis 9-16 mm diametro suborbicularibus 1/3-3/8-lobatis, floribus masculis cum lobis corollae 4-4.4 mm longis ovatis, floribus femineis cum lobis corollae 1-1.2 mm longis ovatis, nucibus 9 mm longis lanceoloideis puberulis. Typus: Lanai I., Kaena, G. C. Munro 87.

C. pauciramosa sp. nov.

Laminis 7-10 cm diametro cordate suborbicularibus 1/4-2/5-lobatis, floribus masculis cum lobis corollae 2 mm longis ovatis acutis, floribus femneis cum lobis corollae 1.5 mm longis lanceolatis, nucibus 5.5-6 mm longis lanceoloideis puberulis, seminibus 4 mm longis ellipsoideis. Typus: Kauai I., Polihale, C. Christensen 326.

C. umbellata sp. nov.

Laminis 4-7.2 cm longis late hastatis 1/4-lobatis, floribus masculis cum lobis corollae 2-2.5 mm longis ovatis subacutis, floribus femineis cum lobis corollae 1.5 mm longis late ovatis subacutis, nucibus 7-8 mm longis late obovoideis pilosulis, seminibus 3.8 mm longis late ellipsoideis. Typus: Hawaii I., Huehue, W. H. Hatheway 509.

C. waimeaensis sp. nov.

Laminis 7-11.5 cm diametro suborbicularibus 1/3-2/3-lobatis, floribus masculis cum lobis corollae 2.7-3 mm longis ovatis subacutis, floribus femineis cum lobis corollae 1.8-2 mm longis ovatis, nucibus 6 mm longis lanceoloideis glabris, seminibus 4 mm longis ellipsoideis. Typus: Hawaii I., Waimea, O. Degener 17,416 (NY).

DIAGNOSES OF NEW SPECIES OF SICYOS (CUCURBITACEAE)

HAWAIIAN PLANT STUDIES 143

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Included are diagnoses of various new species, subspecies, and varieties of Hawaiian Sicyos (Cucurbitaceae). Unless otherwise specified, the types are in the Bishop Museum, Honolulu.

Sicyos erostratus, var. erostratus sp. & var. nov.
Laminis 1/8-lobatis, paniculis masculis cum pedicellis 2-3 mm longis, gemmis puberulis, lobis perianthium 1.8 mm longis ovatis acutis, floribus femineis cum lobis 0.5-0.6 mm longis ellipticis acutis, utriculis 3-3.4 mm longis ovoideis erostratis, seminibus 1.8-2 mm longis late ellipsoideis. Typus: Molokai I., Onini, L. E. Bishop 1,714.

S. erostratus St. John, var. Herbstii var. nov.
Laminis 6-11 cm longis 1/7-1/9-lobatis, paniculis masculis cum pedicellis 3-7 mm longis, lobis perianthium 1.8-2 mm longis ovatis subacutis glandulose puberulis, floribus femineis cum lobis 0.8-0.9 mm longis ovatis subacutis glandulose puberulis, utriculis 5 mm longis ellipsoideis hirsutis, seminibus 2 mm longis ellipsoideis. Typus: Molokai I., Kalamalua, D. Herbst 2,944.

S. erostratus St. John, var. kealiaensis var. nov.
Laminis 9.5-12 cm longis, paniculis masculis cum pedicellis 2-3.5 mm longis glandulose hirsutulis, lobis paerianthium 1.4 mm longis late deltoideis, floribus femineis cum 3 lobis 0.4 mm longis hemisphaericis, utriculis 3-4 mm longis obovoideis parte libera capitate glandulose hirsuta, seminibus 2.3-2.6 mm longis obovoideis. Typus: Oahu I., Kealia Gulch, W. C. Gagne 671.

S. erostratus St. John, var. paucipilosus var. nov.
Laminis 12-13 cm longis 2/3-lobatis, paniculis masculis cum gemmis pauce puberulis, lobis perianthium 1.5 mm longis deltoidei-ovatis, floribue femineis cum lobis perianthium 0.7-0.9 mm longis ellipticis acutis, utriculis cum corpore 2.2-2.6 mm longo ellipsoideo, seminibus 2.3 mm longis late ellipsoideis. Typus: Molokai I., Onini, L. E. Bishop 1,713.

S. Hillebrandii St. John, var. Anunu var. nov.
Nucibus 11-13 mm longis parte libera corporis puberulis, seminibus 3.6 mm longis. Typus: Hawaii I., Kapapala, C. N. Forbes 400.H.

S. Hillebrandii St. John, var. Douglasii var. nov.
Nucibus 10-13 mm longis parte libera ad centrum pilosula parte supera puberula, seminibus 3.2-3.5 mm longis. Typus: Hawaii I., N. slope Mauna Kea, O. Degener & Greenwell 21,364.

S. Hillebrandii St. John, var. lanaiensis var. nov.

Nucibus 11-12 mm longis late deltoideo-obovoideis ad circulum aequinoctialem hirsutulum ad apicem puberulum, rostro 2.5-4 mm longo ad basim puberulo, seminibus 3.5 mm longo. Typus: Lanai I., Kamoa, G. C. Munro 417.

S. microcarpus H. Mann, subsp microcarpus, var. Forbesii var. nov.

Laminis 2.8-4.5 cm longis 1/5-2/3-lobatis, paniculis masculis cum pedicellis 1-2 mm longis hirsutulis, lobis perianthium 1.3-1.8 mm longis ovatis subacutis glandulose puberulis, floribus femineis cum 3 lobis corollae 0.5 mm longis ovatis, glandulose puberulis, utriculis 4.5-6.5 mm longis corpore anguste oblanceoloideis dimidio libero puberulo rostro 1.5-1.7 mm longo puberulo, seminibus 1.7-1.8 mm longis ellipsoideis. Typus: Maui I., Maunahooma, C. N. Forbes 11.M.

S. microcarpus H. Mann, supsp. microcarpus, var. kalaupapaensis var. nov.

Laminis 4.5-8.2 cm longis 1/6-1/9-lobatis, paniculis masculis cum pedicellis 4-5 mm longis puberulis, lobis corollae 2.5-2.7 mm longis late lanceolatis, floribus femineis cum 4 lobis corollae 0.8 mm longis ellipticis acutis puberulis, utriculis 2-2.5 mm longis ellipticis supra puberulis rostro 0.5 mm longo, seminibus 1.7 mm longis late ellipsoideis. Typus: Molokai I., Kalaupapa, J. F. Rock 14,061.

S. microcarpus H. Mann, subsp. microcarpus, var. kilaueaensis var. nov.

Laminis 4-6.5 cm longis 2/5-lobatis, paniculis masculis cum pedicellis 2-3.5 mm longis hirsutulis, utriculis 4.5 mm longis obovoideis viscidis parte supera hirsutula rostro 1-1.2 mm longo glabro. Typus: Hawaii I., Apua, G. O. Farerlund 544.

S. microcarpus H. Mann, subsp. microcarpus, var. paneensis var. nov.

Laminis 12.4-18.5 cm longis 1/11-lobatis, paniculis masculis cum pedicellis 2-3.5 mm longis, lobis corollae 2-2.3 mm longis lancei-ovatis, floribus femineis cum 5 lobis perianthium 0.7 mm longis ovatis, utriculis 3-3.3 mm longis late obovoideis dimidio supera puberulo rostro 0.3 mm longo puberulo, seminibus 2.5 mm longis ellipsoideis. Typus: Oahu I., Kamokuiki, O. Degener 18,035. (NY).

S. microcarpus H. Mann, subsp. microcarpus, var. pohakeaensis var. nov.

Laminis 7 cm diametro 1/5-1/6-lobatis, paniculis masculis cum pedicellis 1-3 mm longis puberulis, lobis perianthium 2-2.5 mm longis ovatis, floribus femineis cum 3 lobis corollae 0.8 mm longis ellipticis, utriculis 5.5-6 mm longis oblanceoloideis parte supera puberula rostro 1.5-1.6 mm longo puberulo, semin-

ibus2.3-2.4 mm longis ellipsoideis. Typus: Maui I., Pohakea, O. Degener 18,400 (NY).

S. microcarpus H. Mann, subsp. microcarpus, var. Woolfordii var. nov.

Laminis 5-9 cm longis 1/3-1/2-lobatis , paniculis masculis cum pedicellis 3-5 mm longis puberulis, lobis perianthium 2.5-3 mm longis lanceolatis obtusis, floribus femineus cum 5 lobis corollae 0.9-1.1 mm longis lanceolatis subacutis, utriculis 7-8 mm longis obovoideis parte supera puberula, rostro 3-4 mm longo puberulo, seminibus 2.5 mm longis late ellipsoideis. Typus: Oahu I., March 11, 1957, H. A. Woolford.

S. microcarpus H. Mann, subsp. kanepuuensis subsp. nov.

Laminis 3.5-7 cm longis 2/3-1/8-lobatis, paniculis masculis cum pedicellis 1-3 mm longis puberulis, 4 lobis perianthium 1.4 mm longis ovati-suborbicularibus acutis, floribus femineis cum 4 lobis corollae 0.4 mm longis ellipticis, utriculis 5.5 mm longis late rhombicis parte supera glandulose puberula rostro 0.5-0.8 mm longo puberulo, seminibus 2.5 mm longis elliptici-discoideis. Typus: Lanai I., Kanepuu, G. C. Munro 10.

S. microcarpus H. Mann, subsp. lanaiensis, var. lanaiensis subsp. & var. nov.

Laminis 5-7.5 cm longis cordatis 1/7-1/10-lobatis, paniculis masculis cum pedicellis 2-4 mm longis hirsutis, lobis perianthium 2-2.3 mm longis ovatis subacutis, floribus femineis cum 4 lobis 0.7 mm longis elliptcis acutis, utriculis 4-4.6 mm longis late obovoideis tertia supera catenulate hirsuta rostro 0.5-1 mm longo, seminibus 2 mm longis ellipsoideis. Typus: Lanai I., Kalulu, G. C. Munro 535.

S. microcarpus H. Mann, subsp. lanaiensis St. John, var. kealiaensis var. nov.

Lamnins 9.5-12 cm longis orbiculari-reniformibus sublobatis, inflorescentia mascula cum pedicellis 2-2.5 mm longis glanculose hirsutulis, lobis perianthium 1.4 mm longis late deltoideis obtusis, floribus femineis cum 3 lobis 0.7 mm longis hemisphaericis, utriculis 3-4 mm longis obovoideis parte libere glanudlose catenulate hirsuta, seminibus 2.3-2.6 mm longis obovoideis. Typus: Oahu I., Kealia, W. C. Gagne 671.

S. microcarpus H. Mann, subsp. lanaiensis St. John, var. kamoaensis var. nov.

Laminis 8-15 cm longis reniformibus fere elobatis, floribus masculis cum lobis perianthium 1.3 mm longis late ovatis, floribus femineis cum 4 lobis corollae 1.5 mm longis angustiore ellipticis obtusis, utriculis 4.5-5.2 mm longis late ellipsoideis dimidio supero

glandulose catenulate hirsutulo, rostro 0.3-1 mm longo, seminibus 2.5 mm longis late ellipsoideis. Typus: Lanai I., Komoa, G. C. Munro 418.

S. microcarpus H. Mann, subsp. lanaiensis St. John, var. koeleensis var. nov.

Laminis 6-19 cm diametro suborbicularibus 1/13-1/23-lobatis, paniculis masculis cum pedicellis 2-3 mm longis hirsutulis, lobis perianthium 2-2.2 mm longis ellipticis subacutis, floribus femineis cum 5 lobis 1.3 mm longis ellipticis subacutis, utriculis 5 mm longis ellipticis rhomboideis parte supera libera catenulate hirsutula, seminibus 1.5-1.7 mm longis late ellipsoideis. Typus: Lanai I., Koele, C. N. Forbes 95.L.

S. microcarpus H. Mann, subsp. lanaiensis St. John, var. oniniensis var. nov.

Laminis 6-9 cm longis cordatis 1/5-1/3-lobatis, paniculis masculis cum pedicellis 1-2 mm longis, floribus cum 4 lobis perianthium 1.2 mm longis ovatis, floribue femineis cum 4 lobis corollae 0.8 mm longis ovatis, utriculis 4 mm longis lanceoloideis in medio hirsutis. Typus: Molokai I., Onini Gulch, L. E. Bishop 1,690.

S. microcarpus H. Mann, subsp. lanaiensis St. John, var. trilobata var. nov.

Laminis 3-5 cm longis cordate suborbicularibus 1/3-1/2-lobatis, paniculis masculis cum pedicellis 3-8 mm longis glandulose puberulis, floribus cum lobis corollae 1.8 mm longis ovate deltoideis acutis, floribus femineis cum 3 lobis corollae 0.6-0.7 mm longis ovatis subacutis, utriculis 3.6-4 mm longis ovoideis dimidio supero hirsuto, rostro 0.7-1 mm longo, seminibus 2.5 mm longis ellipsoideis. Typus: Molokai I., Mokolelau, W. C. Gagne 676.

S. microcarpus H. Mann, subsp. & var. laysanensis comb. nov.

S. laysanensis St. John, Pacif. Sci. 24: 440-443, fig. 1, 1970.

S. microcarpus H. Mann, subsp. laysanensis (St. John) St. John, var. ewaensis var. nov.

Laminis 3.5-6.5 cm longis suborbicularibus 1/9-lobatis, paniculis masculis cum pedicellis 2-3.5 mm longis, lobis perianthium 1.5 mm longis anguste ellipticis, floribus femineis cum lobis corollae 0.8-0.9 mm longis ellipticis puberulis, utriculis 6-7 mm longis late obovoideis puberulis, rostro 1.5-2.5 mm longo, seminibus 2-2.5 mm longis ellipsoideis. Typus: Oahu I., K. M. Nagata 1,656.

S. microcarpus H. Mann, subsp. laysanensis (St. John) St. John, var. haleakalaensis var. nov.

Laminis 3.5-8 cm longis reniformibus 1/6-1/5-lobatis infra nervis puberulis, paniculis masculis cum pedicellis 1.5-2.5 mm longis glandulose puberulis, gemma caitate glandulose puberula, utriculis 5.5-7 mm longis lanceoloideis, seminibus 2-2.3 mm longis late ellipsoideis. Typus: Maui I., Waiopai, C. N. Forbes 1,851.M.

S. microcarpus H. Mann, subsp. laysanensis (St. John) St. John, var. kauensis var. nov.

Laminis 3-5.5 cm diametro suborbicularibus 1/4-lobatis infra hispidulis, paniculis masculis cum pedicellis 1-2 mm longis puberulis, lobis perianthium 3.5-4 mm longis ovatis acutis, floribus femineis cum 4 lobis corollae 1 mm longis ellipticis acutis, utriculis 6-6.3 mm longis oblanceoloideis dimidio supero catenulate pilosulo rostro 1.5-2 mm longo. Typus: Hawaii I., Kau, J. F. Rock.

S. microcarpus H. Mann, subsp. laysanensis (St. John) St. John, var. koloaensis var. nov.

Laminis 6-12 cm diametro suborbicularibus 1/6-1/8-lobatis infra hispidulis, paniculis masculiscumpedicellis 1-3 mm longis puberulis, gemma puberula, lobis perianthium 1.8 mm longis ovatis acutis, floribus femineis cum 4 lobis corollae 0.6-0.7 mm longis anguste ovatis, utriculis 7-7.3 mm longis oblanceoloideis pate supera puberula, rostro 1.6-2 mm longo. Typus: Kauai I., Poipu, C. H. Lamoureus 2,346.

S. microcarpus H. Mann, subsp. laysanensis (St. John) St. John, var. Meeboldii var. nov.

Laminis 3-6 cm latis reniformibus 1/5-1/6-lobatis infra hispidulis paniculis masculis cum pedicellis 2-3 mm longis glandulose puberulis, lobis perianthium 2-2.5 mm longis ovatis subacutis, utriculis 6-7.2 mm longis obovoideis tertia apicali in basi puberula, rostro 1-1.5 mm longo. Typus: Hawaii I., Huehue, G. L. Webster 1,537.

S. microcarpus H. Mann, subsp. laysanensis (St. John) St. John, var. obovoideis var. nov.

Laminis 4-8.2 cm longis ovatis 1/5-7/8-lobatis infra hirsutulis, paniculis masculis puberulis, utriculis 6-7.2 mm longis oblanceoloideis parte supera puberula, seminibus 3-3.3 mm longis ellipsoideis. Typus: Maui I., H. F. Clay.

S. microcarpus H. Mann, subsp puberulus subsp. nov.

Laminis 6.3-8 cm diametro suborbicularibus 1/8-1/11-lobatis infra puberulis, paniculis masculis cum pedicellis 2-3 mm longis glanculose puberulis, gemmis puberulis, lobis perianthium2.8-3.2 mm longis ovatis floribus femineis cum 4 lobis corollae 1.5-1.7 mm longis lanceolatis subobtusis, utriculis 7-7.5 mm

longis obovoideis parte libera glandulose puberula, seminibus 2.7-3 mm longis ellipsoideis. Typus: Oahu I., Waianae, O. Degener 18,391 (US).

S. niger sp. nov.

Laminis 3.5-12 cm diametro cordate suborbicularibus 1/6-1/4-lobatis infra puberulis, paniculis masculis cum pedicellis 2-3 mm longis puberulis, gemmis puberulis, lobis perianthium 2.1-2.4 mm longis ellipticis, utriculis 6-7.5 mm longis oblanceoloides glabris, rostro 1.5-2 mm longo, seminibus 2-2.2 mm longis late ellipsoideis. Typus: Maui I., Nuu, H. St. John 26,771.

S. waimanaloensis sp. nov.

Laminis 4-9 cm diametro suborbicularibus infra hispidulis, paniculis masculis cum pedicellis 1-2 mm longis, lobis perianthium 2.2-2.5 mm longis ovatis glabris, floribus femineis cum lobis corollae 1.5-2 mm longis ovatis, utriculis 7-9 mm longis lanceoloideis glabris, rostro 2.5-3 mm longo, seminibus 3.8 mm longis ovati-ellipsoideis. Typus:Oahu I,, Waimanalo, O. Degener 17,416 (US).

PRELIMINARY STUDIES ON ANTHOCEROTAE

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1. Generic-Subgeneric Limits in Anthocerotaceae

Introduction: In the completion of the last volume of my The Hepaticae and Anthocerotae of North America for Columbia Univ. Press, the MS of which is now in the publisher's hands, a last task was to revise the Anthocerotae.

My initial treatment of that group was prepared in 1953-56 while I was at Duke University; it underwent substantial revision after study of plants from south Chile, collected in October, 1969; it underwent further refinement after study of the New Zealand taxa, first in 1961-62, again in 1976 and 1984. The following attempt at an evaluation of supra-specific concepts was initially prepared in 1976, after consideration of the Australasian taxa. Philosophical concepts for any such attempt derive from the following considerations: (1) No major progress in comprehension of the group will result until the innumerable poorly known taxa are assigned to supraspecific groups. (2) Subfamilial and subgeneric categories are currently unemployed in the Anthocerotales; their utilization will give us additional "depth" in any hierarchy to be set up. Use of the subgenus category, especially, seems long overdue; its use will also mediate between extreme taxonomic positions. A single example: the taxa placed by Hasegawa (1984) in Folioceros were regarded by Proskauer to be congeneric with Anthoceros s. lat. (Aspiromitus in the sense of this paper). I here accept an intermediate position and would recognize Folioceros as an autonomous subgenus. (3) Unless and until biochemical or other criteria so far undiscovered come to light, our classification must remain "conservative" since morphological and anatomical criteria -- the only criteria currently employed in constructing a classification -- are few, and the organisms exhibit considerable phenotypic malleability. Indeed, the exceptional architectural uniformity of the Anthocerotae is linked with equally exceptional levels of phenotypic (and probably genotypic) variation. Recent study of the spermatids of Anthocerotales thus far fails to reveal significant differences between those of Anthoceros s. lat. and Notothylas (Renzaglia & Carothers, 1986). Reluctantly, I must conclude that the Notothylaceae are best regarded as merely a subfamily of Anthocerotaceae.

The classification of the Anthocerotaceae remains a "dark chapter" in part because the approximately 200 binomials have yet to be fully digested. As with, e.g., Riccia, herbarium material is hardly suitable for critical study. Even the generic/subgeneric position of many taxa remains to be established and most will surely

prove to be synonyms of widely disseminiated taxa. The following attempt at an overall generic/subgeneric classification represents the best that I can derive at the moment; the following data serve as an effort at justifying this classification. Some of the rationale for the grouping accepted will be elaborated in the last volume of The Hepaticae and Anthocerotae of North America.

I have repeatedly evaluated extant concepts of genera and subgenera in the Anthocerotales. Indeed, aside from the single case of treating Phaeoceros as a subgenus of Anthoceros by E. Jones (1958), subgenera have not been adopted in the Anthocerotaceae. This is an error: understanding of the many poorly known taxa in the group can only be achieved if the species are organized into comprehensible units. Thus all three genera, Aspiromitus Steph., Megaceros Campb., and Dendroceros Nees are here divided into pairs of subgenera. This, at least, allows us to organize the taxa into more readily grasped units. I am convinced that the two new subgenera recognized (Megaceros subg. Nothoceros, Dendroceros subg. Apoceros) and Aspiromitus subg. Folioceros are natural groups; the level at which they are to recognized remains conjectural. Thus Haessel (1963) goes so far as to unite Dendroceros and Megaceros, while Proskauer refers taxa to Dendroceros that I would place into Megaceros. I would agree with Hasegawa (1983) that Megaceros is adequately defined and would further agree with him in limiting Dendroceros to taxa with multicellular (= precociously germinating) spores. I would agree with Proskauer that the form of the pseudoelaters is inadequate to separate species such as those assigned by Hasegawa (1984) to Folioceros as as autonomous genus, but would move in Hasegawa's direction to the point where I would recognized Folioceros as a distinct subgenus. It is thus evident that my taxonomic concepts fall somewhere between the overly conservative and the rather radical. Before further divisions are attempted, detailed studies, based on living plants, especially of antheridial structure, are badly needed. Since both lack of living material, and time, preclude my currently going into the matter in more detail, the following synopsis (taken with slight emendation from The Hepaticae and Anthocerotae of North America) is presented. In order not to clutter up that work with details on exotic taxa, and Latin diagnoses, these are briefly given here (under Footnotes).

Synopsis of Subfamilies, Genera and Subgenera:

I. Sporophyte erect, filiform, emergent, dehiscent by 2 valves; persistent basal meristem present. Pseudoelaters usually elongated, differing in size and form from spores, usually septate. . . . II.

II. Sporophyte with stomata distinct in the 4-5-stratose wall. Pseudoelaters devoid of spiral thickenings. Spores not green prior to germination. Gametophytic cells with solitary chloroplasts. Usually 2-many antheridia per chamber.

subfam. Anthocerotoideae. . .1.

1. Spores yellowish, not areolate on external face. Thalli solid. Antheridia with many-celled jacket, the cells not tiered.

Anthoceros L. [Phaeoceros Prosk.]

1. Spores fuscous to black, usually (at least imperfectly) areolate, at least on distal face. Thalli with conspicuous cavities. Antheridia with few, mostly elongated, tiered jacket cells.

Aspiromitus Steph., s. lat. . . 2.

2. Pseudoelaters usually highly irregular, wall ± thin, not regularly 4-celled.

subg. Aspiromitus

2. Pseudoelaters always slender, wall thickened, regularly 4-celled.

subg. Folioceros (Bharadw.) Schust.

II. Sporophyte with stomata lacking; wall 4-5- or 8-16-stratose. Spores green within capsule. Pseudoelaters with spiral thickenings. Antheridia 1(2) per chamber.

subfam. Dendrocerotoideae subfam. n. . 3.

3. Capsule abbreviated, with 4-5-layered wall. Thalli nonradiate, sparingly furcate; apical cell hemidiscoidal. Spore with endosporic development, pluricellular prior to release. Columella slight, 16-celled in cross section.

Dendroceros Nees. . . . . 4.

4. Costa (midrib) solid. Thallus wings simply perforate, infrequently with larger lacunae.

subg. Dendroceros
[Type: D. crispus (Sw.) Nees]

4. Costa lacunose or cavernose. Thallus wings with lacunae.

subg. Apoceros Schust., subg. n.
[Type: D. cavernosus Hasegawa]

3. Capsule filiform, elongated, with wall usually 8-16-layered. Apical cell (when known) wedge-shaped. Spores 1-celled at time of release. Columella (when known) massive, to 40-celled in cross section.

Megaceros Campb. . . . . 5.

5. Thalli radiate, closely dichotomously branched, with very abbreviated segments.

subg. Megaceros

5. Thalli nonradiate, remotely furcate, with lingulate to linear segments.

subg. Nothoceros Schust., subg. n.

I. Sporophyte horizontal or semihorizontal, ± fusiform, not or tardily dehiscent, covered until maturity by the perichaetium, lacking a persistent basal meristem. Pseudoelaters reduced, subspherical, similar to spores in form and size.

subfam. Notothyladoideae
Notothylas Sulliv.

Annotations: Several relevant comments as to this arrangement seem appropriate. But first I must note, as Proskauer repeatedly emphasized, that most described taxa are so poorly known, usually only from herbarium material, that distinctions used above may prove to be nonapplicable in individual cases. The following comments (and brief diagnoses and synonymy) are needed.

(1) One cannot ignore the fact that Aspiromitus is legally published and, as Proskauer himself noted, was based by Stephani very largely on the black-spored taxa. In the final volume of The Hepaticae and Anthocerotae of North America, an appropriate discussion of the relevant literature is found. As circumscribed by Stephani, the genus was far less heterogeneous than, e.g., virtually every genus proposed by Dumortier! The lectotype of Aspiromitus agrees with Aspiromitus as here accepted; it was valid in 1916 and widely accepted in succeeding years.

(2) The family appears to be divisible into 3 genus-complexes and criteria used in the above synopsis are generally applicable. I am aware that at least one species of Aspiromitus exists that lacks stomata; this appears to be a parallel, a secondary loss which does not necessarily invalidate the basic generalization.

(3) The Dendrocerotoideae[1] seem distinct in at least 4 non-related criteria, derived from capsule wall, spores, pseudoelaters and antheridial number.

(4) Folioceros Bharadw., in essence, was based on a single criterion: the thick-walled, 4-celled pseudoelaters. Although certain authors (e.g., Hasegawa, 1984) accept this taxon at the generic level, I think subgeneric status more accurately reflects the level of discontinuity. Aside from the solitary pseudoelater criterion, Hasegawa (1984) utilizes two other distinctions:

Aspiromitus (Anthoceros sensu Proskauer)	Folioceros
Spores "always with conspicuous triradiate marks, without conical or mammiform outgrowths."	Spores "often with indistinct triradiate marks, when with conspicuous triradiate marks coni-

	cal to mammiform outgrowths present."
Epidermal cells of capsules with fairly large lumina	Epidermal cells of capsules with narrow, linear lumina.

Regarding these two distinctions, the following points are relevant: (a) in the A. macounii-adscendens complex the spore exine bears superficial tubercles of all faces, much as in "Folioceros" fuciformis (Mont.) Bharadw. (cf. Hasegawa, 1984, fig. 10:a-b and Schuster, 1966, fig. 10:3); in A. adscendens (A. ravenelii) the triradiate ridges are considerably reduced vis a vis such typical Aspiromitus species as A. punctatus s. lat. The spore criteria in these taxa are clearly intermediate between the two extremes recognized by Hasegawa. (b) The degree to which the epidermal capsule-wall cells are incrassate is subject to wide variation. Thus Proskauer (1958, p. 1306, fig. 509:c, g) draws the capsule-wall cells of A. caucasicus and A. mandoni (both with Aspiromitus-type elaters) with the lumina virtually as narrowed, and the longitudinal walls as thickened, as in, e.g., "Folioceros" fuciformis (cf. Hasegawa, 1984, fig. 10:j).

At best these two distinctions represent quantitative distinctions. I would agree with Proskauer in retaining the species subsequently segregated into Folioceros within the larger genus Aspiromitus (Anthoceros sensu Proskauer), but grant that subgeneric status for the Folioceros species is appropriate. [2]

(5) Megaceros subg. Nothoceros Schust., subg. n.[3] The two taxa I refer here were placed by Proskauer (1953) into Dendroceros, but he admitted that with M. endiviifolius one runs into "the difficult problem of the definition of. . . Megaceros and Dendroceros." Haessel (1963, p. 32) also referred Megaceros fuegiensis Steph. to Dendroceros, widening the concept of Dendroceros even further. However, Dendroceros s. str. differs from Megaceros not only in the criteria used in the above synopsis, but also, in general, as follows: (a) the costal region is reduced and the "wings" widely expanded, normally perforate; (b) epidermal cells of the capsule wall are little elongated, typically 1.5-3.5:1, with conspicuous convex-sided thickenings at the angles (cf., i.a., Hasegawa, 1980, fig. 1:g-h; 1981, fig. 1:9) ranging to moderately elongated and 3.5-5:1, with very thick and confluent longitudinal walls (cf. Hasegawa, 1980, figs. 3:i-j and 5:f). In nearly all Megaceros species the cells are linear (Haessel, 1963, pp. 30, 32) or regularly short-oblong (Hasegawa, 1983), never developing thickenings at the angles. I would thus agree with Hasegawa (1980) in retaining Megaceros as a distinct genus and would solve the problem of the two nonradiate taxa, which seem superficially intermediate between Megaceros and Dendroceros, by placing them into an autonomous subgenus within Megaceros. This is admittedly a tentative classification. Chloroplast number may yet necessitate alterations in this system.

(6) Dendroceros Nees includes two widely different species-com-

plexes: (a) one complex, typified by the generic type D. crispus (Sw.) Nees, has a solid costal region and the thallus wings bear simple perforations between cells (cf. fig. 2 in Proskauer, 1960); belonging here are, i.a., D. japonicus Steph., D. tuberculatis Hatt., D. subplanus Steph., D. foliicola Hasegawa, D. acutilobus Steph., D. validus Steph., and D. borbonicus Steph. (b) A complex typified by D. cavernosus Hasegawa, D. difficilis Steph., and D. pedunculatus Steph. in which the costa varies from lacunose to cavernose. For this complex I propose the subgeneric epithet, Apoceros Schust., subg. n.[4]

Among recently studied species, D. javanicus (Nees) Nees appears to form a transition: it has a solid, biconvex costa, but has lacunae of the thallus wings (cf. Hasegawa, 1980, fig. 8). So apparently does D. granulatus Mitt. (Hasegawa, 1982).

One problem remains that I have been unable to solve for want of adequate material: in the generic type the pseudoelaters are 4-celled, as in Aspiromitus subg. Folioceros (cf. Proskauer, 1960, fig. 4), while Hasegawa (1980), when he illustrates entire pseudoelaters, shows them to be uniformly 1-celled (cf. figs. 5:g, 8:k).

The primary basis for dividing Dendroceros into two groups, in my opinion, must be costal anatomy. Stephani (1909) already recognized this fact. Unlike the situation with the Anthoceros-Aspiromitus complex, however (where we also see the solid vs. lacunose dichotomy in thallus structure), the difference in thallus anatomy in Dendroceros is not adequately linked with other criteria -- as the example of the D. javanicus-granulatus complex appears to show.

Taxa with a cavernose costa appear to form a well-defined complex also on the basis of capsule anatomy. The species illustrated by Hasegawa (D. cavernosus, D. pedunculatus, D. difficilis) all have elongated (2.5-5:1) epidermal cells with longitudinal walls strikingly and almost uniformly thick-walled (cf. figs. 9:g, 10:f, 11:f in Hasegawa, 1980). By contrast, taxa with a solid costa show wide deviations in form of epidermal capsule-wall cells. Thus the anomalous D. javanicus complex has epidermal cells identical to those seen in Apoceros (cf. fig. 8:g in Hasegawa, 1980); so does the generitype, D. crispus (cf. Proskauer, 1960, fig. 3).

Most taxa with a solid costa, however, and with simple perforations of the wings show abbreviated (1-2.5:1) epidermal cells, strikingly thickened at the angles, but with lateral pitlike, thin connections between adjoining cells (cf. fig. 1:g-h, in Hasegawa, 1980), although others have such strikingly thickened cells that lumina become linear (e.g., D. acutilobus Steph.)

As a consequence, capsule-wall anatomy does not support any subgeneric link, at least as understood at present.

(7) Notothyladoideae (K. Müll.) Schust., stat. n. [Basionym:

Notothylaceae K. Müller, Rabenh. Krypt.-Fl. 6, Erganz. Bd.:200, 1940.] In my opinion it is better to classify the Anthocerotaceae into 3 rather than 2 subfamilies. The 3 groups represent steps in reduction. Thus the Anthocerotoideae are generalized in: (a) retaining stomata; (b) the usually short involucrum or perichaetium; (c) the relatively unspecialized pseudoelaters. The Dendrocerotoideae have undergone some reductive evolution; (a) they have lost stomata of the 2n generation; (b) they tend to develop, in Dendroceros, more abbreviated sporophytes, with the perichaetia becoming tubular and elongated. This linked with evolution of one major specialized trait: the spiral elaters. In the tendency toward reduction in length of sporophytes and evolution of longer perichaetia, linked with loss of sporophytic stomata, Dendroceros foreshadows the more massive reduction we see in the Notothyladoideae; here perichaetia are expanded and sporophytes even more reduced. Associated with the general reduction of the sporophyte, the columella has undergone varying degrees of reduction. I do not wish to suggest that the Dendrocerotoideae gave rise to the Notothyladoideae. Rather, both subfamilies show parallel reductive tendencies -- that of the Notothyladoideae clearly more marked. Tendencies toward sporophyte reduction already crop up in the Anthocerotoideae, e.g., in Aspiromitus macounii. As a consequence we should not assign too much significance to sporophyte size, or simplification, in the Notothyladoideae. No new feature has evolved in this last group: Notothylas, indeed, differs from Anthocerotoideae principally in the horizontal capsules. Admittedly reduction in pseudoelaters in Notothylas has reached an end point -- yet comparable reduction already exists in taxa such as Aspiromitus macounii (Howe) Schust., comb. n. [Anthoceros macounii Howe, Bull. Torrey Bot. Club 25:19, 1898]; cf., e.g., Schuster (1953, fig. 16:2-4). There seems to be a general tendency in terrestrial Anthocerotae for capsule reduction linked with pseudoelater reduction, as seen not only in A. macounii, but also in Aspiromitus adscendens (L. & L.) Schust., comb. n. [Anthoceros adscendens Lehm. & Lindenb., in Lehmann, Nov. et Minus Cogn. Stirp. Pug. Quart., p. 24, 1832], as is shown in Frye & Clark (1937-47, p. 941, figs. 6-8).

2. Aspiromitus appalachianus Schust., sp. n.[5]

Similar to the A. punctatus crispulus phenotype in the crispate and freely lamellate thalli; distinct from A. punctatus and virtually all other taxa of Aspiromitus in the sharp distinction between a spinose-areolate external spore face and plane, only obsoletely sculptured inner spore faces. Type. North Carolina: Toxaway R., Transylvania Co. (RMS 45231). Known again only from above Jocassee, Estatoe Cr., South Carolina (RMS).

This species is described and illustrated in detail in the final volume of The Hepaticae and Anthocerotae of North America; here only the Latin diagnosis is given, since material of the species (labelled Anthoceros appalachianus) by now has been widely distributed during the last three decades.

I know of no member of Aspiromitus in which the strongly spinose-foveolate external spore face is contrasted more strongly to the inner (proximal) spore faces.

Acknowledgement: I thank Dr. Hannah Croasdale for generously preparing the Latin diagnoses.

Footnotes

[1] Subfam. Dendrocerotoideae Schust., subfam. n. Subfamilia a Antherocotoidis differens quod (a) sporophyta sine stomatibus; (b) elateres spirales; (c) omnis locellus antheridialis 1 vel 1(2) antheridia continet. Type: Dendroceros Nees.

[2] Aspiromitus subg. Folioceros (Bharadw.) Schust., status nov. Basionym: Folioceros Bharadw., Geophytology 1(1):9, 1971. Type: Aspiromitus assamicus (Bharadw.) Schust., comb. n. [Basionym: Folioceros assamicus Bharadw., ibid. 1(1):9, 1971].

[3] Megaceros subg. Nothoceros Schust., subg. n. Subgenus a subg. Megacerote differens quod thalli raro ad sparse furcati, segmentis linearibus ad ligulata; a Dendrocerote differens quod sporae tempore liberationis unicellulares. Type: Megaceros endiviaefolius Steph. (M. endiviifolius) of South America; M. giganteus (L. & L.) Steph. of New Zealand also belongs here.

[4] Apoceros Schust., subg. n. Subgenus a subg. Dendrocerote differens: (a) costa cavernosa aut lacunosa; (b) alae thalli lacunosae aut perforatae, lacunis magnitudine variantibus. Type: D. cavernosus Hasegawa (1980, p. 306, fig. 11).

[5] Aspiromitus appalachianus Schust., sp. n. Species A. punctato crispulo phenotypo similis quod thalli crispati et libere lamellati; distincta ab A. punctato et fere omnibus aliis taxis Asperomiti quod superfacies externa sporae spinoso-areolata bene distincta e superficiebus sporarum internis planis et modo obsolete sculptis.

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THREE NEW SPECIES OF KOANOPHYLLON (ASTERACEAE-EUPATORIEAE) FROM WESTERN MEXICO

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A forthcoming treatment of the Asteraceae of Mexico (Turner & Nesom, in prep.) necessitates description of the following novelties. While described within Koanophyllon this need not mean I favor acceptance of the generic name, as already noted (Turner, 1983).

KOANOPHYLLON SINALOENSIS B. Turner, sp. nov.

K. richardsono affinis sed foliis pubescentibus, capitulis parvioribus, et acheniis hispidis differt.

Shrub to ca 2 m high. Stems brown, puberulent, the internodes mostly 3-7 cm long; leaves opposite throughout, 11-17 cm long, 3-7 cm wide; petioles 2.5-5.0 cm long, puberulent; blades thin, broadly ovate to somewhat deltoid, the flanges rounded, 3-nerved from the base, moderately pubescent above and below, especially along the veins, atomiferous-glandular, the apices long attenuate, the margins crenulo-serratulate; heads 4-5 mm high, numerous in terminal or axillary cymose-panicles, the ultimate peduncles mostly 3-6 mm long; involucres 2-seriate, 2.2-2.7 mm long; bracts 12-13, linear-lanceolate; receptacle glabrous; florets 13-19 per head; corollas reportedly white or pale lavender, glabrous or a few atomiferous glands present, ca 2.5 mm long, the tube ca 1 mm long gradually flaring into the throat; achenes ca 1.5 mm long, brown, markedly hispid; pappus of 20-30 white bristles, 2.0-2.5 mm long.

TYPE: MEXICO. SINALOA: Mcpio. Badiraguato, 3 mi N of Los Ornos along road to Ocurahui, Sierra Suratato, 6500 ft, 3 Nov 1969, D. E. Breedlove & F. S. Kawahara 16906 (holotype MICH).

Additional Specimens Examined: CHIHUAHUA: Mpio. Ocampo, area of Cascada de Basaseachic at the confluence of Rio Basaseachic and Rio Durazo, ca 2 mi S of Basaseachic (28°02'N x 107°55'W), 2100-2200 m, 17-20 Oct 1986, G. Nesom & L. Vorobik 5566 (TEX, MEXU). SINALOA: Mcpio. Sinaloa y Vela, 5 mi NW of Los Ornos along road to Mocorito, 5800 ft, 6 Nov 1969, Breedlove & Kawahara 17091 (MICH).

The species is superficially similar to Koanophyllon richardsonii B. Turner (1983), a species of northeastern Mexico with nearly glabrous leaves, larger heads and eciliate, glandular, achenes.

KOANOPHYLLON RZEDOWSKII B. Turner, sp. nov.

K. richardsono affinis sed foliis parvioribus tenuioribus valde pubescentibus petiolis longioribus et acheniis hispidis differt.

Shrub to 1.5 m high; stems densely tan-hirsutulous; leaves opposite, 5-8 cm long, 2.0-3.5 cm wide; petioles 0.5-1.0 cm long; blades broadly ovate, obtuse or rounded at base, 3-nervate, moderately pubescent above, both hirsute and atomiferous-glandular beneath, the margins denticulate to nearly entire; heads numerous, terminal and axillary in corymbose panicles; involucre 4-5 mm high, 3-4 seriate, graduate, the bracts 2-5 mm long, puberulent, narrowly lanceolate, the apices sharply acute; receptacle plane, glabrous; florets 30-34 per head; corollas whitish, glabrous, 3.0-3.5 mm long, the lobes ca 0.5 mm long; anther appendages thin, somewhat flattened, ca 0.25 mm long, 0.20 mm wide, rounded at the apices; achenes ca 2.5 mm long, brown, the ribs 5, yellow, hispidulous, carpopod well-marked, annular; pappus of 20-25 ciliate, tawny, bristles ca 3 mm long.

TYPE: MEXICO. SAN LUIS POTOSI: Sierra de San Miguelito, cañon arriba de Terrero, 2250 m, 8 Sep 1954, G. C. Rzedowski 4324 (holotype MICH).

The holotype was determined by its collector to be Eupatorium mendezii, which is a synonym of E. collinum, as noted by McVaugh (1984). King and Robinson treat this latter taxon within their concept of the genus Chromolaena. Indeed, K. rzedowskii much resembles E. collinum but differs in numerous details (nonurceolate, persistent involucral bracts, etc.). Nevertheless, it is likely that E. collinum is better positioned within the Koanophyllon grouping than within Chromolaena itself, as indicated by Whittemore (1987).

Koanophyllon rzedowskii is closely related to K. richardsonii B. Turner, which differs in having larger, thiner, nearly glabrous leaves, with much longer petioles, glandular instead of hispid achenes, etc. It is also close to K. revrobinsonii of Nuevo Leon. All of these are in turn related to K. longifolia (B. L. Rob.) King & H. Rob. and K. gracicaulis (Sch-Bip. ex B. L. Rob.) King & H. Rob which appear to make up a fairly close-knit species group in Koanophyllon.

KOANOPHYLLON GUERREROANA B. Turner, sp. nov., Fig. 1

K. albicauli affinis sed foliis grandibus ellipticis coriaceis et corymbis axillaribus differt.

Said to be a "vine"; stems white; leaves opposite, thick and leathery, 15-20 cm long, 4.5-6.0 cm wide, minutely pubescent below

to glabrate; petioles 5 mm long; blades elliptical, prominently 3-nerved from 10-15 mm above the base; heads ca 9 mm high, 10-15, in short axillary clusters, the ultimate peduncles 1-6 mm long; involucres 2-3 seriate, ca 6 mm long; bracts linear-lanceolate, dark, without well-defined nerves, puberulent throughout, the apices acute; florets 18-20 per head; corollas 4-5 mm long, glabrous, the lobes atomiferous-glandular; achenes (immature) ca 2.5 mm long, pubescent; pappus of ca 50 bristles, 4-6 mm long.

TYPE: MEXICO. GUERRERO: District Coyuca, Santa Barbara, 6 Apr 1935, G. B. Hinton et al. 7592 (holotype GH).

The type and only known collection is depicted in Fig. 1. It is very closely related to K. albicaulis (Klatt) King & H. Rob. but is so strikingly differt as to leaf shape, size, and texture, capitulescence and habit (described as a "vine" on the collectors' label) that I dare describe it as new. At least the collection stands out from among the hundreds of specimens of this plant which I have examined at GH, LL, TEX, UC and US. Nevertheless, it is possible that the collection is from an aberrant, late-flowering individual taken from older parts of the plant, thus perhaps the peculiar capitulescence and thicker, larger leaves.

While Koanophyllon albicaulis occurs along the Pacific Coast of Mexico from Chiapas to Sinaloa, I have not previously seen specimens from the states of Guerrero or Oaxaca. Nor had McVaugh (1984), to judge from his account of the taxon for Flora-Novogaleciana. B. L. Robinson recognized the material from northwestern Mexico as Eupatorium albicaule var. laxius B. L. Rob., which was distinguished from the var. albicaule by its loose capitulescence and linear-attenuate involucral bracts. He subsequently elevated the variety to specific rank as Eupatorium ymalense B. L. Rob. Neither McVaugh (1984) nor King and Robinson (1971) recognize the varietal taxon, although its treatment as a regional variant of E. albicaule would seem to have merit. In any case the present species has involucral characters of var. laxius.

The type locality (Santa Barbara) is on the flood plain of the Rio Balsas ("habitat: IRF Balsas" is typed on the label), which is located by Hinton and Rzedowski (1975) at ca 18°16'N × 100°31'W at an elevation of ca 800 m, well above the 300 m limit which McVaugh notes for E. albicaule.

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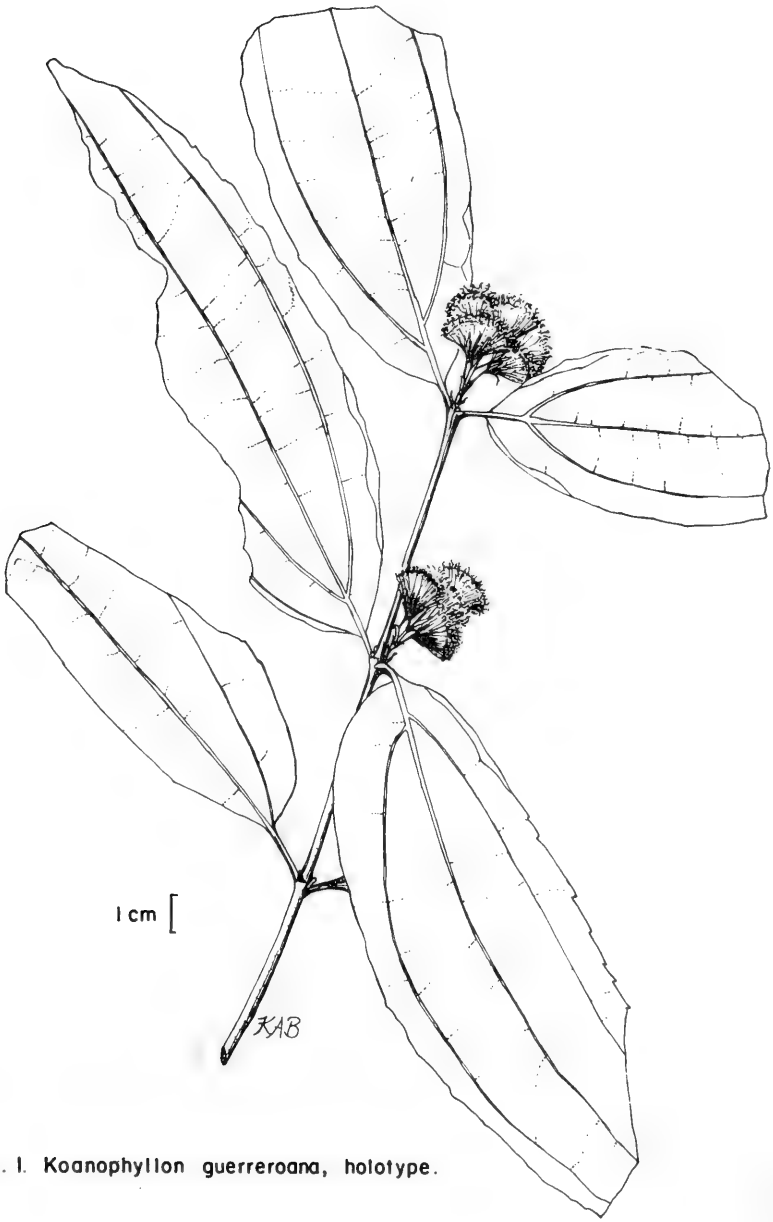

Fig. 1. Koanophyllon guerreroana, holotype.

BOOK REVIEWS

Alma L. Moldenke

"McGRAW-HILL ENCYCLOPEDIA OF SCIENCE AND TECHNOLOGY, VOLUMES 1-20" Sixth Edition, edited by Sybil P. Parker and staff, 12700 pp., 15000+ illustrations, 69 unnumbered color plates. McGraw-Hill Book Company, New York, N.Y. 10011. 1987. $1,600.00.

Readers can safely believe all of the "high class" publicity that the McGraw-Hill publishers have put forth about this new edition excellently produced, considerably enlarged and enriched by modernization of content and by new illustrative materials. Just as the previous editions were outstanding in their time, so this new one excels the others and also excels similar presently available works of other publishers. In this new 6th edition there are 1,900 new and 2,000 revised illustrations, 3,500 distinguished experts authoring contributions, measurements given throughout in both the U.S. Customary System and the International System, an Analytic Index of 150,000 entries and an extensive Topical Index, bibliographies given with signed articles, and articles with larger explanations than just the dictionary style so that interrelationships between ideas and processes can be better integrated and more broadly understood in the 7,700 articles. The format and printing make for easier reading than most encyclopedias and the interesting content and style made for "run on" reading. University, school, laboratory, public and many home libraries need this new edition. Congratulations are due to several -- the authors and compilers, the artists and lay-out staff, the publishers and the fortunate owners and/or readers to be.

"THE SEAWEED HANDBOOK - An Illustrated Guide to Seaweeds from North Carolina to the Arctic" by Thomas F. Lee, v + 217 pp., 81 black/white line drawings, 17 halftones and 1 map. Dover Publications Inc., Mineola, New York 11501. 1986. $5.95 paperbound.

This is a most helpful and interesting book for the naturalist-scuba diver, -glass bottom-boat viewer, -swimmer, -diver, or even -beachcomber who wants to learn about these under saltwater simply structured plants. They are helpfully keyed, well described and effectively illustrated. There is fascinating information about seaweeds generally and more identifying details about 78 species found along the eastern coast of North America. This book is an unabridged, but author-corrected replication of the 1977 first edition from the Mariner's Press of Boston.

"ROOT DEVELOPMENT AND FUNCTION" edited by P.J. Gregory, J.V. Lake and D.A. Rose, xiii+ 206 pp., 70 black/white figures incl. 36 photo. + 11 tables, Cambridge University Press, Cambridge and London, U. K. and New York, N. Y., 1987. $34.50.

"This volume is based on the review papers presented at the Annual Meeting of the Environmental Physiology Group of the Society for Experimental Biology ... with the Association of Applied Biologists and the British Ecological Society" 1985. The xeroxed typing is neat but hard on the eyes. Besides a well organized prologue there are 10 technical papers on such topics as: cellular organization of roots and responses to the physical environment, root tissue functions in nutrient transport, competition between root systems in natural communities, and goals for future research.

"LA SELVA NUBLADA DE RANCHO GRANDE PARQUE NACIONAL 'HENRI PITTIER': El Ambiente Fisico, Ecologia Vegetal y Anatomia Vegetal" edited by Otto Huber, 281 pp., 172 black/white fig. incl. 47 photo., 6 maps,4 pp. insert of 9 color photo. + 124 pollen grain photos. Fondo Editorial Acta Cientifica Venezolana, Caracas, Venezuela. 1986. paperbound.

This book is a very fine study of the beautifully unique cloud forest of el Rancho Grande named in honor of a wonderful botanist, ardent advocate of education and conservation, and an admired personal friend, Dr. Henri Pittier, who showed us much of this fascinating area two score years ago. Well aware of its unique plant, animal, atmosphere and other special features, he was even then advocating its being designated as a national park. There are 10 carefully prepared detailed papers by 10 authors with 4 by the editor who too is an excellent botanist and ecologist - on the geography, physiology, climate, soils and ecological interpretation of vascular plant adaptations in this misted area. The whole text is rich in illustrations and bibliography and is well documented with the careful research results of the other authors.

"THE JOHN BURROUGHS REVIEW - Sesquicentennial Issue 1837-1987, Number I ii + 72 pp., 4 black/white photo., John Burroughs Assn., American Museum of Natural History, New York, N. Y. 12561. 1987. $5.00 paperback.

The sesquicentennial is not for this journal but honors the birth on April 3, 1837 of this wonderful naturalist-philosopher-teacher-writer whom it was our privilege to know. There are articles about the Wake-Robin Club, the ties with Vassar College across the Hudson River, the journals, the Washington, D.C. years, and his books. Ah, "Wake-robin"!

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The title of the paper should be typed in all uppercase (capital) letters with 2 blank lines above the title and one beneath; then the name of the author in ordinary upper- and lower-case letters, along with his address (if so desired); followed by 2 blank lines; then the first line of text. It is usually best to leave a blank line between paragraphs.

All scientific plant and animal names and group names should be typed either in italic type (if available) or underscored. Any corrections in the text made by the author must be complete and neat as they will be photographed as they are.

The finished typescript as submitted by the author will be reduced from the 8⅝ x 5⅝ inch size as submitted to 6⅜ x 4 inches by the printer. It is therefore advisable to place a centimeter or millimeter scale on all text figures and plates included.

Use a *new* heavily inked black typewriter ribbon and be sure to *clean* the type on the typewriter after each several pages of typing.

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