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THE PHYTOGEOGRAPHIC SURVEY OF CUBA

II. FLORISTIC RELATIONSHIPS AND PHYTOGEOGRAPHIC SUBDIVISIO

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In the first part (Acta Bot. Hung. 31: 1–37, 1985) the main characteristics and the historical survey of the Cuban flora were discussed. The second part deals with the phytogeographical place of Cuba in the Neotropical flora and with its floristic relations to the other floras of the Greater Antilles. Authors consider Cuba as a separate phytogeographic province within the Antillean subregion of the Caribbean region. The phytogeographic province of Cuba can be subdivided into three subprovinces, nine sectors and 36 floristic districts. Each of the floristic units are characterized by describing their geographical, climatological, floristic and geobotanical features.

The geobotanical status of Cuba

GOOD's phytogeographic regionalization of the Caribbean

Cuba belongs to the Neotropical floristic kingdom whose phytogeographic subdivision is due to GOOD (1954) and, more recently, TAKHTADJAN (1970). According to these authors, the Neotropical kingdom has been divided into seven floristic regions and is characterized by 32 endemic plant families 10 of which occur in Cuba. These are: Marcgraviaceae, Bixaceae, Cochlospermaceae, Brunelliaceae, Picrodendraceae, Calyceraceae, Bromeliaceae, Cyclanthaceae, Heliconiaceae and Cannaceae. The Caribbean floristic region has been divided into four provinces: 1. Southern California–Mexico, 2. Caribbean, 3. Guatemala–Panama, and 4. North Colombia–North Venezuela. Cuba, as a separate subprovince, belongs to the Caribbean province.

A new proposal for the phytogeographic regionalization of the Caribbean area

In the author's opinion the above mentioned phytogeographic classification does not reflect correctly the evolutionary history and the present floristic conditions of the Caribbean. In addition, the early isolation of the Antilles and the rich endemic flora of the archipelago are not considered satisfactorily. For these reasons it seems justified to make a distinction between two equally important sub-regions, continental and Antillean, within the Caribbean floristic region and, further, to modify the regionalization as follows (see Fig. 29).

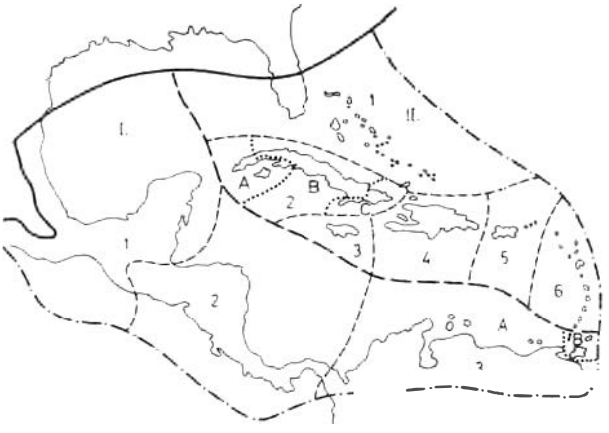

Fig. 29. Phytogeographic subdivision of the Caribbean floristic region according to BORHIDI (1973)

I. Mexican Venezuelan sub-region
Provinces: 1. Baja California—Mexico
2. Guatemala—Panama
3. North-Columbia—North-Venezuela
Sub-provinces: A: Mainland area
B: Trinidad and Tobago

II. Antillean sub-region
Provinces: 1. South-Florida, Bahamas, Bermuda
2. Cuba
Sub-provinces: A: Western Cuba
B: Central Cuba
C: Eastern Cuba
3. Jamaica
4. Hispaniola
5. Porto Rico
6. Lesser Antilles

NEOTROPICAL KINGDOM (32 endemic families)

Caribbean region (2 endemic families, Goetzeaceae and Plocospermataceae, and more than 500 endemic genera).

A) Mexican Venezuelan sub-region (a single endemic family, Plocospermataceae, and approximately 200 endemic genera)

Province:

1. Baja–California–Mexico
2. Guatemala–Panama
3. North Colombia–North Venezuela (incl. Trinidad and Tobago)

B) Antillean sub-region (a single endemic family, Goetzeaceae, and about 200 endemic genera and 7500 endemic species)

Provinces:

1. South Florida–Bahamas–Bermuda (7%, 10% and 8% endemics, respectively)
2. Cuba (51.4% endemics, 74 endemic genera and approximately 3000 endemic species)

3. Jamaica (20–22% endemics, 8 endemic genera)
4. Hispaniola (39.2% endemics, 36 endemic genera, 1797 endemic species)
5. Puerto Rico (13% endemics, 2 endemic genera)
6. Lesser Antilles (10–12% endemics)

Relationships within the flora of the West Indies

In the paper on the vegetation of the Antilles by HOWARD (1973) in fact the relationships between the flora of the islands and the distribution patterns of plants, rather than the vegetation, are discussed. In HOWARD's views the geobotanical relationship between the continent and the islands should be evaluated on the basis of genera, rather than species. The results of this analysis are presented in 30 tables where only those genera are listed which were considered by HOWARD as being free from taxonomic problems. Based on this analysis the following statements were made.

In the Antilles several endemic genera are restricted to one or two islands and there are only two endemic genera with more than 20 species.

Picrodendraceae, including a single genus and three species, is the only family restricted to the Antilles in distribution.

The flora of the Greater Antilles has several genera in common with Central America which are otherwise absent from the Lesser Antilles. Contrarywise, the Lesser Antilles have several South American genera that are missing from the Greater Antilles.

Table 1

West Indian genera missing in Central and South America and genera of West Indian evolution center represented only by a few species in the American continent (*)

Borrichia (Compositae) 1 species
Calycogonium (Melastomataceae) 33 species
Catesbaea (Rubiaceae) 20 species
Charianthus (Melastomataceae) 2 species
*Coccothrinax** (Palmae) 45 species (2 in Yucatan and Fda)
Consolea (Cactaceae) 14 species
Ernodea (Rubiaceae) 3 species
Gesneria (Gesneriaceae) 55 species
Gundlachia (Compositae) 10 species
Hypelate (Sapindaceae) 1 species
Metopium (Anacardiaceae) 3 species
Neolaugeria (Rubiaceae) 5 species
Oplonia (Acanthaceae) 20 species (2 in Peru and 3 in Madagascar)
Oxandra (Lauraceae) 2 species
Petitia (Verbenaceae) 2 species
*Reynosia** (Rhamnaceae) 18 species (1 in CA)
*Rhytidophyllum** (Gesneriaceae) 21 species (1 in SA)
*Rochefortia** (Boraginaceae) 12 species (1 in CA and SA)
*Rondeletia** (Rubiaceae) 130 species, only 3 in CA (?)
Sarcomphalus[1] (Rhamnaceae) 12 species
Scolosanthus (Rubiaceae) 22 species
Strumpfia (Rubiaceae) 1 species
Tetrazygia (Melastomataceae) 15 species
Tetrazygiopsis (Melastomataceae) 13 species
Thrinax (Palmae) 5 species
*Wallenia** (Myrsinaceae) 26 species (2 in CA)

[1] I prefer maintain *Sarcomphalus* as a separate genus, because of its type of placentation completely different from that of *Zizyphus* (see VENT 1982).

HOWARD's study suggests that the flora of the West Indies is not uniform and its development is not completely independent, since inner disjunctions are more characteristic than close relationships. This idea has been manifested in KLOTZ's (1978) work in which a northern Caribbean subregion is distinguished within the Caribbean floristic region by excluding the Lesser Antilles. Within this sub-region a Greater Antillean province is delimited.

The regionalization concept described above was developed (BORHIDI 1973) in the year of HOWARD's publication and the studies carried out since then appear to support the author's early view. In the meantime, the Picrodendraceae family, considered earlier as being endemic to this area, was incorporated into Euphorbiaceae, whereas the family status of Goetzeaceae was restored (AIRY SHAW 1965, HUNZIKER 1979, FUENTES 1982). The latter family comprises four genera, all endemic to the Antilles. Several new genera were described from the Antillean area (BORHIDI 1973, 1977, 1981, 1982, AIELLO 1979, A. H. LIOGIER 1981) and new species of West Indian genera were discovered. Following HOWARD's pioneer studies, some problems concerning the floristical relationships between the Lesser and Greater Antilles were clarified. Also, the presence of some South American genera in the Lesser Antilles turned out to be the result of secondary introduction (HOWARD 1982, in litt.).

Table 2

Genera endemic to the Greater Antilles and mostly occurring in the Bahamas as well

Auerodendron (Rhamnaceae) C,J,B, 8 species
Bonania (Euphorbiaceae) C,H,B, 8 species
Grimmeodendron (Euphorbiaceae) C,J,H,B, 2 species
Lasiocroton (Euphorbiaceae) C,H,J,B, 4 species
Leptocereus (Cactaceae) C,H,J,PR, 14 species
Nashia (Verbenaceae) C,H,B, 6 species
Neobracea (Apocynaceae) C,B, 8 species
Neothymopsis (Compositae) C,B, 2 species
Phialanthus (Rubiaceae) C,J,PR,B, 18 species
Picrodendron (Euphorbiaceae) C,J,H,B, 3 species
Pseudocarpidium (Verbenaceae) C,H,B, 8 species
Sachsia (Compositae) C,H,J,PR,B,Fda, 2 species
Spathelia (Rutaceae) C,J,B, 16 species
Tetranthus (Compositae) H,B, 2 species
Triopteris (Malpighiaceae) C,J,H,B, 5 species

Table 3

Genera endemic to Cuba, Jamaica and Hispaniola

Acidocroton (Euphorbiaceae) 10 species
Broughtonia (Orchidaceae) 2 species
Brya (Fabaceae) 12 species
Cameraria (Apocynaceae) 6 species
Gyrotaenia (Urticaceae) 5 species
Haenianthus (Oleaceae) 4 species
Lagetta (Thymelaeaceae) 5 species

Table 4

Genera endemic to Cuba, Hispaniola and Porto Rico

Ditta (Euphorbiaceae) 2 species
Ottoschulzia (Icacinaceae) 3 species
Torralbasia (Celastraceae) 2 species

In the sequel some tables will summarize the genera whose distribution is confined to the West Indian subregion (sensu BORHIDI). In addition, genera having the evolutionary centre in the West Indies but also represented by as few as 1–2 species in the South or Central American continent are listed, these are indicated by an asterisk (Table 1).

Table 5

Genera endemic to Cuba and Hispaniola

Ampelocera (Ulmaceae) 2 species
Barleriola (Acanthaceae) 5 species
Bellonia (Acanthaceae) 2 species
Bisgoeppertia (Gentianaceae) 2 species
Chascotheca (Euphorbiaceae) 1 species
*Copernicia** (Palmae) 29 species (3 in SA)
Cubanola (Rubiaceae) 1 species
Cubanthus (Euphorbiaceae) 3 species
Ekmanianthe (Bignoniaceae) 2 species
Fuertesiella (Orchidaceae) 2 species
Isidorea (Rubiaceae) 20 species
Lantanopsis (Compositae) 3 species
Leucocroton (Euphorbiaceae) 27 species
Macrocarpaea (Gentianaceae) 2 species
Margaritopsis (Rubiaceae) 3 species
Mozartia (Myrtaceae) 9 species
Neoregnellia (Sterculiaceae) 1 species
Ottoschmidtia (Rubiaceae) 1 species
*Pachyanthus** (Melastomataceae) 24 species (1 in SA?)
Peratanthe (Rubiaceae) 2 species
Picardaea (Rubiaceae) 2 species
Pinillosia (Compositae) 1 species
Plethadenia (Rutaceae) 2 species
Saugetia (Gramineae) 2 species
Scutachne (Gramineae) 2 species
Spirotecoma (Bignoniaceae) 5 species
Suberanthus (Rubiaceae) 7 species
Thogsennia (Rubiaceae) 1 species
Verhuellia (Piperaceae) 3 species
Victorinia (Euphorbiaceae) 1 species

Table 6

Genera endemic to Cuba and Jamaica

Acrosynanthus (Rubiaceae) 7 species
Calyptronoma (Palmae) 5 species
Cheilophyllum (Scrophulariaceae) 8 species
Cionosicyos (Cucurbitaceae) 1 species
Dinema (Orchidaceae) 2 species
Homalopetalum (Orchidaceae) 1 species
Neo-Urbania (Orchidaceae) 2 species
Pheidonocarpa (Gesneriaceae) 2 species
Strempeliopsis (Apocynaceae) 2 species
Urbananthus (Compositae) 2 species

Table 7

Genera endemic to Cuba and Porto Rico

Gaussia (Palmae) 2 species

In summary, not less than 27 flowering plant genera are considered as being endemic to, or having the evolutionary centre in the West Indies. These genera are represented by a total of 500 species, approximately.

The number of endemic genera common in the Greater Antilles is 15, most of those occurring in the Bahamas as well (Table 2). They include more than 100 species. This figure shows that the flora of Bahamas is closely related to that of the Greater Antilles, in particular, of Hispaniola. The floristic relationships among the islands of West Indies are best illustrated by examining the number of endemic genera found only in the combination of tbree, or two islands or in a single island.

Table 8

Genera endemic to Hispaniola and Porto Rico

Goetzea (Goetzeaceae) 1 species
Piptocoma (Compositae) 1 species
Pleodendron (Canellaceae) 1 species
Stahlia (Leguminosae) 1 species

Table 9

Genera endemic to Hispaniola

Anacaona (Cucurbitaceae) 1 species
Arcoa (Caesalpiniaceae) 2 species
Casabitoa (Euphorbiaceae) 1 species
Coeloneurum (Goetzeaceae) 1 species
Cryptorhiza (Myrtaceae) 1 species
Ekmaniocharis (Melastomataceae) 1 species
Eupatorina (Compositae) 1 species
Fuertesia (Loasaceae) 1 species
Haitia (Lythraceae) 1 species
Herodotia (Compositae) 1 species
Hottea (Myrtaceae) 4 species
Leptogonum (Polygonaceae) 2 species
Manekia (Piperaceae) 1 species
Mattfeldia (Compositae) 1 species
Mommsenia (Melastomataceae) 1 species
Narvalina (Compositae) 1 species
Neoabbottia (Cactaceae) 2 species
Neobuchia (Bombacaceae) 1 species
Pedinopetalum (Umbelliferae) 1 species
Penelopeia (Cucurbitaceae) 1 species
Poitea (Fabaceae) 5 species
Priamosia (Flacourtiaceae) 1 species
Pterocissus (Vitaceae) 1 species
Rhodopis (Fabaceae) 1 species
Samuelssonia (Acanthaceae) 2 species
Sarcopilea (Urticaceae) 1 species
Selleola (Caryophyllaceae) 1 species
Selleophytum (Compositae) 3 species
Stevensia (Rubiaceae) 6 species
Theophrasta (Theophrastaceae) 2 species
Tortuella (Rubiaceae) 1 species
Ulbrichia (Malvaceae) 1 species
Vegaea (Myrsinaceae) 1 species
Wunschmannia (Bignoniaceae) 1 species
Ximeniopsis (Olacaceae) 1 species
Zombia (Palmae) 1 species

Table 10

Genera endemic to Jamaica

Acanthodesmos (Compositae) 1 species
Dendrocousinia (Euphorbiaceae) 3 species
Jacaima (Asclepiadaceae) 2 species
Jacmaia (Compositae) 1 species
Odontocline (Compositae) 6 species
Portlandia (Rubiaceae) 6 species
Salpixantha (Acanthaceae) 1 species
Tetrasiphon (Celastraceae) 1 species

Table 11

Genera endemic to Porto Rico

Cybianthopsis (Myrsinaceae) 1 species
Rudolphia (Leguminosae) 1 species

The importance of insularity in evolution is emphasized by the fact that the number of endemics occurring in three islands is lower than that in two islands. This number is the highest for the single islands. When Cuba, Jamaica and Hispaniola are viewed together 7 endemic genera with 44 species result (Table 3). Cuba, Hispaniola and Puerto Rico together possess 3 endemic genera with 7 species, so the total is 10 genera with 51 species (Table 4).

If pairwise combinations are taken, the following figures are obtained: Cuba and Hispaniola have in common 30 endemic genera with 168 species (Table 5). Cuba and Jamaica have 10 genera with 32 species (Table 6). There is only a single genus with two species common, to Cuba and Puerto Rico (Table 7). Hispaniola and Puerto Rico have in common four species, each representing a different genus (Table 8). The totals are 45 and 206, respectively, for genera and species.

Finally, the number of genera confined to one island is 121 altogether (237 species) (Tables 9, 10, 11). The number of species per endemic genus is 2.27 in Cuba, 1.4 in Hispaniola,

Table 12

Genera endemic to Cuba — with indication of edaphic conditions

	Number of species	Lime-stone	Slate sand-stone	Silic. sand	Serpen-tine	Other rocks
Acunaeanthus (Rubiaceae)	1	–	–	–	1	–
Adenoa (Turneraceae)	1	–	–	–	1	–
Amphiolanthus (Scrophulariaceae)	3	+	+	+	–	+
Ancistranthus (Acanthaceae)	1	1	–	–	–	–
Antillia (Compositae)	1	+	–	–	–	+
Ariadne (Rubiaceae)	2	–	–	–	2	–
Asciadium (Umbelliferae)	1	–	–	1	–	–
Behaimia (Fabaceae)	2	+	+	–	+	+
Belairia (Fabaceae)	6	3	1	1	1	+
Bembicidium (Fabaceae)	1	1	–	–	–	–
Caribaea (Nyctaginaceae)	1	1	–	–	–	–
Ceratopyxis (Rubiaceae)	1	1	–	–	–	–
Ceuthocarpus (Rubiaceae)	1	–	–	–	1	–
Chaetium (Gramineae)	1	+	–	–	+	–
Ciceronia (Compositae)	1	–	–	–	1	–
Cubacroton (Euphorbiaceae)	1	1	–	–	–	–
Dasytropis (Acanthaceae)	1	–	–	–	1	–

Table 12 (continued)

	Number of species	Lime-	Slate sand-	Silic. sand	Serpen-	Other
Dendrocereus (Cactaceae)	1	1	–	–	–	–
Doerpfeldia (Rhamnaceae)	1	1	–	–	–	–
Ekmania (Compositae)	1	1	–	–	–	–
Ekmanochloa (Gramineae)	2	–	–	–	2	–
Encopella (Scrophulariaceae)	1	–	–	+	–	+
Eosanthe (Acanthaceae)	1	–	–	–	1	–
Espadaea (Goetzeaceae)	1	+	+	–	+	+
Euchorium (Sapindaceae)	1	1	–	–	–	–
Euleria (Anacardiaceae)	1	1	–	–	–	–
Feddea (Compositae)	1	–	–	–	1	–
Gastrococos (Palmae)	1	+	–	–	+	+
Goerziella (Amaranthaceae)	1	1	–	–	–	–
Grisebachianthus (Compositae)	7	2	–	–	5	–
Harnackia (Compositae)	1	–	–	–	1	–
Hebestigma (Fabaceae)	1	+	+	+	+	+
Hemithrinax (Palmae)	3	2	–	–	1	–
Henleophytum (Malpighiaceae)	1	+	–	–	+	–
Henoonia (Goetzeaceae)	1	+	–	–	+	–
Heptanthus (Compositae)	7	1	1	1	4	–
Herpyza (Fabaceae)	1	–	+	+	–	–
Kodalyodendron (Rutaceae)	1	–	–	–	1	–
Koehneola (Compositae)	1	–	–	–	1	–
Krokia s. l. (Myrtaceae)	11	2	–	–	8	1
Lachnorrhiza (Compositae)	1	–	+	+	+	–
Lepturidium (Gramineae)	1	–	–	1	–	–
Lescaillea (Compositae)	1	–	–	–	1	–
Linodendron (Thymelaeaceae)	3	–	–	–	2	1
Megalopanax (Araliaceae)	1	1	–	–	–	–
Microcycas (Cycadaceae)	1	+	+	–	–	–
Mniochloa (Gramineae)	2	+	+	–	+	+
Moacroton (Euphorbiaceae)	7	–	–	–	7	–
Neomazaea (Rubiaceae)	1	–	–	–	1	–
Nodocarpaea (Rubiaceae)	1	–	–	1	–	–
Notodon (Fabaceae)	4	2	–	–	2	–
Phania (Compositae)	2	+	+	–	1	–
Phidiasia (Acanthaceae)	1	–	–	–	1	–
Phyllacanthus (Rubiaceae)	1	–	–	–	1	–
Phyllomelia (Rubiaceae)	1	–	–	–	1	–
Pinosia (Caryophyllaceae)	2	1	–	1	–	–
Platygyne (Euphorbiaceae)	7	1	1	1	4	2
Rhodogeron (Compositae)	1	–	–	–	–	1
Roigella (Rubiaceae)	1	–	+	+	+	–
Sapphoa (Acanthaceae)	2	–	–	–	2	–
Sauvallella (Fabaceae)	1	–	–	–	1	–
Schmidtottia (Rubiaceae)	16	–	–	–	16	–
Shafera (Compositae)	1	–	–	–	1	–
Shaferocharis (Rubiaceae)	3	–	–	–	3	–
Siemensia (Rubiaceae)	1	1	–	–	–	–
Solonia (Myrsinaceae)	1	–	–	–	–	1
Spaniopappus (Compositae)	5	1	–	–	3	1
Synapsis (Bignoniaceae)	1	1	–	–	–	–
Tetralix (Tiliaceae)	5	–	–	–	5	–
Tetraperone (Compositae)	1	–	1	–	–	–
Triscenia (Gramineae)	1	+	–	–	+	+
Woehleria (Amaranthaceae)	1	+	–	–	–	+
Zonanthus (Gentianaceae)	1	1 (?)	–	–	–	–

2.12 in Jamaica and 1 in Puerto Rico. This ratio is 5.6 for Cuba and Hispaniola taken together, 3.2 for the pair of Cuba and Jamaica, 2 for Cuba and Puerto Rico, and 1 for Hispaniola and Puerto Rico.

The geobotanical subdivision of Cuba

Three proposals for the geobotanical subdivision of Cuba have been published. LEÓN (1946) makes a distinction among three floristic sectors and 9 districts and give a short description of the flora and vegetation of each. VORONOV (1970) also distinguishes 3 sectors within which 11 districts plus 5 sub-districts are differentiated without detailed characterization. SAMEK (1973) elaborated the first comprehensive phytogeographic regionalization of Cuba distinguishing 3 sectors, 7 subsectors and 39 districts and recognizing some of the main characteri tics of the Cuban flora. The regionalization presented here is based on the geographical geological and soil conditions and the flora and vegetation, giving equal weight to each. As a result, the suggested geobotanical system distinguishes 3 sub-provinces, 9 sectors and 36 floristic districts (see BORHIDI et MUÑIZ in BORHIDI 1973)

SUB-PROVINCE A: WESTERN CUBA (OCCIDENTO-CUBANICUM) (Fig. 30)

The western part of Cuba to Bahia Honda, to Cayajabos, River San Juan and Laguna de Piedras the southern swampy coast of the Habana province and the entire Isla de Pinos and the Zapata peninsula plus the adjacent marshland belong to this category. The geological and soil conditions are highly varied, the landscape is characterized by mountains of medium

Fig. 30. The phytogeographic subdivision of the West-Cuban sub-province

A.1. Sector: *Peninsularicum*
- A.1.1. District: *Guanahacabibense*
- A.1.2. District: *Sudpineroënse*
- A.1.3. District: *Zapatense*

A.2. Sector: *Pinaricum*
- A.2.1. District: *Sabaloënse*
- A.2.2. District: *Indiosense*
- A.2.3. District: *Pinarense*
- A.2.4. District: *Geronense*

A.3. Sector: *Rosaricum*
- A.3.1. District: *Viñalense*
- A.3.2. District: *Cajalbanense*
- A.3.3. District: *Rosariense*

height, sandy plains, lagoons, marshes, flat and conical karsts. 16 endemic genera and approximately 500 endemic species occur. Important features of the flora are the high proportion of elements from Florida, southwestern USA and the northern areas, as well as the occurrence of Mexico — Yucatan elements. Several genera, such as *Befaria*, *Kalmiella*, *Chaetolepis*, *Rhexia*, *Pieris*, *Syngonanthus*, *Xyris* and *Eriocaulon* (with one species exception) do not occur elsewhere in Cuba. Coniferous forests of flat and rolling countries and tropical karstic forests are the predominant and characteristic vegetation types. Swamps, marshes and, on the flat karsts, semi-deciduous and dry evergreen forests also cover extensive areas (Fig. 30).

Sector A.1.: Karstic peninsulas (Peninsularicum)

Guanahacabibes, southern Isla de Pinos and Zapata, the three spatially isolated peninsulas that comprise this sector, have similar geological past, vegetation and a relatively monotonous flora poor in endemics. These lands formed a common shoreline at the end of the Pliocene. This land contact has been reflected by the similarity between the forest and shrub vegetation of marshes and flat karsts. The relationship between the flora of Guanahacabibes peninsula and Isla de Pinos is best shown by the presence of some common endemics (*Erythroxylon roigii*, *Allophylus roigii*) and rare floristic elements, e.g., *Bauhinia jenningsii* which is also present in Central America, and *Diospyros tetrasperma*, also occurring in Jamaica. The flora of Zapata peninsula includes some elements common with Guanahacabibes, as *Cissus formosa*, *Pontederia lanceolata* and *Heliotropium antillarum*.

District A.1.1.: Guanahacabibes peninsula (Guanahacabibense)

a. Geography: Flat karsts composed coral limestone originated from neritic medium of the Quaternary. Shallow ferralitic soils.
b. Climate: Seasonal tropical climate with 5–6 arid months, tending to be bixeric in the east.
c. Flora: A single endemic genus, *Goerziella*, occurs. Important endemic species are *Harrisia taetra*, *Piper guanahacabibense*, *Galactia acunana*, *Callicarpa roigii*, *Vitex acunae*, *V. guanahacabibensis*, *Serjania occidentalis*, and *Tabebuia capotei*. *Diospyros anisandra*, *Forchhammeria trifoliata* and *Bumelia retusa* originate probably from the Yucatan peninsula reaching only this part of Cuba.
d. Vegetation: Mangrove on the peaty silt deposits on the northern shore. Dry evergreen shrubwoods on the rocky southern shore. In the inner part of the peninsula semideciduous forests predominate.

District A.1.2.: Southern Isle of Youth (Isla de la Juventud) (Sudpineroënse)

a. Geography: Marine limestone deposited in the Neogene Shallow tropical brown soils in the west, humic carbonated skeletal soils in the east.
b. Climate: Semiarid monsoon with 5–6 dry months, tending to be bixeric in the west. Annual precipitation is 1200–1600 mm.
c. Flora: One exclusive endemic is *Phialanthus bissei*. The area is characterized by the endemics of western and northern Cuba, as *Allophylus roigii* (common with the Guanahacabibes Peninsula) and *Neobracea angustifolia*, etc. (Fig. 9).
d. Vegetation: Mangrove and swamp forests and reed vegetation in the Lanier Swamps in the north. In the west semi-deciduous forests, in the east dry evergreen forests predominate. Karstic lagoons are commonly found. An interesting stand of *Pinus caribaea* on limestone grows near Cayo Piedra, in a rather complete community of pine forest.

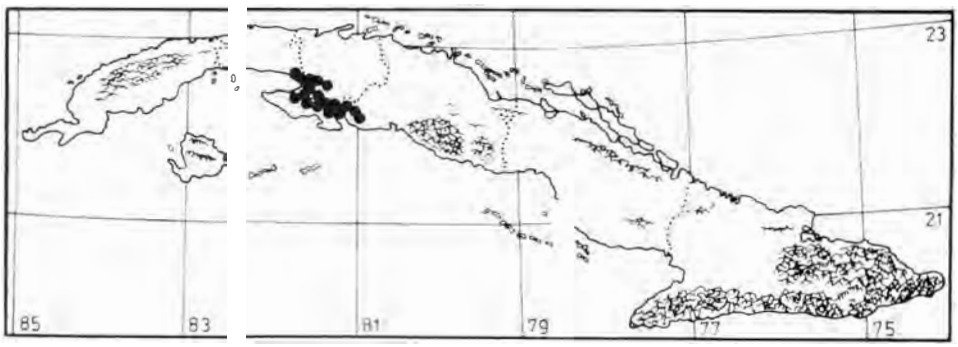

Fig. 31. Geographical distribution of *Fraxinus caroliniana* ssp. *cubensis* (after SAMEK 1973, modified)

District A.1.3.: Zapata peninsula (Zapatense)

The Zapata peninsula, the Hatiguanico river basin and the surrounding swamps, Laguna del tesoro, the eastern marchlands of Zapata, the karstic lowland and the marshy mangrove coast of southern Habana province to Majana belong to this district.

a. Geography: Young, mainly peaty and boggy areas with a Neogene limestone ridge of NW–SE direction in the middle. Occasinally, flatland karsts, dissected by lagoons, with shallow, humic carbonated soils.

b. Climate: Seasonal, dry in the winter. 5–6 dry months, 1200–1700 mm annual precipitation.

c. Flora: Very few exclusive endemics (*Acacia zapatensis*, *Phoradendron zapatanum*, *Calyptranthes peninsularis*). *Bucida palustris* is a common endemic to S-Isle of Youth. Furthermore, some species also occurring in the swamps of Florida and Virginia, e.g., *Fraxinus caroliniana* ssp. *cubensis* (Fig. 31), *Vallisneria neotropicalis* (MARIE-VICTORIN 1944) and *Polygala carteri*, are characteristic.

d. Vegetation: Extensive mangrove and swamp vegetation, alluvial forests and derived *Sabal* savannas on the northern edge. Semi-deciduous forests, dry evergreen forests and patches of shrubwoods occur on the karsts.

Sector A.2.: The flatland and hill-country of Pinar del Rio Province and North of Isle of Pines (actually Isle of Youth) (Pinaricum)

This sector comprises the northern Isle of Pines (Isla de la Juventud) and the province of Pinar del Rio, excluding Sierra del Rosario, the mogotes of Sierra del los Organos and the serpentine area of Cajalbana. Mainly hills, with sandstone and slate as chief rocks, and flatlands covered by oligotrophic soil with quartz sand underneath. The dominant vegetation types are closed and open coniferous forests and their derived savannas, sandy lagoons and swampy patches with palms. Eight endemic genera occur in this area, one of them *Microcycas*, (also present in Sierra de los Organos), *Colpothrinax*, *Herpyza*, *Nodocarpaea* and *Roigella* live throughout the area, *Tetraperone* is confined to Pinar del Rio, whereas *Lepturidium* is found only in Isle of Pines. In addition, 95 endemic species have been detected, for example, *Pinus tropicalis*, *Colpothrinax wrightii* (Fig. 32), *Phyllanthus junceus*, *Heptanthus ranunculoides*, *Syngonanthus wilsonii*, *Kalmiella ericoides*, *Lyonia myrtilloides*, *Vaccinium cubense* ssp. *ramonii*, *Pieris cubensis*, *Paepalanthus alsinoides*, *Chaetolepis cubensis*, *Miconia adrosaemifolia*,

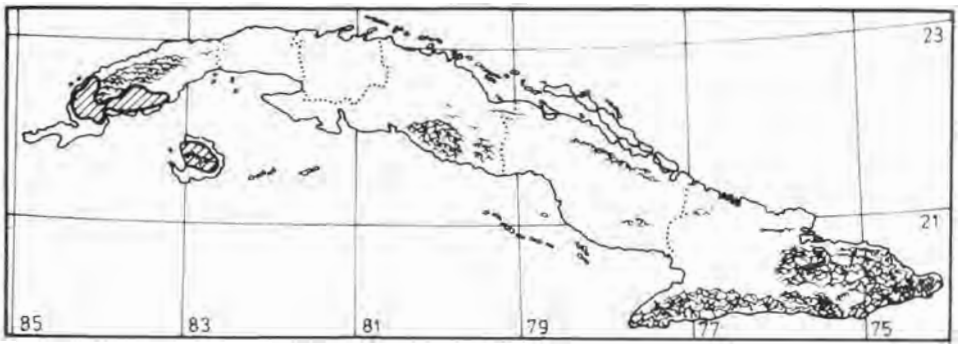

Fig. 32. Geographical distribution of *Colpothrinax wrightii* (after SAMEK 1973, modified)

Pachyanthus cubensis, P. angustifolius, P. wrightii. Several vicarious species pairs occur, such as *Lachnocaulon anceps* (Isle of Youth)—*L. ekmanii* (Pinar del Rio); *Lyonia vaccinoides* (Isle of Youth)—*L. ekmanii* (Pinar del Rio); *Galactia jenningsii* (Isle of Youth)—*G. isopoda* (Pinar del Rio); and others in the genera of *Phyllanthus, Tabebuia, Eugenia* and *Eriocaulon.*

Sub-sector A.2.a.: White sandlands (Sabalo-Indiosense)

Light-colored sandy areas with low nutrient content on the western and southern border of Isle of Youth and South Pinar del Rio from the pre-isthmus of the Guanahacabibes peninsula till Paso Real de San Diego. The open pine woodlands and the swampy sand lagoons have several endemic species in common, for example, *Xyris bicarinata, X. grandiceps, Paepalanthus seslerioides, Aristida brittonorum, Eriocaulon sphaerocephalum, E. dioecum, Amphiolanthus arenarioides, Micranthemum rotundatum, Lindernia alternifolia, Bacopa longipes,* and *Colpothrinax wrightii.*

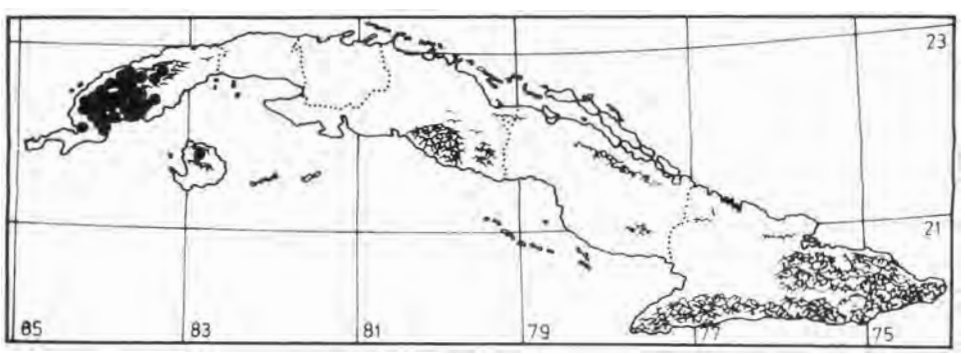

Fig. 33. Geographical distribution of *Quercus oleoides* ssp. *sagraeana* (after SAMEK 1973, modified)

District A.2.1.: White sandlands of South-west Pinar del Rio (Sabaloënse)

a. Geography: Flatland covered by soils of mild glei character with quartz sand underneath. The area is relatively abundant in oligotrophic lakes.
b. Climate: Seasonal with dry winter, 5–6 dry months. Annual precipitation is 1000–1400 mm on the average.
c. Flora: Several endemics common to this district and the pinewoods of slate areas. These are *Befaria cubensis*, *Gochnatia ekmanii*, *Pinguicula albida*, *Byrsonima pinetorum*, *Quercus oleoides* ssp. *sagraeana* (Fig. 33). Approximately 30 exclusive endemics, for example: *Aristida fragilis*, *Syngonanthus leoni*, eight *Eriocaulon* species, *Hibiscus urbanii*, *Mollugo enneandra*, *M. brevipes*, *Pachyanthus mantuensis*, and *Plinia ramosissima*.
d. Vegetation: Mixed palm-pine woodlands with loose canopy layer (*Eragrosti cubensi—Pinetum* Samek) was the original vegetation in which *Colpothrinax wrightii*, *Acoelorrhaphe wrightii* and *Pinus tropicalis* were dominant. Also, derived savannas, wet *Acoelorrhaphe* palm groves, and swampy and freshwater vegetation rich in Eriocaulaceae.

District A.2.2.: White sandlands of Isle of Youth (Indiosense)

a. Geography: The area of El Soldado Los Indios, San Pedro and Santa Isabel, is located north of the Lanier swamp and on the western shore of the island. Similarly to the preceding area, it is a humid, acidic, quartz sand plain.
b. Climate: Seasonal with 3–4 dry months in the winter. Annual precipitation is 1400–1600 mm.
c. Flora: A single endemic genus, *Lepturidium*, and approximately 20 endemic species, such as *Eugenia victorini*, *Mollugo pinosia*, *Pectis pinosia*, *Pachyanthus longifolius*, *Kalmiella aggregata*, *K. simulata*, *Phyllanthus selbyi*, *Evolvulus siliceus* and six species of *Eriocaulon* characterize this floristic district. *Bulbostylis paradoxa* is found only here in Cuba, the savanna plant *Byrsonima verbascifolia* occurs here and in Oriente.
d. Vegetation: Open pinewoods on sandy soils (*Paepalantho—Pinetum tropicalis* Samek), derived savannas, wet *Acoelorrhaphe* groves. Swampy and freshwater vegetation rich in *Eriocaulons*.

Sub-sector A.2.b.: Silicate heights and their alluvial plains (Eu-Pinaricum)

This area includes the silicate heights in the North and South side of Sierra de los Organos, with the adjacent alluvial sites and the northern and north-eastern part of Isle of Youth. Two endemic genera, *Roigella* and *Nodocarpaea*, and about 70 endemic species occur, some of them listed in I.2.

District A.2.3.: The slatey heights and plains of Pinar del Rio (Pinarense)

a. Geography: Gently rolling hill-country, the plains are divided by rivers. The parent material of hills is composed of sandstone and lower Jurassic slate layers (the so-called San Cayetano formation). The quartz-siallitic soils of hills are acidic, yellow in color, and poor in nutrient. In the plains tropical reddish-yellow fersiallitic soils predominate, these are covered by acidic sand.
b. Climate: Seasonal tropical with dry winter. 1–2 dry months and 1600–2300 mm annual precipitation in the hills, 3–4 dry months and 1200–1600 mm annual precipitation in the plain.
c. Flora: Characteristic are the endemics of the sector; these are in common with the other floristic districts. The dominant coniferous vegetation (*Pinus tropicalis* and *P. caribaea*) causes certain floristic uniformity. Additional characteristic elements are *Quercus oleoides* ssp. *sagraeana* (Fig. 33) in the tree layer, and *Befaria cubensis*, *Vaccinium cubense* ssp. *ramonii*,

Lyonia myrtilloides, *Miconia ibaguensis*, *M. splendens*, *Pachyanthus poiretii*, *P. angustifolius*, *Tabebuia lepidophylla*, *Roigella correifolia*, *Rhus copallina* ssp. *leucantha* in the shrub layer. Species in common with Cajalbana, but rare, are *Acunaeanthus tinifolius*, *Hyperbaena columbica* and *Pisonia petiolaris*. *Microcycas calocoma* is common to this district and the limestone karsts. Local endemics are lacking with the exception of *Cassia roigii* in Cerro de Cabras. In the southern plains, however, several local endemics appear, such as *Gochnatia mantuensis*, *G. ekmanii*, *Peperomia nummularia*, *Hyptis cubensis*, *Galactia herradurensis*, *Lyonia ekmanii*, and *Melochia manducata*, usually at the edge of the plain.

d. Vegetation: On the hard crystalline slates a loose pine woodland formed by *Pinus tropicalis* and *P. caribaea* was the original dominant vegetation, but it is mostly replaced by secondary grasslands of *Hyparrhenia rufa* and *Andropogon bicornis*. In the areas of the softer sandstone bedrock (San Cayetano formation) a deeper brownish-yellow soil is developed covered mostly by evergreen sclerophyllous oak forests of *Quercus oleoides* ssp. *sagraeana*, *Buchenavia capitata*, *Pithecellobium cubense*, *Xylopia aromatica*. On the southern slopes and foothills a narrow strip of tropical semideciduous forest is developed frequently transformed into orchards or plantations of vegetables. In the lowland areas *Colpothrinax* palm-pine woodland was extended, but its sites actually are used as rice fields, pastures and secondary grasslands. The district may be subdivided into two sub-districts: the slatey heights (Eu-Pinarense) and the alluvial plains (Herradurense).

District A.2.4.: North of Isle of Youth (Geronense) (Fig. 30)

a. Geography: Alluvial plain is the most extensive with some karstic limestone mountains (Sierra de las Casas, Sierra de Caballos) and low silicate hills (Sierra de la Cañada, Sierra de La Siguanea, Loma de Mal Pais, etc.). The dominant soil types are yellow quartz allitic or yellow pseudoglei soils.

b. Climate: Seasonal tropical. The dry season is winter. 5–6 dry months, 1400–1700 mm annual precipitation.

c. Flora: Very similar to that of the preceding flora district, although several elements (*Microcycas*) have not reached this area despite the land connection at the end of the Tertiary and during the glacials of the Quaternary. Some characteristic endemic species are *Hyeronima crassistipula*, *Stenandrium pinetorum*, *Machaonia acunae*, *M. pauciflora*, *Miconia perelegans*, *Jacquinia curtissii*, *Hypericum incurvum*, and, on the limestone mountains, *Tabebuia geronensis* and *Eugenia ignota*.

d. Vegetation: Forests of *Pinus tropicalis*, in some places mixed with *P. caribaea*, mostly replaced by pastures. On the limestone hills semi-deciduous forests at the foot hill areas and karstic forests on the steep formations.

Sector A.3.: The mountainous Pinar del Rio (Rosaricum) (Fig. 30)

Three mountainous area of very different geological structure, geomorphology and vegetation have been included: the haystack mountains of Sierra de los Organos, the serpentine area of Cajalbana and vicinity, and the geologically highly varied mountain range of Sierra del Rosario. The main justification for considering these three fundamentally different areas as parts of the same flora sector is that the mountains form an unbroken system, and many species from the limestone flora of Sierra de los Organos and the serpentinophilous flora of Cajalbana are found together in Sierra del Rosario.

Ten endemic genera characterize this sector, these are *Euchorium* (Sapindaceae), *Ancistranthus* (Acanthaceae), *Neomazaea* (Rubiaceae), *Phyllomelia* (Rubiaceae), *Phyllacanthus* (Rubiaceae), *Sauvallea* (Commelinaceae), *Sauvallella* (Fabaceae), *Lescaillea* (Compositae), *Sie-*

mensia (Rubiaceae) and *Ceratopyxis* (Rubiaceae). Genera common to Sierra de los Organos and Sierra del Rosario are *Siemensia*, *Ceratopyxis* and *Gaussia*, whereas *Phyllomelia* is common to Cajalbana and Sierra del Rosario. Here is the chorological centre of the genera *Acunaeanthus* and *Phania* which occur sporadically in the east, in the provinces of Matanzas and Las Villas. In addition to the endemic genera, about 150 endemic species prove the ancient character of the western Cuban mountains and the long, isolated development of their flora.

The vegetation of this area is also characterized by high diversity and intensive mingling. The vegetation of limestone rocks of Sierra de los Organos is also found in several localities in Sierra del Rosario (Pan de Guajaibón, Peña Blanca, Monte Toro). Communities similar to the pinewoods and scrubs of Cajalbana occur at several points in Sierra del Rosario (Loma Zambumbia near Rancho Mundito, Rangel, Cuzco, Loma Pelada de Cayajabos). Despite these similarities, the three mountainous areas are sharply different from one another in geomorphology, flora and vegetation.

District A.3.1.: Sierra de los Organos (Viñalense)

a. Geography: Deeply inclined, tower-like karstic hills with narrow and deep gorges hidden cave systems and a long valley separating the mountains in a SW–NE direction. The surface of mountains is usually bare rock or more or less eroded skeletal soils. In the gorges deep humic-carbonated rendzina soils are deposited, whereas in the so-called intercolline valleys tropical brown and red soils predominate.

b. Climate: Seasonal tropical with dry winter. The dry season is shortened in the SW–NE direction. In the west and north 3–4, in the south and east 1–2 dry months. In some centrally situated areas humid rainforest climate may occur mesoclimatically. The annual precipitation is 1500–2200 mm.

c. Flora: The mountains composed of old, very hard upper Jurassic rocks, the so-called blue limestone, emerged in the Cretaceous. They have been dry lands since then. Due to the gradual erosion of soft rocks, free-standing limestone cliffs were formed. On the top of rocks a very ancient and highly specialized flora developed preserving several taxonomically isolated relicts, conditioned by the decreased competition in the extremely unfavourable habitats.

Two monospecific genera, *Euchorium* and *Ancistranthus*, and two other genera common to this district and Sierra del Rosario (*Ceratopyxis* and *Siemensia*), as well as *Microcycas* (which is also present in the slatey heights) illustrate the richness of the flora, likewise the 90 endemic species (e.g., *Gaussia princeps*, *Ancistranthus harpochiloides*, *Ceratopyxis verbenacea*, *Siemensia pendula*, *Ekmanianthe actinophylla*, *Spathelia brittonii* (Fig. 6), *Bourreria polyneura*, *Eugenia galeata*, *Gesneria celsioides*, *Omphalea hypoleuca*, *Annona cascarilloides*, *Malpighia roigiana*, *Anthurium venosum*, *Philodendron urbanianum*, *Bursera shaferi*, etc.).

Important species of karstic woods are the endemic *Bombacopsis cubensis*, *Thrinax morrisii* and *Agave tubulata*. Many local endemics have been discovered here. The most intensively explored area is Viñales where 17 local endemics were found, for example: *Pilea affinis*, *P. simplex*, *Salmea glaberrima*, *S. umbratilis*, *S. caleoides*, *Rhytidophyllum rupincola*, *Clusia brittonii* and *Acalypha mogotensis* (for others, see the list above). Sumidero has 10 local endemics, e.g., *Piper sumideranum*, *Calycogonium saxicola*, *Plinia rubrinervis*, *Cissus dichroa*, and *C. humilis*, Cerro de Guane has 5, e.g., *Eugenia guanensis*, *Peperomia guanensis* and *Caesalpinia guanensis*. *Dorstenia roigii* is an endemic of Mogote la Jagua, whereas *Gouania ekmanii* is endemic to Mogote de la Baliza. Five endemics have been found in the Sierra de la Güira (*Pilea güirana*, *Bourreria mucronata*, *Tetrazygia minor*, *Guettarda amblyophylla* and *Rondeletia susannae*). In the mountains isolated by coombs from one another a number of local vicarious endemics occur, e.g., *Leptocereus assurgens* (Viñales) — *L. prostratus* (Sumidero) — *L. ekmanii* (Cerro de Guane): *Psidium vicentium* (Viñales) — *P. nummularium* (Pan de

Guajaibón): *Pilea hemisphaerica* (Viñales) — *P. sumideroensis* (Sumidero). The mountains of Viñales and Sumidero may be regarded as being the most important centres of speciation. **d. Vegetation:** The karstic hills (mogotes or haystack hills) are covered by a unique mogote vegetation including the open *Agave* scrub of sunny cliffs, the veil — communities of shady rock walls and crevices, bromelia-rich open shrubwoods of the eroded tops, and the closed forest on gravel slides and ravines (intrazonal semi-deciduous shrubwoods). On the gravel slides at the foothills semi-deciduous forests, in the coombs seasonal evergreen forests and extrazonal rainforest patches develop. The intercolline valley, formerly covered by seasonal evergreen forests, is a cultivated land with fragments of a *Roystonea* — *Ceiba* secondary savanna.

District A.3.2.: Cajálbana Mountains (Cajalbanense)

a. Geography: Due to the red ferritic soils and the very rich flora, this small (about 70 km²) area of old serpentine mountains extending to the coastal lowland of La Mulata satisfies the criteria of being a separate floristic district. The relief is characterized by wide, flat hilltops and deep valleys with steep slopes. Regarding physiognomy, soil and vegetation, this area is a smaller, vicarious complement of Sierra de Nipe of eastern Cuba.

Loma Preluda to the West, and the range of serpentine hills from Las Pozas to south of Bahia-Honda and the coastal area of Toscano-Morrillo are also included in the district. The adjacent northern coast, composed mainly of serpentine or young sedimentary rocks as the top layer, is also considered here.

b. Climate: Seasonal with dry winter, 3–4 dry months, 1400–1600 mm annual precipitation. **c. Flora:** Four monospecific endemic genera: *Neomazaea*, *Sauvallella*, *Phyllacanthus* and *Lescaillea*, and 40 endemic species, including several palaeoendemics characterize the district. Of the endemics of pinewoods *Tetrazygia coriacea*, *Psidium cymosum*, *Phania cajalbanica* (Fig. 25), *Tabebuia leptopoda*, *Plinia dermatodes*, *Rondeletia venosa*, *Coccothrinax yuraguana* (Fig. 34), *Phyllanthus sagraeanus*, *Chaptalia ekmanii*, and *Eupatorium grisebachianum* are

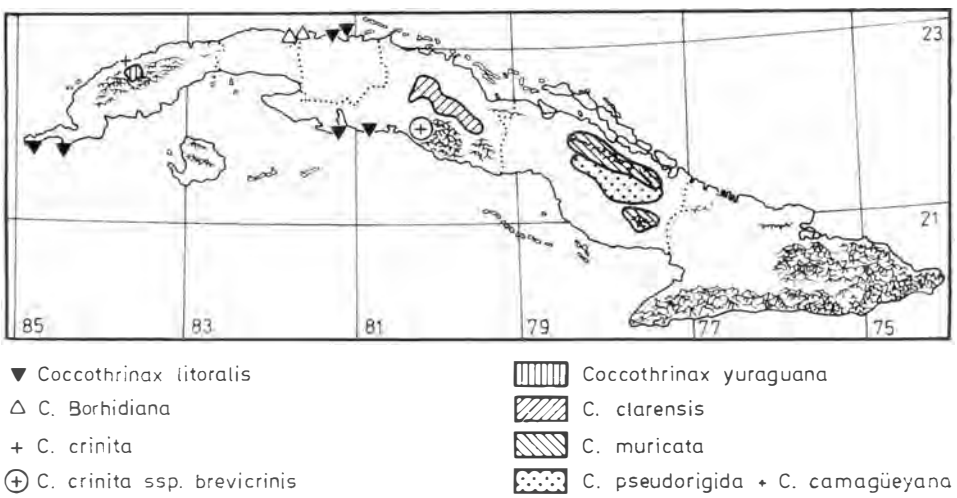

Fig. 34. Geographical distribution of the West- and Central Cuban taxa of the genus *Coccothrinax* (after BORHIDI 1973, modified)

noteworthy. Noted species of the evergreen shrubwoods are *Agave cajalbanensis*, *Moacroton trigonocarpus* (Fig. 12), *Euphorbia cubensis*, *Zanthoxylum dumosum* s. str. *Gesneria ferruginea*, *Gochnatia intertexta*, *Guapira cajalbanensis*, *Machaonia dumosa*, *Phialanthus rigidus*, and *Scolosanthus acunae*. Several floristic elements are vicariads of Nipe and Moa endemics, for example, *Lescaillea — Harnackia* (Fig. 10), *Euphorbia cubensis — E. helenae*, *Moacroton trigonocarpus — M. lanceolatus* (Fig. 12), *Anemia cajalbanica — A. coriacea* (Fig. 11), and *Helicteres trapezifolia — H. nipensis*. Isolated populations of several species may also be encountered in the serpentine areas of central Cuba, e.g., *Ottoschmidtia dorsiventralis*, *Anemia cajalbanica*, *Harpalyce cubensis* (Matanzas), *Acunaeanthus tinifolius*, *Leucocroton revolutus*, *Linodendron venosum*, *Coccothrinax crinita* (Macizo de Guamuhaya).

The coastal belt at Toscano Playa Morrillo originally had a highly specialized flora. The present vegetation, however, is strongly degraded and an endemic genus (*Phyllacanthus*) and 19 endemic species, e.g., *Maytenus lineata*, *Heptanthus brevipes*, *Ilex ternatiflora*, *Mimosa apleura*, *M. catalinae*, *Calycogonium microphyllum*, *Randia cubana* and *Calyptranthes gracilipes*, etc., have not been collected here for a long time.

d. Vegetation: On the rocky soil of the steep slopes and cliffs evergreen shrubwoods, whereas on the hilltops *Pinus caribaea* forests grow. In the valleys wet coniferous gallery forests with ferns, palms and *Odontosoria wrightiana* are found. In the lowland areas semideciduous forests, serpentine shrub woods, and mangrove vegetation grow.

District A.3.3.: Sierra del Rosario (Rosariense)

a. Geography: Mountainous formations composed primarily of upper Jurassic limestone and, to a lesser extent, of sandstone, gneis and others. Serpentine intrusions often reach the surface forming more or less extensive patches. Two parallel ranges reach the altitude of 5–600 m, some peaks (Monte Toro, Peña Blanca, Piedra Calzada, Pan de Guajaibón) are elevated over 600 m. The relief is highly varied. Tropical brown soils predominate but there are also yellow quartz-allitic soils on sandstone, red ferallitic soils on serpentine and tropical rendzina on limestone.

b. Climate: Tropical climate with 1–2 months long dry winter. In the central basin, particularly in the east, humid rainforest climate occurs, rainy throughout the year.

c. Flora: Rich and diverse, thanks to the high geological variability of the mountains. On the serpentine outcrops the plants of the Cajalbana Mts. and its vicinity occur, for example, *Phyllomelia coronata*, *Malpighia wrightiana*, *Rondeletia chamaebuxifolia*, *Eugenia rigidifolia*. Some species of slatey heights, e.g., *Pinus caribaea*, *Quercus oleoides* ssp. *sagraeana* and *Byrsonima pinetorum*, occur in the sandstone areas, whereas several plants from the karsts of Sierra de los Organos (*Siemensia pendula*, *Gaussia princeps*, *Auerodendron acuminatum*) are found on limestone rocks. The exclusive endemics are relatively few in number, totalling about 25. Examples are *Pilea bullata*, *Zanthoxylum ekmanii*, *Z. organosium*, *Banara acunae*, *Daphnopsis guacacoa*, *Lagetta wrightiana*, *Plinia recurvata*, *Myrtus sagraei*, *Myrcia valenzuelana*, *Pachyanthus tetramerus*, *Mouriri valenzuelana*, *Henriettea granularis*, *Cordia valenzuelana*, and *Gochnatia ekmanii*. Four local endemics are known from Pan de Guajaibón, namely *Gesneria brevifolia*, *Piper perditum*, *Psidium nummularia* and *Tetrazygia lanceolata*.

d. Vegetation: Originally seasonal evergreen tropical forests were predominating. Most of the native vegetation was replaced by coffee plantations in the second half of the last century, but these fields have became abandoned resulting in degraded, secondary forests. Below the peak of Pan de Guajaibón developed a small stand of montane rainforest. On the southern slopes and the foothills semi-deciduous forests grow. The mogotes are covered by deciduous shrubwoods, whereas on the sandstone outcrops pinewoods and mixed pine-oakwoods are found. The serpentine areas are covered by microphyllous thorn scrubs.

SUB-PROVINCE B: CENTRAL CUBA (CENTRO-CUBANICUM) (Fig. 37)

The plains, isolated mountains and hills of central Cuba are included in this sub-province which extends from Bahia Honda and the Rosario Mountains in the west to the Cauto basin and the Central Valley of Oriente in the east, reaching the feet of Sagua-Baracoa and Sierra Maestra. This area has been a contiguous land mass since the end of the Pliocene only. Before that period, the terrestrial plants were scattered over the extensive archipelago of limestone mountains and cliffs. The plants of the plain of central Cuba originated primarily from the mountains of Oriente, and also from Pinar del Rio. This view is supported by the fact that the plains are poor in exclusive endemics most of which being local or vicariant endemics. Those distributed all over the area, partly serpentine plants partly coastal elements, are in common with western or eastern Cuba or both nearly without exception. The landscape and the vegetation are characterized by dominant Antillean, Caribbean and Neotropical species that are also found elsewhere. Being most abundant, however, these plants may be considered as the most typical species of the area.

Of the serpentine endemics *Neobracea valenzuelana* (Fig. 9), *Phyllanthus orbicularis* (Fig. 8), *Annona bullata*, *Calliandra pauciflora*, of the mesophilous forest species *Ficus subscabrida*, *F. combsii*, *Coccoloba retusa*, *Tabernaemontana amblyocarpa*, *Espadea amoena*, *Casasia calophylla* and *Guettarda calyptrata* are mentioned here.

Pan-Cuban endemics of the dry shrublands and coastal communities are *Belairia mucronata*, *Oplonia tetrasticha*, *Randia spinifex*, *Platygyne hexandra* and *Gastrococos crispa* (Fig. 35), etc.

Further characteristic elements of the landscape are non-endemics, such as *Roystonea regia*, *Ceiba pentandra*, *Bucida buceras*, *Cecropia peltata*, *Samanea saman*, *Croton lucidus*, *Eugenia maleolens*, these are the most common in this area. In addition, species whose dispersal is facilitated by human activity are *Comocladia dentata*, *Glyricidia sepium*, *Dichrostachys cinerea* and *Rhynchelytrum roseum*. In the floristic sub-province of Central Cuba 21 endemic Cuban genera occur, seven being confined to this area. Of these *Megalopanax*, *Euleria* and *Rhodogeron* have a local distribution pattern, and only 4 genera, *Gastrococos*, *Behaimia*, *Henleophytum* and *Chaetium*, have been widely distributed all over the area, although the role of the latter ones in the vegetation is negligible. There are only about 25–30 non-local endemics characterizing this sub-province although their distribution extends a little to the neighbouring areas (e.g., on the southern coast of Oriente). Examples are *Andropogon multinervosus*, *Scleria*

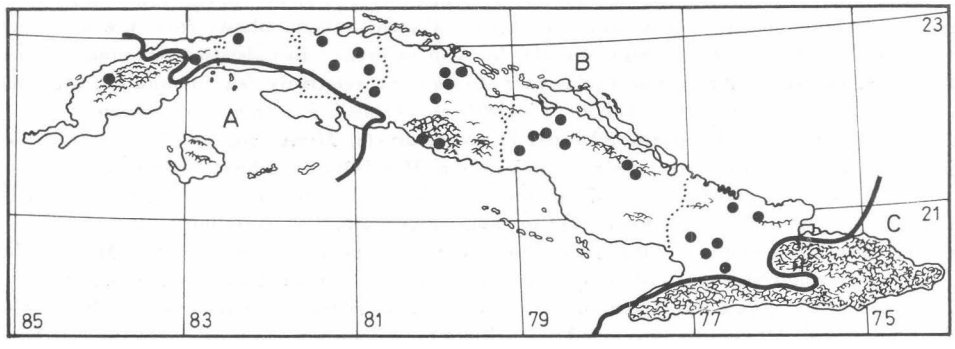

Fig. 35. Geographic distribution of *Gastrococos crispa* (after SAAKOV 1970, modified)

havanensis, Agave legrelliana, Copernicia macroglossa, C. baileyana (Fig. 36), *Coccothrinax miraguama* p. maj. p., *Behaimia cubensis, Piscidia cubensis, Malpighia nummulariifolia, Byrsonima motembensis, Leucocroton moncadae, L. havanensis, Chamaesyce paucipila, Tabebuia lepi-*

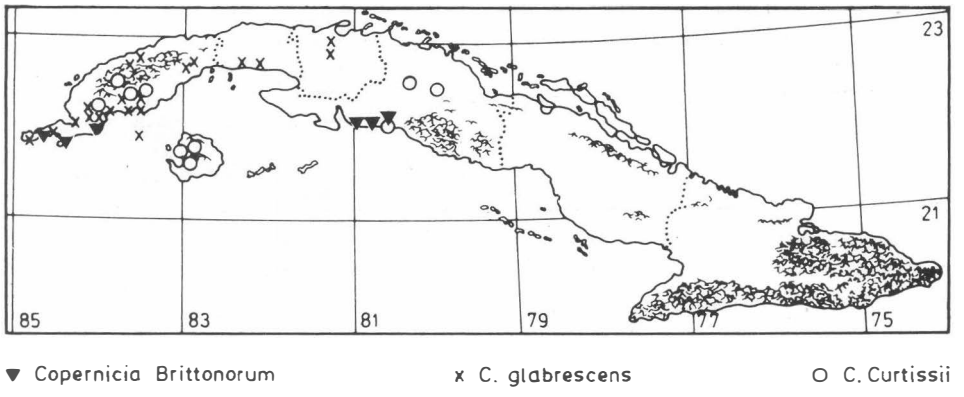

Fig. 36. Geographical distribution of the West-Cuban taxa of the genus *Copernicia* (after DAHLGREN and GLASSMAN 1963, modified)

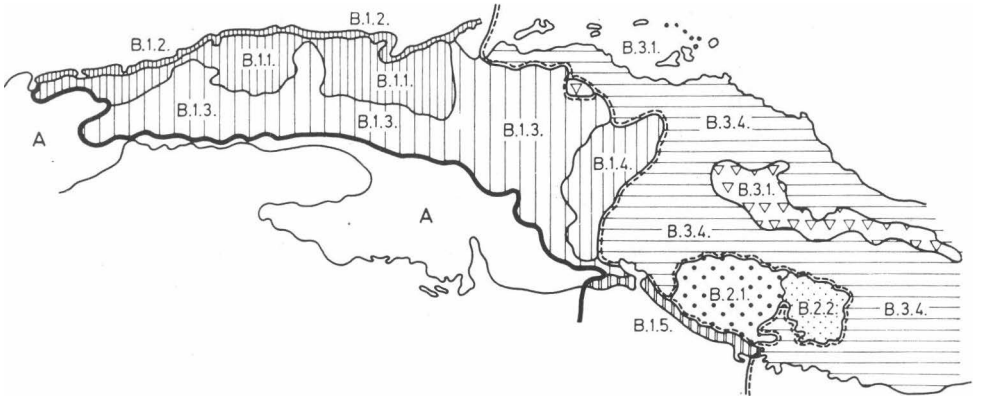

Fig. 37. The phytogeographical subdivision of the western part of the Central Cuban subprovince

B.1. Sector: Western Central Cuba (*Havanicum*)
B.1.1. District: *Jarucoënse*
B.1.2. District: *Havanense*
B.1.3. District: *Güinense*
B.1.4. District: *Cascajalense*
B.1.5. District: *Casildense*

B.2. Sector: The Guamuhaya Massif of Escambray (*Trinidadicum*)
B.2.1. District: *Trinidadense*
B.2.2. District: *Spirituënse*

B.3. Sector: Eastern Central Cuba (*Camagüeyicum*)
B.3.1. District: *Claraënse*
B.3.4. District: *Saguënse*