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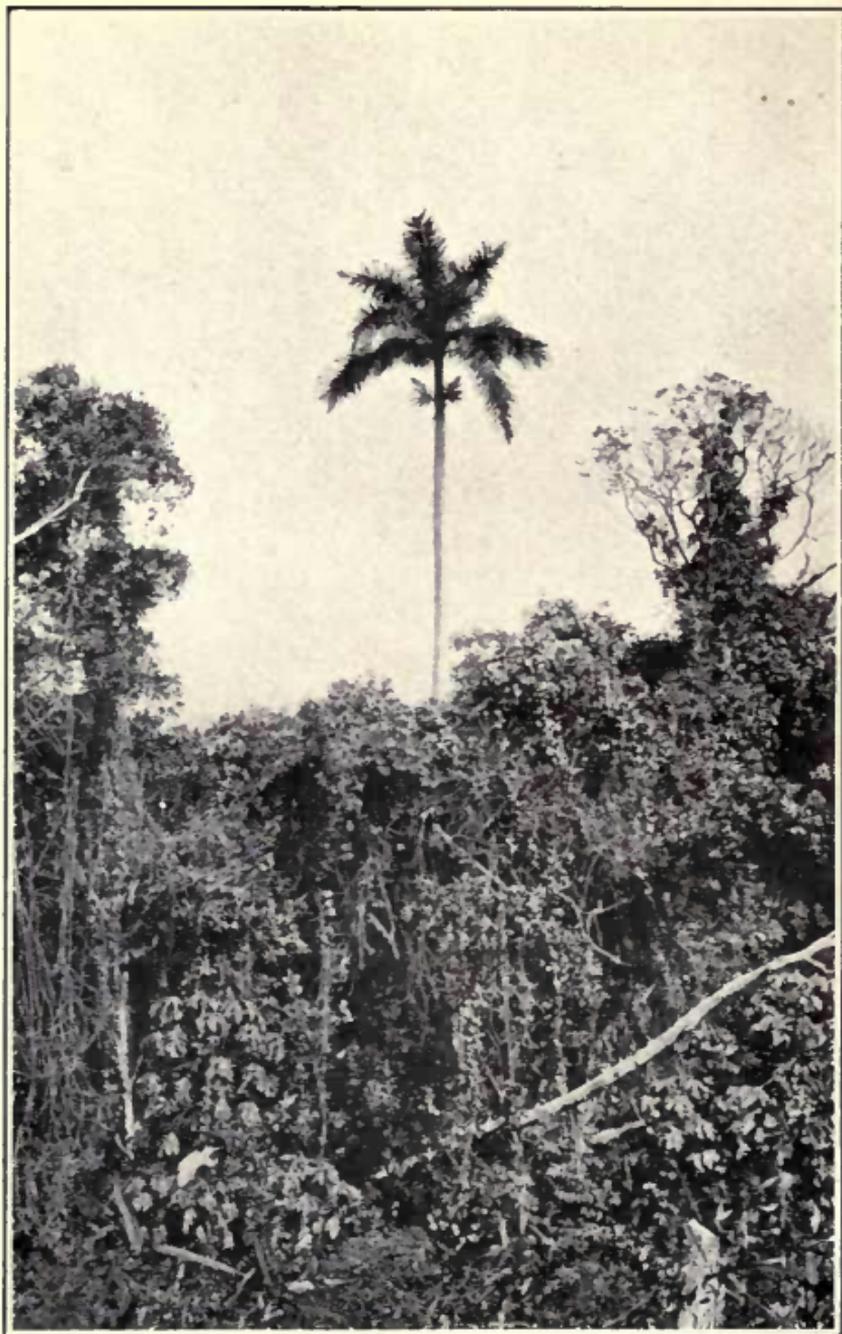


PLATE 1. In Royal Palm Hammock. Dense jungle in foreground. Tall royal-palm, in flower, in background.

FERNS
OF
ROYAL PALM HAMMOCK

DESCRIPTIONS AND ILLUSTRATIONS OF
THE FERNS AND FERN-ALLIES
GROWING NATURALLY

IN
ROYAL PALM HAMMOCK
AND
THE ADJACENT EVERGLADES

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PREFACE 1918

The southern part of the Everglades is dotted with myriads of clumps of shrubs and trees which lie on either side of a chain of rock islands which constitute the Everglade Keys.¹

The two natural divisions of this chain of islands, the Biscayne pineland and the Long Key pineland, are separated from each other by a distance of about three miles. The larger or eastern group takes its name from Bay Biscayne which washes the shores of one of the islands for a distance of about fifteen miles. The smaller group takes its name from Long Key, the largest island of the western group. The intervening Everglades contain a number of sloughs which represent the upper reaches of an unmapped river that flows southward and empties into the Bay of Florida. Among the forks and sloughs of this river are many wooded islands. Most of the islands are small; but one of them is larger than many of the others put together, and it stands out so prominently in the landscape that it may be seen across the

¹The word key (Spanish *cayo*, English *cay*) primarily applied to islands along the coast in and near Spanish-speaking countries, largely replaces the use of the word "island" in southern Florida, and by the inhabitants is applied to islands in the Everglades as well as to the islands of the coast and reef of Florida.

prairie for a distance of more than ten miles. It lies a little south of the main axis of the Everglade keys, and is called Royal Palm Hammock.¹ The island received its name from the most conspicuous element of the vegetation, this consisting of scores of royal-palms, many of which tower above the tops of the other forest trees.

When settlers entered southern Florida in the latter half of the last century, the Seminole Indians told them of an island far away in the Everglades with large palms growing on it. However, as far as we know, it was not visited by the white man until 1882, and after that date not again until 1893. It was not until about the beginning of 1904 that the botanical exploration of the island and the contiguous region was undertaken.²

Royal Palm Hammock is nowhere duplicated. It is quite different from the high pineland and the low pineland hammocks of the Everglade Keys. It is an Everglade hammock, but it is much the largest one of all. It differs from the others not only in size, but also in the relatively high rock floor which supports a more extensive and varied flora than is found on the other islands of this kind. The hammock has been protected from fire by the surrounding water in

¹ A hammock—the word probably of Indian origin—is a dense growth of mostly broad-leaved shrubs and trees, thus giving shade, in a pine forest or on a prairie. The use of the word is confined mostly to Florida and adjacent states. It was formerly confused with the word hummock.

² For a more complete history of the hammock see *Journal of the New York Botanical Garden* 17: 165-172.

the Everglades, or by damp sloughs in periods of dry weather.

Royal Palm Hammock exhibits an interesting reversal of the normal phytogeographic conditions of the region. On the Everglades Keys we have extensive pinelands. These surround, here and there, small areas of hammock growth. Royal Palm Hammock is, as the word hammock means, a dense growth of broad-leaved shrubs and trees; but, the wind during hurricanes, or perhaps in less violent storms, carried seeds from the pine trees growing in distant pinelands, and dropped them in spots where the jungle was less dense than that covering most of the area. Thus, in open and otherwise favorable spots, pine-trees have sprung up. Consequently here and there we find areas of pineland in a hammock. These areas of pine-woods are small, but they are characteristic, and they even support a growth of the saw-palmetto which is nearly always present in the pine-woods on the Everglade Keys. The seeds of the latter plant were not, however, carried there by the wind; but by animals, most likely by the bear, which up to a few years ago was very abundant throughout that region.

Perhaps, if the surface of Royal Palm Hammock had been slightly higher, and the surrounding Everglades without wet sloughs and the natural protection from prairie-fires thus wanting, the hammock would long ago have been transformed into a pine island, nearly or quite devoid of hammock.

The vegetation, both herbaceous and woody, has had nearly uninterrupted growth for ages. This condition, perhaps, accounts for the continued presence of the royal-palms. The decaying leaves, the large inflorescences, and the fruits, falling at the very base of the palm, on account of the unbranched trunk, form mounds of humus larger and higher than do any of the hardwood trees with their widely spreading branches. Upon such a gradually increasing mound a gigantic palm, is, from year to year, raised higher and higher on humus formed from its own tissues. These mounds of humus would furnish ideal fuel, and the palm, although able to resist fire above the roots, could not exist, or even stand up, if the humus were burned away. As it is, it seems nothing short of a miracle that the slender trunks over one hundred feet tall with the massive crown of leaves and spadices can withstand the winds of ordinary storms, not to mention hurricanes.

The accumulated mass of decaying vegetable matter and the humus from both the palms and the broad-leaved shrubs and trees forms the foundation for a remarkably luxuriant growth of ferns, shrubs and trees. Herbaceous flowering plants are only slightly represented.

Botanical exploration up to 1918 has revealed about two hundred and fifty kinds of plants growing naturally on the key. Sixty-odd of these are flowerless plants, viz.: mushrooms 18, lichens 6, liverworts 13, mosses 11, and ferns 15. The remaining one hundred

and eighty kinds are flowering plants. Of these more than one hundred and sixty-five are native species, while the others have been recently introduced.

The eighteen ferns of the hammock fall into five natural families. One species, the royal-fern, is almost cosmopolitan. Another species, the chain-fern, is typical of the lower Atlantic coastal plain and otherwise occurs only in Bermuda. The remainder of the species are typically, if not strictly, tropical kinds. All, except two species, are generally distributed in the forest, and a few occur in luxuriance not duplicated elsewhere in southern Florida.

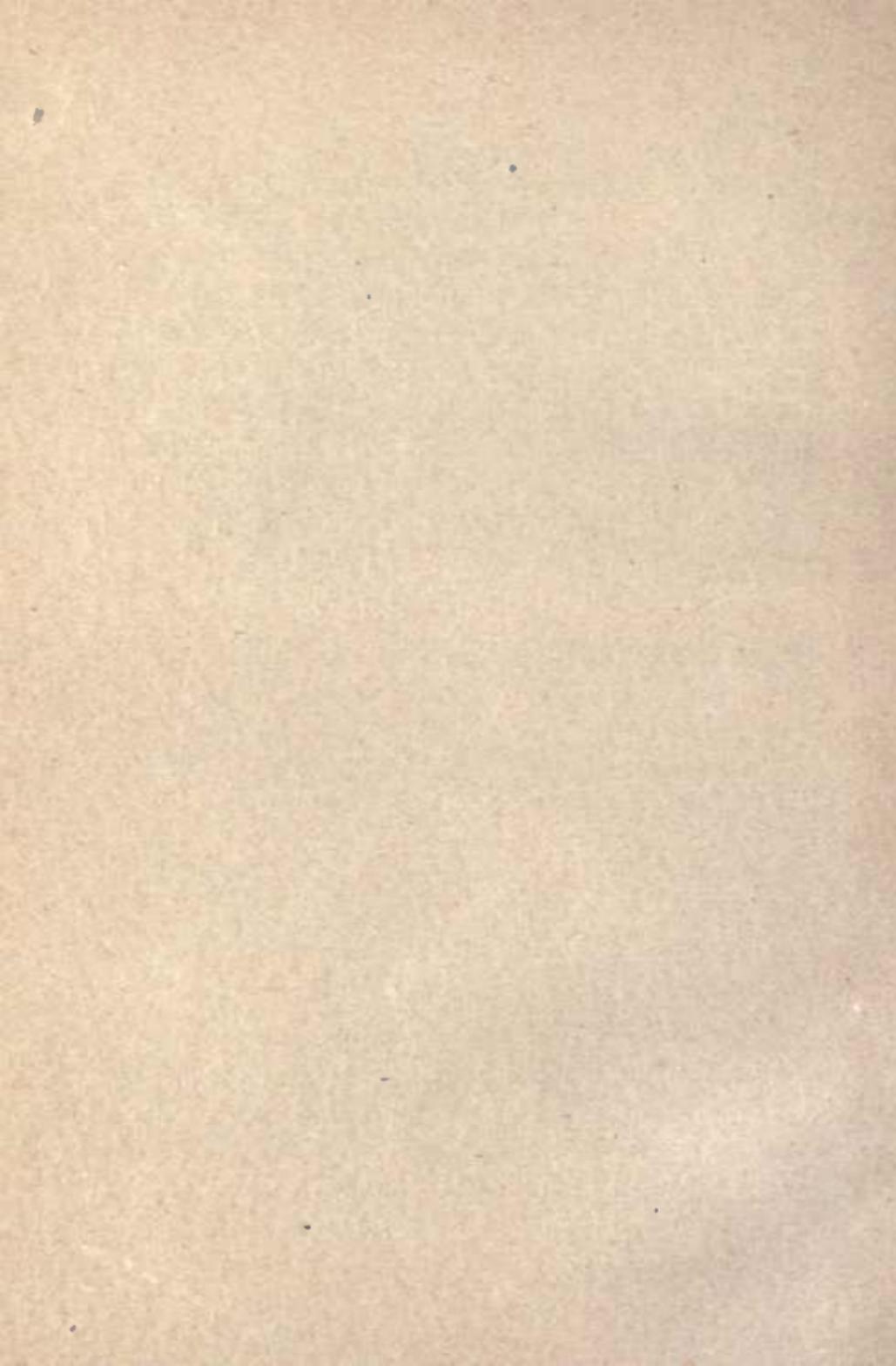
J. K. SMALL.

THE NEW YORK BOTANICAL GARDEN,
November 1, 1918.

NOTE

The descriptions and figures on the following pages are from my "Ferns of Tropical Florida," published May 28, 1918.

The habitat or habitats in southern Florida is given after the description of each species.



DESCRIPTIVE FLORA

SUBKINGDOM PTERIDOPHYTA

FERNS AND FERN-ALLIES

Plants containing woody and vascular tissues. They produce spores asexually, each of which, on germination, develops into a prothallium or a small thalloid body (gametophyte). The prothallia bear the reproductive organs; the female organ is known as an archegone, the male as an antherid. As a result of the fertilization of an egg in the archegone by a motile spermatozoid produced in the antherid, the asexual state of the plant is developed (sporophyte); this phase is represented by and popularly known as a fern, a lycopod, or a quillwort.—About 6000 species of living ferns and fern-allies are known. Several thousand fossil species have been discovered. A great majority of the living forms grow naturally in tropical regions. Eighteen species are known to occur in Royal Palm Hammock, and thirty-three additional kinds have been found in the neighboring

regions, while over one hundred species of ferns have been found growing naturally in Florida.

KEY TO THE ORDERS

- Leaves with broad or narrow, entire, toothed, or dissected blades.—Fern-like plants. Order 1. FILICALES.
 Leaves scale-like or subulate.—
 Brush-like plants or rush-like plants. Order 2. LYCOPODIALES.

Order 1. FILICALES

Terrestrial or epiphytic, or in one family aquatic, plants, various in habit. Sporangia developed normally from single epidermal cells, variously disposed, mainly upon the under surface of the leaf, commonly in clusters (sori) upon the veins, or within special marginal indusia; or, less commonly, irregularly or in rows upon slender more or less non-foliose pinnae or segments, often opening along a line of parallel, thickened cells, called the ring. Spores of one sort. Indusia various in form, or wanting. Prothallia flattish or filamentous, green, terrestrial or epiphytic.—Includes several families, four of which occur in our range.

KEY TO THE FAMILIES

- Leaves with filmy translucent blades: sporangia sessile on a filiform receptacle. Fam. 1. HYMENOPHYLLACEAE.
 Leaves with herbaceous or leathery blades: sporangia on normal or modified leaf-blades.
 Sporangia in panicles or spikes developed from modified leaves or parts of leaves.
 Sporangia nearly globose, with a rudimentary ring. Fam. 2. OSMUNDACEAE.

- Sporangia ovoid or pyriform, with a complete apical ring. Fam. 3. SCHIZAEACEAE.
 Sporangia borne on the back or margin of a leaf-blade. Fam. 4. POLYPODIACEAE.

FAMILY 1. HYMENOPHYLLACEAE

FILMY-FERN FAMILY

Delicate or dainty, mostly matted small ferns with filiform or slender creeping or suberect rootstocks. Leaves often numerous and crowded: blades very thin, entire, erose, toothed, or usually much divided, the leaf-tissue pellucid, usually consisting of a single layer of cells. Sporangia sessile upon a filiform usually elongate receptacle within an urceolate, cup-like, or tubular, either truncate or 2-lipped marginal indusium which arises at the tip of a vein; ring complete, transverse, opening vertically.—There are two genera in the filmy-fern family, the following and *Hymenophyllum*. The latter, common throughout wet tropical regions, has not yet been found within the United States.

1. TRICHOMANES L.

Plants extensively creeping, often densely matted, terrestrial or epiphytic. Leaves remote or close together on the rootstock: blades entire, lobed, or pinnatifid, or several times pinnately divided, or flabellate. Indusium tubular or funnel-form, truncate or sometimes broadly 2-lipped, the sporangia mostly upon the lower portion of the slender often exserted receptacle.—Two species occur on the adjacent Everglade Keys and another has been found in northern Florida. An additional species is found in Georgia, Alabama, and Mississippi.—(FILMY-FERN.)

1. *T. punctatum* Poir. Terrestrial, or rarely epiphytic, very fragrant: rootstocks matted, very slender, finely and softly radiculose: leaves 0.8–2 cm. long; blades flabellate, cuneate, obovate, or orbicular-obovate, with a cuneate base, 3–8 mm. wide or sometimes wider, slender-petioled, incised or incised-lobed, the margins with stellate hairs: indusia solitary or few, usually partly immersed and often narrowly winged, 1.5–2 mm. long.—Edges of lime-sinks or on moist rocks in dense shade.—Figure 1, natural size.



This filmy-fern is almost always terrestrial. It occasionally occurs on the bases of tree-trunks about lime-sinks where this fern is in abundance. It occurs either in small patches or as dense carpets, sometimes entirely lining the perpendicular sides of the sinks. In Royal Palm Hammock it grows sparingly only in the upper part of the island. It was first found in Florida in 1901 in Snapper Creek Hammock. Since then it has been found in several of the pineland hammocks. The species is common in tropical America.

FAMILY 2. OSMUNDACEAE

CINNAMON-FERN FAMILY

Tall leafy terrestrial plants, with creeping or sub-erect rootstocks. Leaves erect or spreading: petioles winged at the base: blades 1- or 2-pinnate. Veins free, mostly forked, extending to the margins of the leaflets. Sporangia naked, large, globose, mostly stalked, borne on modified contracted leaflets, or in clusters (sori) on the lower surface of the leaflets, opening in 2 valves by a longitudinal slit: ring few-celled or wanting. Prothallia green.—There are three genera in this family: the following, and two others in the Old World.

1. OSMUNDA L.

Leaves in large crowns, erect, from a thickened root-stock: blades once-pinnate or twice-pinnate, some wholly



or some partly spore-bearing, the spore-bearing blades or leaflets very much contracted and devoid of chlorophyl. Sporangia short-stalked, thin, reticulate, opening in halves, a few parallel thickened cells near the apex representing the rudimentary transverse ring. Spores copious, greenish.—Besides the following, two other species grow in Florida and four or five additional ones in other parts of the world.

1. *O. regalis* L. Leaves clustered, 6–20 dm. tall: blades 2-pinnate; leaflets 1.5–5 cm. long, the blades

elliptic-ovate, or lanceolate-elliptic, serrulate and sometimes crenately lobed near the base, sessile or slightly stalked. Spore-bearing portion of the leaf terminal, panicle-like, the segments linear-cylindric, greenish before maturity, red-brown or dark-brown and withering with age.—(ROYAL-FERN. FLOWERING-FERN.)—Wet and moist grounds, in and about low hammocks.—Figure 2, reduced.

The royal-fern is most common in and about the Everglade hammocks, and especially in cypress swamps and cypress-heads, where it often forms upright tussocks half a meter high or more. In Royal Palm Hammock the royal-fern is most common around the low edge of the forest; however, it occurs in low places within the hammock. Sometimes it grows in the open Everglades, especially near streams and sloughs, often occurring in colonies an acre in extent. The species occurs throughout Florida, and is almost cosmopolitan in its distribution, excepting boreal regions.

FAMILY 3. SCHIZAEACEAE

CURLY-GRASS FAMILY

Erect and rigid or climbing plants, sometimes tufted. Leaves with simple, pinnate, or dichotomous and palmate-lobed blades. Sporangia borne in double rows on narrow specialized lobes or segments of ordinary leaves or wholly on specialized leaves, ovoid, sessile, naked or indusiate, provided with a transverse apical ring, opening vertically by a longitudinal slit. Prothallia green.—Comprises six or more genera. Besides the following another (*Lygodium*) is represented in Florida.

Sporophyls borne on specialized leaves: leaves with simple grass-like, angled, or flattish blades. 1. ACTINOSTACHYS.

Sporophyls borne on the elongate pinnae of ordinary leaves: leaves with pin-

nately compound blades.

2. ANEMIA.

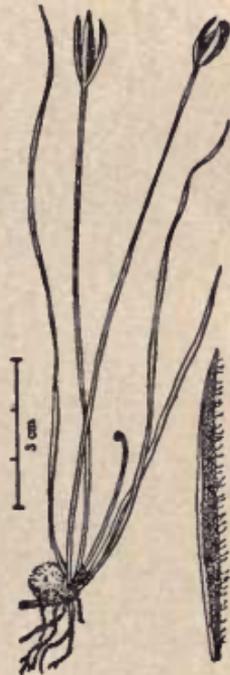
1. ACTINOSTACHYS Wall.

Epiphytic, low, sometimes tufted, often humus-plants. Leaves erect; blades simple, linear, triquetrous or flat-

tish. Sporophyls erect: segments terminal in a penicillate tuft, spuriously digitate. Indusium continuous, formed of the narrowly reflexed margin of the leaf-segment.—Represented in the United States by the following species:

1. *A. Germani* Fée. Leaves rigidly erect, 1 or several from a bristly tuber usually buried in rotten wood, borne upon a slender chestnut-brown rootstock, 5–15 cm. long, about 1 mm. in diameter, triangular or flattish in drying: spore-bearing segments linear, 1–4 pairs, 8–15 mm. long, the sporangia in 2 rows, often appearing in 4's from crowding, the mid-vein pilose.—Low hammocks.—Figure 3, reduced.

This relative of the northern curly-grass has been found but twice in Florida. It was discovered in low hammocks about the headwaters of the Miami River in 1904. About a decade later it was found on Royal Palm Hammock, where it occurred very sparingly in the northern part of the forest. It grows in decaying wood, sometimes in stumps over a meter from the ground. Outside of Florida it is known only in the West Indies.



2. *ANEMIA* Sw.

Terrestrial erect plants, with creeping or ascending rootstocks. Leaves (in our species) with the lowermost pair of leaflets (sporophyls) of some of the blades

skeleton-like, non-foliose, greatly elongate, erect, often overtopping the rest of the blade, and bearing numerous panicles of sporangia in 2 rows on the back of very narrow divisions.—A tropical genus of several dozen species. Besides the following, another occurs in western and southern Texas.

1. *A. adiantifolia* (L.) Sw. Plants 1 m. tall or usually less: leaf-blades triangular-ovate, 12–30 cm. long, on usually elongate petioles, slightly pubescent, pinnately decomposed; ultimate segments obovate or cuneate, striate above with numerous flabellate veins: panicles of the sporophyll ascending or erect, tan or brown, hairy on the back, continuous or slightly interrupted.—Dry pine-lands and hammocks. Showing much variation in size and proportions.—Figure 4, reduced.



This fern is more common in pinelands than in the hammocks, but it usually grows two or three times as large in hammocks.

In Royal Palm Hammock it is rather widely distributed; but it is more abundant in the southern and higher parts of the forest.

It seems to have been first collected in Florida in the early part of the last century on Key West and on Big Pine Key. Insular and continental tropical America are also inhabited by this fern.

FAMILY 4. POLYPODIACEAE

FERN FAMILY

Terrestrial, epiphytic, or aquatic plants. Root-stocks elongate, creeping or horizontal, or short and erect. Leaves sometimes dimorphous, coiled in veneration, erect, spreading, or pendulous: blades simple, once-pinnatifid or several times pinnatifid or pinnate, or decomposed. Sporangia borne either promiscuously or in clusters (sori) on the lower side or margins of the leaf-blades, stalked, provided with an incomplete vertical ring of thickened cells, opening transversely. Sori either with or without a membranous covering (indusium). Prothallia green.—The largest of the families of ferns. It includes nearly one hundred and fifty genera and nearly five thousand species. It is represented in arctic, temperate, and tropical regions.

Spore-bearing leaflets densely clothed with masses of sporangia.

I. ACROSTICHEAE.

Spore-bearing leaflets, or leaf-segments, with sporangia borne in separated sori.

Indusia wanting.

Sori broad, circular or nearly so, or elliptic, not marginal.

II. POLYPODIEAE.

Sori linear, in continuous or interrupted marginal or intramarginal lines.

III. VITTARIEAE.

Indusia present.

Sori marginal or essentially so: indusium formed in part of the more or less modified leaf-margin.

Sporangia borne on a continuous vein-like receptacle connecting the apices of the veins.

IV. PTERIDEAE.

Sporangia borne at or near the apices of unconnected veins.

V. ADIANTEAE.

Sori not marginal, dorsal: indusium not formed in part of the leaf-margin.

Sori narrow, linear to elliptic: indusium more than thrice as long as broad.

VI. BLECHNEAE.

Sori broad, roundish or reniform: indusium less than twice as long as wide.

Sori mostly on the backs of the veins: indusia attached at or near the middle, opening all around: leaf-blades simple or compound, the leaflets not articulate, persistent.

VII. DRYOPTERIDEAE.

Sori terminal on the veins: indusia attached at the side, opening laterally, mostly towards the margin of the leaflet: leaf-blades once-pinnate, the leaflets articulate and deciduous.

VIII. NEPHROLEPIDAE.

I. ACROSTICHEAE.

Erect plants with entire leaflets.

1. ACROSTICHUM.

II. POLYPODIEAE

Veins free: leaf-segments usually numerous.

2. POLYPODIUM.

Veins anastomosing: leaf-segments few or leaf-blades entire.

Leaf-blades broad, pinnatifid.

3. PHLEBODIUM.

Leaf-blades narrow, elongate, not pinnatifid, essentially entire.

4. CAMPYLONEURUM.

III. VITTARIEAE

Veins obscure, forming a single row of areolae without included veinlets.

5. VITTARIA.

IV. PTERIDEAE

Indusium double, an inner membranous portion arising from the receptacle: leaf-blades more than twice-pinnate.

6. PTERIS.

V. ADIANTEAE

Leaves pinnately or pedately compound, the leaflets very oblique. 7. ADIANTUM.

VI. BLECHNEAE

Blades of the leaflets or leaf-segments entire or toothed: veins free, or in spore-bearing leaflets connected near their bases by a transverse continuous receptacle: sori continuous or nearly so. 8. BLECHNUM.

Blades of the leaflets pinnatifid: veins anastomosing near the midrib: sori interrupted, chain-like. 9. ANCHISTEA.

VII. DRYOPTERIDAE.

Veins copiously and irregularly anastomosing, the areolae irregular: sori separated. 10. TECTARIA.

Veins free or those of the lower one or two pairs joined and running to the sinus. 11. DRYOPTERIS.

VIII. NEPHROLEPIDAE

Epiphytic or terrestrial plants: leaves long and narrow, often greatly elongate: leaflets numerous; blades toothed: indusia reniform or orbicular-reniform. 12. NEPHROLEPIS.

1. ACROSTICHUM L.

Tall coarse marsh-plants or swamp-plants. Leaves on the short or somewhat elongate rootstock: petioles smooth or with several pairs of spur-like spines: blades pinnate, on stout petioles; leaflets leathery, the blades thick, entire or obscurely toothed, flat, erect or spreading. Veins anastomosing, forming copious minute areolae without free veinlets. Sporangia very numerous, thickly covering the entire lower surface of all the leaflets or of the upper leaflets only, with a red or brown felt-like coating.—About five species, widely distributed in the tropics. A species, *A. aureum*, additional to the following, occurs in the nearby coastal region.

1. *A. excelsum* Maxon. Leaves closely tufted, ascending or erect, stiff, 1.5-4 m. tall. petiole unarmed, stout, deeply furrowed; blade much longer than the petiole; leaflets usually numerous, the blades thick, lanceolate to linear-lanceolate, the larger ones mostly 2-3 dm. long, sometimes more, deep-green, stiff, approximate or imbricate, short-stalked; areolation fine, slightly oblique to the mid-rib: sporangia covering the lower surface of all the leaflets of the spore-bearing leaves.—(LEATHER-FERN.)—Fresh-water marshes, low prairies, and wet hammocks.—Figure 5, reduced.



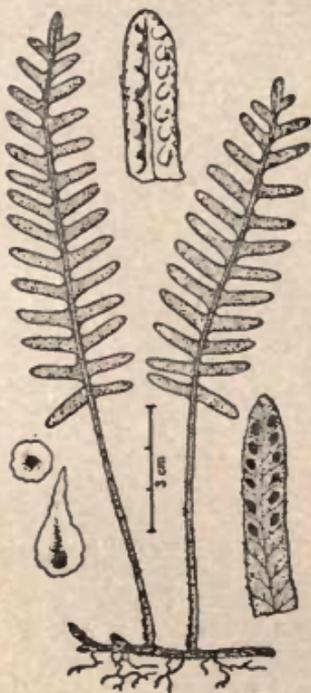
This fern as far as mass is concerned has the largest leaves of any of our fern-plants. In favorable localities leaves often measure nearly four meters in length.

Away from the influence of salt-water it reaches its greatest development, both in size and quantity. In the prairie-like outlets of the Everglades and far north about Lake Okeechobee areas acres in extent are covered with a magnificent growth of this fern. The tangled masses of rootstocks and the close-set stout leaf-stalks make these thickets almost impenetrable. It thrives best in places fully exposed to the sun. In Royal Palm Hammock it is common among the shrubbery around the edge of the hammock and it also occurs more sparingly in the low places in the forest. This plant is common in insular and continental tropical America, and was discovered in Florida in the earlier half of the last century. Besides occurring in our range it extends northward into the lake region of peninsular Florida.

2. POLYPODIUM L.

Low epiphytic or terrestrial wood-plants. Leaves erect or spreading on horizontal or creeping rootstocks, to which the petioles are jointed: blades simple to several times pinnatifid or pinnate, the segments thin or leathery, entire or toothed. Veins free or only casually anastomosing. Sori orbicular, borne in one row or in several rows on the back of the leaf-blade on either side of the midrib or on the back of the leaf-segment on either side of the midrib. Indusium wanting.—There are several hundred species known in this genus, widely distributed in temperate and tropical regions. Two other species grow on the adjacent Everglade Keys.

1. *P. polypodioides* (L.) A. Hitchc. Rootstock elongate, widely creeping, slender: leaves scattered along the rootstock, bright-green, or grayish when dry, 0.5–2.5 dm. long; petioles copiously scaly, slender; blades lanceolate to elliptic, or sometimes elliptic-ovate, as long as the petioles or longer, the segments linear to narrowly elliptic, entire or undulate, sparingly scaly above, densely scaly beneath, the scales dark-centered: veins very obscure, forking: sori near the margin, in pocket-like depressions which protrude on the upper side of the leaf, mostly oval, 1.5–2 mm. long. — (RESURRECTION-FERN.) — Hammocks. Figure 6, reduced.



The resurrection-fern has the distinction of being the most abundant and common of the

small ferns of the hammocks in southern Florida. In dry weather the leaves shrivel, shrink, and curl up, but after a rain storm or a rainy period they are restored to a perfectly fresh state, whence the common name. This fern grows in every hammock on the adjacent Everglade Keys and in many places on the Florida Keys. It occurs in abundance on the trunks and the limbs of the live-oak and on other rough-barked trees and also on dead stumps and prostrate rotting logs. On Royal Palm Hammock it is most plentiful on the limbs of the large live-oaks. It is more rare on the ground and on rocks. This plant is common in continental and insular tropical America, and extends northward in the eastern United States to Iowa and Pennsylvania. It was discovered in Florida in the eighteenth century. Sometimes it is known as scaly-polypody, tree-polypody, and gray-polypody.

3. PHLEBODIUM J. Smith

Rather coarse epiphytic plants. Leaves borne singly and spreading or drooping from a stout creeping rootstock to which the long petioles are jointed: blades broad, deeply pinnatifid, the segments thickish, entire or toothed. Veins regularly anastomosing, forming large areolae in which are included two or more free veinlets. Sori orbicular, borne on the back of the leaf-blade, a single one usually terminating a pair of veinlets. Indusia wanting.—About six species widely distributed in the tropics.

1. *P. aureum* (L.) J. Smith. Rootstock stout, creeping, serpent-like, copiously chaffy with red or red-brown scales: leaves scattered along the rootstock, 3–11 dm. long, bright-green or yellowish-green, spreading; petioles brown, smooth; blades ovate to elliptic-ovate in

outline, longer than the petioles, the segments lanceolate, elliptic-lanceolate, or linear-lanceolate, or linear when young, mostly 1-2 dm. long, entire, undulate or sometimes crisped, separated or approximate and even overlapping: areolae copious, somewhat irregular: sori in one series on each side of the midrib, about 2.5 mm. in diameter. — (SERPENT-FERN. GOLDEN-POLYPODY.) — Hammocks and adjacent pinelands.—Figure 7, reduced.



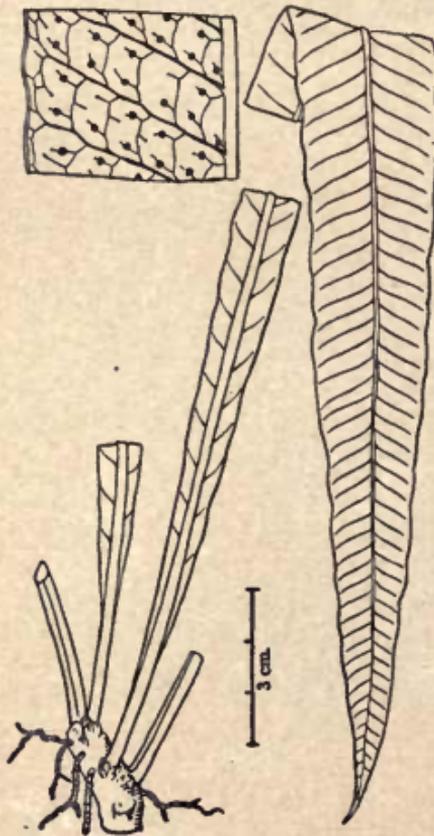
The serpent-fern is usually confined to the palmetto or cabbage-palm. Its bright-colored rootstock adheres closely to the stem of the palm, winding between and over the dead and living petiole-bases just below the crown of leaves. It occurs less frequently, on other trees and on fallen logs and even in humus on the hammock floor and on rocks; but is most common on palmettos around the edges of the hammocks, and it also grows on palmettos on the pinelands away from the hammocks. It is not plentiful in Royal Palm Hammock, but it may be met with frequently, especially in the lower part of the forest. It is widely distributed in all parts of tropical America, and was discovered in Florida in the earlier part of the last century. In Florida its range extends to the northern part of the peninsula.

4. *CAMPYLONEURUM* Presl

Rather coarse terrestrial or epiphytic wood-ferns. Leaves erect, arching, or spreading, in a crown on the

short rootstock to which the short petioles are jointed; blades narrow, elongate, entire or at least undivided, usually glossy. Lateral veins extending from the midrib to the leaf-margin, connected by curved parallel transverse veinlets which form more or less regular areolae, these containing usually 2 free veinlets. Sori orbicular, borne in 1 row or in several rows on the back of the leaf-blade on either side of the midrib on the free veinlets. Indusia wanting.—About fifty species, mostly confined to the tropics.

1. *C. Phyllitidis* (L.) Presl. Rootstock stout; leaves several together, erect or arching, 2.5–16 dm. long; blades elongate, linear and tapering to each end, shining, somewhat leathery, slightly paler beneath than above, entire or undulate, short-petioled: veins rather prominent, the areolae large: sori usually in a double row between the lateral veins. — (STRAP-FERN.) — Hammocks. — Figure 8, reduced.



The strap-fern grows nearly throughout the forest on Royal Palm Hammock, but it is more common on the higher parts of the island. It occurs also in all the hammocks of the Everglade Keys. In the high pineland hammocks it is exceedingly abundant, growing in the humus on

the hammock floor, on logs, stumps, and on tree-trunks, and high up on the branches. This fern is not as common on the Florida Keys as on the Everglade Keys, although it grows sparingly on most of the larger islands of the Florida reef. It is widely distributed in tropical America, and was discovered in Florida in the earlier half of the last century. In Florida its range extends about half way up the peninsula.

5. VITTARIA J. E. Smith

Slender, tufted, epiphytic plants. Leaves grass-like, crowded on the short rootstock, pendent; blades narrowly linear and elongate, entire, often strongly revolute. Veins obscure, forming a single row of areolae



on each side of the midrib. Sori linear, continuous in a single marginal or intramarginal groove, sometimes partly covered with the slightly produced and revolute margin of the leaf-blade. Indusia wanting.—About fifty species, natives of the tropics.

1. *V. lineata* (L.) J. E. Smith. Rootstock with short clustered branches, densely scaly: leaves many together, sometimes exceedingly numerous, densely clustered, drooping or pendent, 1–12 dm. long; blades narrowly elongate-linear, usually between 2 mm. and 3 mm. wide, smooth and shining: veins very obscure: sori borne in an intramarginal continuous groove.—(GRASS-FERN. SHOE-STRING-FERN. BEARD-FERN.) — Ham-

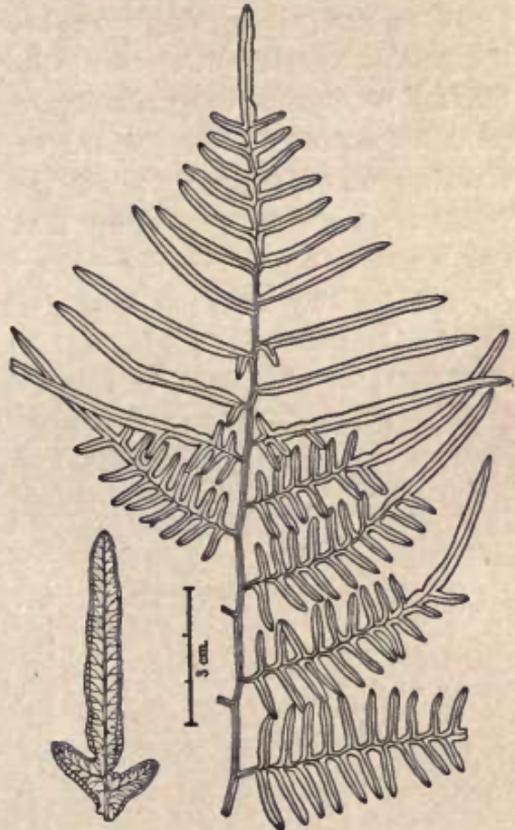
mocks, and on palmettos in the Everglades.—Figure 9, reduced.

The grass-fern or shoestring-fern, so called from the very narrow elongate leaves, is widely distributed on Royal Palm Hammock; but its growth is not as luxuriant as if the cabbage-tree were more abundant, for it is on the trunks of that palm that it seems to thrive best. This fern is common in all the hammocks of the neighboring Everglade Keys. Its distribution and habitat correspond closely to those of the serpent-fern, *Phlebodium aureum*. It is widely distributed in insular and continental tropical America, and was discovered in Florida in the latter part of the eighteenth century. Besides occurring in southern Florida this plant grows almost throughout the peninsula.

6. PTERIS L.

Coarse terrestrial plants, sometimes vine-like. Leaves borne singly along the elongate rootstocks, sometimes greatly elongate and clambering or climbing, the petiole continuous with the rootstock: blades broad, triangular or pentagonal in outline, or elongate, decomposed, the ultimate segments entire, toothed, or lobed. Veins free. Sori linear, continuous, marginal, borne on a slender receptacle which connects the ends of the free veins. Indusium double, the outer prominent, formed by the reflexed margin of the leaf-blade, the inner obscure, borne upon the vein-like receptacle and extending beneath the sporangia.—Several species of very wide geographical distribution.

1. *P. caudata* L. Rootstock elongate, stoutish, horizontal: leaves erect, spreading or reclining, 1-5 m. long or more; petioles stout, purple at the base; blades 3- or 4-times pinnate, the divisions pinnatifid, the ultimate segments narrow, usually linear, separated, often with small lobes on one or both sides of the base; veins once-forked or twice-forked: indusium brown.— (BRAKE.) — Hammocks.—Figure 10, reduced.



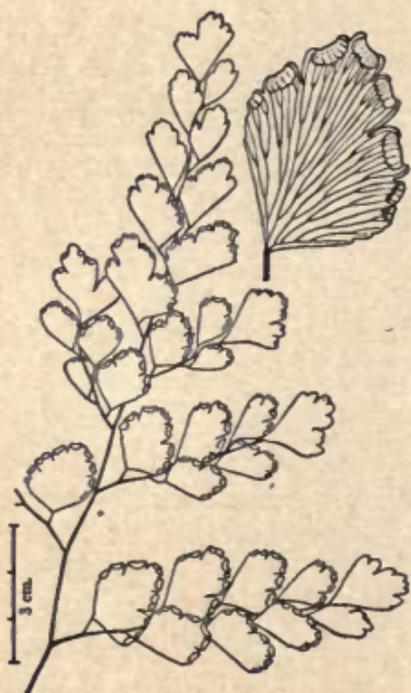
This brake is among the larger ferns of the hammock. It occurs also in nearby pine-lands; but it is

more at home in the hammocks and on their borders. It grows singly or sparingly or in great tangles, often forming large masses, to the exclusion of nearly all other vegetation. Occasionally in hammocks it acts as a vine and the leaves clamber up trees to a height of twenty feet. It was discovered in Florida, perhaps on Key West, in the earlier half of the last century. Originally discovered in the West Indies, where it is widely distributed, as it is also on the tropical mainland. It occurs in many places in the southern half of peninsular Florida.

7. ADIANTUM L.

Delicate or graceful plants of rocky situations. Leaves erect or pendulous, single or tufted on the rootstocks, the petiole and its divisions black or dark, often shining: blades pinnately or pedately compound, the leaflets sometimes prominently jointed to the rachis, the midrib wanting or marginal, veins mostly flabellate-forking, free. Sori short, appearing marginal on the back of the leaflets, borne at the ends of the veins. Indusia formed by the more or less altered and reflexed lobes of the leaflets.—About one hundred and seventy-five species, most abundant in tropical America.

1. *A. tenerum* Sw. Rootstock stout, creeping: leaves erect, several together, mostly 1 m. long or less; petioles often about as long as the blade, but sometimes shorter or sometimes longer, polished; blades deltoid or ovate-deltoid in outline, thrice-pinnate or four-times pinnate, the primary divisions long-stalked; leaflets very numerous, the blades irregularly cuneate, mostly 1-2 cm. long, with fine veins, slender-stalked, prominently jointed at the base: indusia scarcely emarginate. — (MAIDEN-HAIR-FERN.)—Hammocks.—Figure 11, reduced.



This maidenhair-fern reaches its best development in the very dense hammocks of the Biscayne and Long Key pinelands, with much eroded floors.

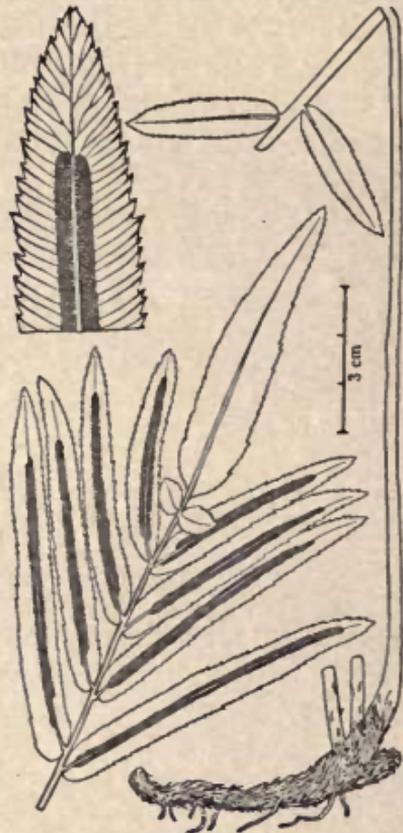
It occurs in nearly all the high-pineland hammocks, but in those where arboreous vegetation is so dense as to cause twilight in mid-day and whose floor is honeycombed with lime-sinks the development of this delicate fern is surprising. There are exceptions to this rule of growing so luxuriantly only in dense shade, for in occasional localities where storms have carried away the tops of trees thus exposing areas of several square rods in extent, this beautiful fern takes almost complete possession of the ground, forming a carpet over the hammock floor. The plant grows only sparingly in Royal Palm Hammock and apparently never develops as luxuriantly as it does in the hammocks of the neighboring pinelands. Another species *Adiantum melanoleucum* grows in a hammock on Long Key.

Curiously enough, this, although one of the more common tropical ferns in Florida, was not discovered there until 1877. It ranges northward to the upper part of the peninsula, and is widely distributed in insular and continental tropical America.

8. BLECHNUM L.

Coarse terrestrial or rarely epiphytic often swamp-plants. Leaves single or clustered on the horizontal or erect rootstock: blades rather narrow in proportion to their length, pinnatifid or pinnate, the segments or leaflets entire or toothed, those without spores with free veins, the spore-bearing ones with the veins connected near their bases by a transverse receptacle which bears a narrow sorus parallel to the midrib and usually near it. Indusia membranous, linear, distinct from the edge of the leaf-blades and at length reflexed from the inner side.—About twenty species, native of the south-temperate regions and the tropics.

1. *B. serrulatum* L. C. Rich. Rootstock stout, widely creeping and often partly erect: leaves erect, 2 m. tall or less, rigid in sunny places, pliable in shade; petioles scaly near the base; blades broadly linear to elliptic-lanceolate in outline, mostly longer than the petioles; leaflets numerous, leathery, the blades linear, linear-lanceolate, or elliptic-lanceolate, those of the spore-bearing leaves the smaller, often shiny, with a pale irregularly serrulate margin, sessile: veins very numerous, close together, simple or forking near the midrib or beyond the indusium, curving into the teeth at the margin; indusia about 3 mm. wide, red. — Everglades and prairies and adjacent hammocks. — Figure 12, reduced.



The fresh-water swamp or marsh is the home of this fern. Consequently the edges of Royal Palm Hammock are ideal places for its growth, low places within the hammock are also quite favorable to a good development of it. However, it occurs also in the low pine-land hammocks as well as in the Everglade hammocks. It likes shade, and thriving best out of the direct sunlight, this fern grows plentifully in open places as well, but there it is always more or less stunted, the plants being strictly erect and rigid. Within our range the plant is terrestrial; wherever it occurs near salt-water or brackish-water it becomes more or less epiphytic.

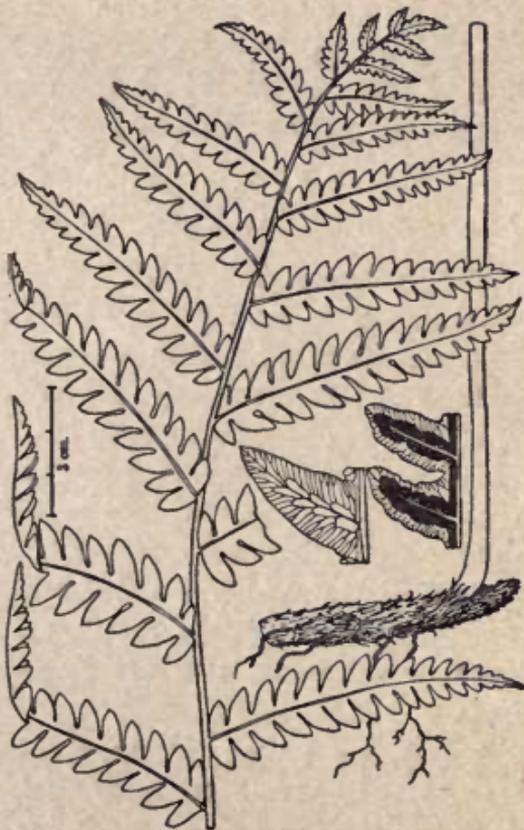
Blechnum was discovered in Florida before the beginning of the last century, and it grows also on the mainland and islands of tropical America.

9. ANCHISTEA Presl

Coarse erect terrestrial swamp-plants. Leaves uniform, erect or arching, single or somewhat clustered on the stout elongate creeping or horizontal rootstock: blades pinnate, the leaflets pinnatifid. Veins united to form a single series of elongate areolae next to the midrib and its branches in the segments, elsewhere free.

Sori borne on transverse veins forming the outer sides of the areolae. Indusia opening on the side away from the midrib.—Contains only the following species native of eastern North America.

1. *A. virginica* (L.) Presl. Rootstock stout, usually horizontal: leaves erect or arching, 1.5 m. long or less, or rarely more; petioles usually purple and shining below, green above; blades lanceolate to elliptic-lanceolate or ovate in out-



line: leaflets separated, mostly 1-2 dm. long, the blades lanceolate to linear-lanceolate, acuminate or merely acute, pinnatifid, sessile, the segments ovate to lanceolate or elliptic with a very narrow obscurely toothed pale border: veins beyond the areolae simple or forked: indusia mostly 2-2.5 mm. wide.—Everglades, prairies, and adjacent hammocks.—Figure 13, reduced.

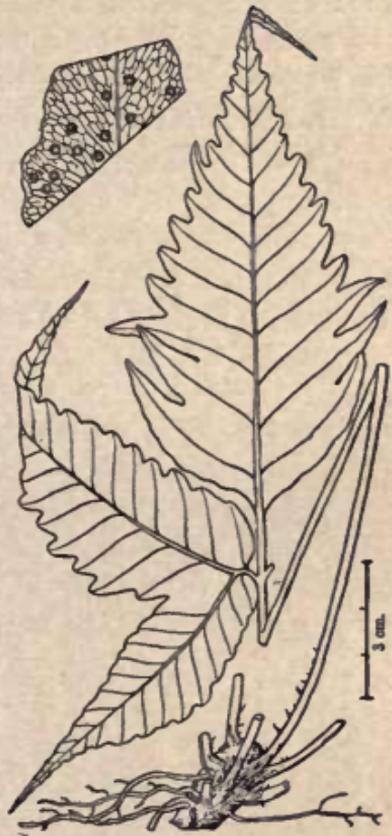
The chain-fern is not common in our range, but it occurs in and about low or wet places around and within Royal Palm Hammock. It sometimes grows in the open, but it thrives best in partial shade around the bases of trees or among cypress-knees. Although discovered in the early part of the eighteenth century or before, this plant was not found in Florida until many years later. Outside of the United States, where it ranges from Nova Scotia and Ontario to Florida and Louisiana, it is known only in Bermuda.

10. **TECTARIA** Cav.

Elegant terrestrial, usually rock-plants. Leaves erect and arching or pendent, more or less clustered on the short creeping or horizontal rootstock, the petiole not jointed to the rootstock: blades broad, usually of a deltoid, ovate, or hastate type, lobed or 1-pinnate. Veins freely anastomosing, forming numerous areolae with free included veinlets. Sori orbicular or reniform, scattered over the back of the leaf-blade or its segments, situated in the angles of veins or on the back of a vein. Indusia peltate, flattish, opening all around the edge.—About twenty-four species widely distributed in the tropics.

1. **T. heracleifolia** (Willd.) Underw. Rootstock stout, elongate, decumbent or nearly erect, with dark-brown

scales: leaves mostly 1 m. tall or less; petioles light-brown or dark-brown, somewhat shining, with deciduous scales, particularly near the base; blades dark-green, hastate, 1.5-5 dm. long, somewhat leathery, undivided or 3-5-foliolate; leaflets various, the terminal one the largest, the blades acuminate, undulate, incised, or lobed, those of the lower pair stalked, more or less curved: sori numerous, in two rows between the lateral veins, about 2-2.5 mm. in diameter: indusia orbicular, peltate. — (HALBERD-FERN.) — Hammocks. — Figure 14, reduced.



This large halberd-fern is most at home in the prolonged twilight of the very dense hammock. It thrives best in habitats suitable to the growth of the maiden-hair (*Adiantum tenerum*) and usually in company with it. It grows in and on the edges of shallow lime-sinks, sometimes almost carpeting the hammock floor, and is largest in the well-like lime-sinks of some of the pineland hammocks, particularly in the smaller sinks, where it often grows a foot or two below the orifice with the large leaf-blades supported on the elongate petioles, completely hiding the sink, thus forming a perfect pit-fall. The plants do not reach their best development in Royal Palm Hammock and occur there rather sparingly.

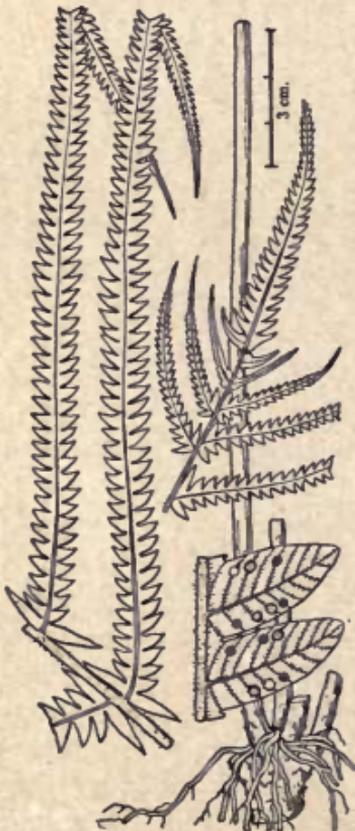
It was discovered in Florida in 1880, in the upper

part of the peninsula, where it occurs as far north as the northern part of the lake region. It grows naturally in Texas and is common in insular and continental tropical America.

11. DRYOPTERIS Adans.

Coarse or delicate terrestrial wood-ferns. Leaves erect, spreading, or creeping, usually clustered on the rootstock, the petiole not jointed to the rootstock: blades narrow or broad, 1- to 3-pinnate, or dissected; leaflets usually toothed or lobed. Veins simple or forked, free or variously jointed. Sori nearly or quite orbicular, borne on the back of the leaf-blade or its divisions, on the

veins or rarely at their tips. Indusia orbicular-reniform, attached at the center or at or near the sinus, or vestigial in a few species. —Several hundred species of wide geographic distribution, chiefly tropical.



1. *D. patens* (Sw.) Kuntze. Rootstock stout, erect or nearly so: leaves clustered, arching, 1.5 m. long or less; petioles sparingly scaly near the base: blades ovate in outline, sometimes narrowly so, or lanceolate, usually 4–8 dm. long, more or less pubescent, often sparingly so, acuminate, 1-pinnate; leaflets numerous, often very numerous, approximate, mostly 9–20 cm. long, the blades linear-acuminate, sessile, pinnatifid, spreading or the

lower ones somewhat deflexed, the segments falcate or subfalcate by the strongly revolute edges, and thus also apparently acute or acutish, entire, the basal pair much larger than the others, auricle-like, sometimes incised: veins 8-15 pairs, simple: sori medial or nearer the margin: indusia pubescent. [*D. stipularis* (Willd.) Maxon.]—Hammocks.—Fig. 15, reduced.

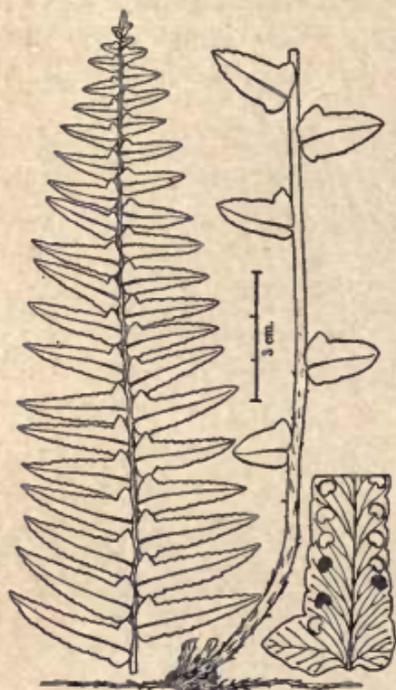
This shield-fern is one of the late additions to our flora. It grows on the floor of the hammock rather than in the lime-sinks. Although scattered throughout the hammock, in some places it forms extensive beds to the exclusion of nearly all other vegetation. It reaches its best development in Royal Palm Hammock. The leaves are arched, yet the blades lie often in an almost horizontal position, thus completely hiding the ground. A single plant was discovered in Florida in 1905, but it was not until a decade later that plants were found in abundance. It is common in tropical America generally.

12. NEPHROLEPIS Schott

Graceful epiphytic or terrestrial wood-ferns. Leaves approximate or clustered on the short rootstock, spreading, arching, or pendent; blades elongate, sometimes greatly so, 1-pinnate, the petiole not jointed to the rootstock; leaflets numerous, narrow, approximate, jointed to the rachis. Veins free, usually forked. Sori reniform or orbicular-reniform, borne at the apex of the upper branch of a vein, usually near the margin of the blade. Indusia reniform or orbicular-reniform, attached near the sinus.—About ten species, widely distributed in tropical and subtropical regions.

Blades of the leaflets distinctly auricled at the base: indusia reniform. 1. *N. exaltata*.
Blades of the leaflets rounded or merely angled at the base: indusia suborbicular. 2. *N. biserrata*.

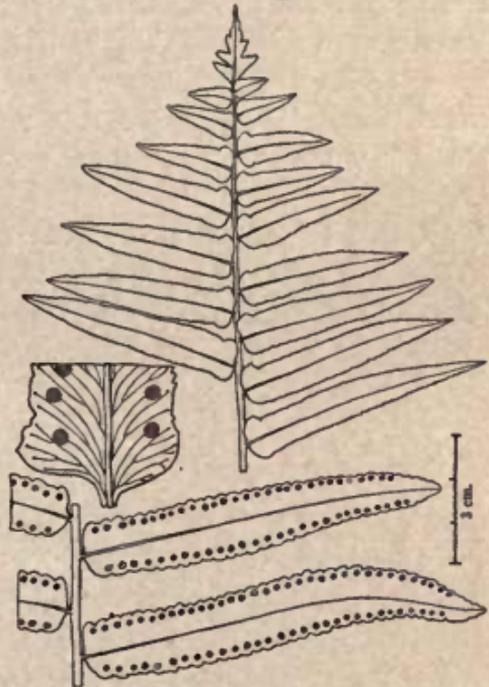
1. *N. exaltata* (L.) Schott. Rootstock stoutish, often nearly erect: leaves erect or spreading in all directions, 2.5 m. long or less; petioles rather slender, mostly brown, more or less scaly; blades elongate-linear in outline, often narrowly so: leaflets numerous, 3-6 cm. long, the blades lanceolate to elliptic-lanceolate, singly serrate or singly crenate, or with some of the teeth occasionally accompanied with smaller teeth, coarsely and sparingly pubescent beneath, subcordate to truncate at the base, the lower side rounded, the upper auricled: indusia reniform: sori less than 1.5 mm. in diameter. — (BOSTON-FERN.) — Hammocks. — Figure 16, reduced.



This, the Boston-fern, is sometimes locally known by the name of Sword-fern. It grows in all the hammocks and in all kinds of hammocks. It grows on trees, in humus on the hammock floor, and in the honeycombed sides of small and large lime-sinks. It is scattered throughout Royal Palm Hammock, as single plants, small colonies, and as extensive beds. Although common in dense shade, this plant reaches its best development in open sunny spots in hammocks and there sometimes covers the floor to the exclusion of nearly all other vegetation. As in the case of the following species, the petioles of the leaves are favorite supports for some species of mosses and liverworts. This fern was discov-

ered in Florida about the middle of the last century. It ranges northward in Florida to the lake region, and is distributed on the mainland and islands of tropical America.

2. *N. biserrata* (Sw.) Schott. Rootstock stout, often erect: leaves erect, spreading, or reclining, 1-5 m. long or more; petiole stout, more or less scaly at the base, usually brown; blade broadly linear in outline, or narrowly so when greatly elongate: leaflets numerous, mostly 1-2 dm. long, the blades lanceolate to linear-lanceolate, doubly serrate or doubly crenate, finely and closely pubescent beneath, truncate to broadly cuneate at the base, the lower side of the base rounded, the upper side slightly angled: indusia suborbicular: sori fully 1.5 mm. in diameter. — (SWORD-FERN.)—Hammocks.—Figure 17, reduced.



This, the Sword-fern, is sometimes locally known by the name of Boston-fern. Like the preceding species it grows in all the different kinds of hammocks and usually in company with its close relative, the preceding species. It occurs throughout Royal Palm Hammock, but in places favorable to its growth it reaches an extraordinary development. Although it is sometimes epi-

phytic, it usually grows in humus on the hammock floor. It may be expected anywhere in a hammock, but often in open places or areas of partial shade it forms impenetrable tangles with such a copious growth of leaves that the mass will support men walking over it several feet above the ground. This plant must be granted the distinction of having the longest leaves of any of our ferns. Leaves approximately eighteen feet long are not uncommon, while the maximum length is twenty-seven feet three inches. The long leaves are often vine-like. They clamber over shrubs and up tree trunks and hang over the limbs of the trees. It was discovered in Florida in 1887, and is now known as far north as the Lake Okechobee region. The geographic range of the species includes both continental and insular tropical America.

Order 2. LYCOPODIALES

Terrestrial or epiphytic plants. Sporangia borne in the axils of scale-like leaves, 1-celled or 2- or 3-celled. Spores all of one sort and size or of two kinds and sizes.—Embraces the following family and Lycopodiaceae.

FAMILY 1. PSILOTACEAE

PSILOTUM FAMILY

Perennial slender terrestrial or epiphytic plants, apparently leafless on account of the greatly reduced and therefore inconspicuous leaves. Sporangia sessile in the axils of the scale-like bracts on the branches, 2- or 3-celled, 2- or 3-lobed, opening by valves at the apex. Spores uniform.—Comprises two genera, *Tmesipteris* of Australasia and the following.

1. *PSILOTUM* R. Br.

Tufted, epiphytic or terrestrial, but humus-loving, sometimes stiff plants, with slender coral-like roots. Stems repeatedly dichotomous. Leaves alternate, remote, reduced to scales. Sporangia 3-celled, 3-lobed, opening by 3 valves at the apex, closely sessile. Spores mealy, oval or elongate-reniform in outline.—Represented by 2 or 3 species of wide geographic distribution.

1. *P. nudum* (L.) Griseb. Stems tufted, erect or nodding, rather rigid and tough, 1-4.5 dm. tall, 3-angled, forked, sometimes copiously so above, the branches with 3 wing-like angles: leaves remote, scale-like or awl-like, 1-1.5 mm. long: sporangia in much-interrupted spikes, 2-2.5 mm. wide, usually wider than long, the three lobes rounded, yellow or yellowish-brown.—Hammocks.—Figure 18, reduced.



This relative of the club-mosses is not uncommon in most of the nearby pineland hammocks. It grows on the bark in partly decayed spots

on standing hardwood trees and on palmettos, particularly near the bases of the trees. It occurs commonly on fallen and partly decayed trunks and on the ground where tree-trunks have decayed and fallen to pieces. The coral-like roots are securely fastened in the substance in which they grow. The plant is rather rare in Royal Palm Hammock, while in some of the hammocks not far distant on Long Key it is exceedingly plentiful.

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¹ Contributed by Dr. John Hendley Barnhart.

GLOSSARY

- ACUMINATE.** Tapering to the end.
- AMPHIBIOUS.** Living both on land and in water.
- ANASTOMOSE.** To run together or to unite.
- ANNUAL.** Having one season's duration.
- ANTHERIDIUM.** The organ (male) in ferns corresponding to the anther.
- AQUATIC.** Living in water.
- ARCHEGONIUM.** The organ (female) in ferns corresponding to the pistil.
- ARCUATE.** Bowed or arched.
- AREOLA.** A space marked out by veins.
- ARTICULATE.** Jointed.
- ATTENUATE.** Slenderly tapering.
- AURICLE.** An ear-shaped appendage.
- AURICULATE.** With ear-shaped appendages.
- AWL-SHAPED.** Tapering from a base to a slender tip:
- AWN.** A bristle-like appendage.
- AXIL.** The angle formed by a branch, or a leaf, with the stem from which it arises.
- BIENNIAL.** Having two seasons' duration.
- BLADE.** The dilated part of a leaf.
- BRACT.** A leaf, often much reduced, subtending a flower as a part of an inflorescence.
- CELL.** The smallest element in the structure of a living organism.
- CHAFF.** A scale, usually dry and membranous.
- CHANNELED.** Grooved longitudinally.
- CHLOROPHYL.** The green coloring matter in plants.

- CLAVATE. Club-shaped.
- COMPOUND. Having two or more similar parts.
- CONE. An inflorescence with imbricated scales around an elongate axis.
- CORDATE. Having two lobes and a sinus at the base.
- CORIACEOUS. Leathery in texture.
- CORM. The swollen base of a stem; like a bulb, but solid.
- CREEPING. Lying on the ground and rooting at the nodes.
- CRENATE. Having rounded teeth.
- CRENULATE. Having small rounded teeth.
- CUNEATE. Wedge-shaped.
- DECIDUOUS. Not evergreen, not persistent.
- DECOMPOUND. More than once compound.
- DECUMBENT. Reclining or procumbent but with the tip ascending.
- DELTOID. Shaped like the Greek letter Δ .
- DENTATE. Toothed, with the teeth directed outward.
- DICHOTOMOUS. Forking regularly by pairs.
- DIMORPHOUS. Occurring in two forms.
- DISSECTED. Divided into numerous segments.
- DIVIDED. Lobed to the base.
- EMARGINATE. Having a shallow notch at the apex.
- ENDOPHYTIC. Living within a plant.
- ENTIRE. Without toothing or lobing.
- EPIDERMAL. Pertaining to the superficial layer of cells.
- EPIPHYTIC. Growing attached to other plants; but not parasitic.
- FALCATE. Scythe-shaped.
- FILAMENTOSE. Having thread-like structures.
- FILIFORM. Thread-shaped.
- FLABELLATE. Fan-shaped.
- FOLIOLATE. Having leaflets.

- FREE.** Said of veins in a leaf that are simple or forked, but whose branches do not unite.
- FUGACIOUS.** Falling away early.
- GAMETOPHYTE.** The phase of a fern that produces the sexual organs.
- GLABROUS.** Without hairs.
- HASTATE.** Shaped like an arrow-head with the basal lobes directed outward.
- IMBRICATE.** Overlapping.
- INCISED.** Cut sharply and irregularly.
- INDUSIUM.** The covering of a sorus in ferns.
- LABYRINTHIFORM.** Having complicated curved lines.
- LANCEOLATE.** Shaped like a lance-head.
- LEAFLET.** A division of a compound leaf.
- LIGULE.** A projection at the top of a sheath.
- LINEAR.** Narrow and elongate, with parallel sides.
- LOBE.** A segment, usually if rounded.
- LOBED.** Having rounded segments.
- MEGASPORANGIUM.** The envelope in which macrospores are developed or contained.
- MEGASPORE.** The larger kind of a spore where there are two kinds.
- MICROSPORANGIUM.** The envelope in which microspores are developed or contained.
- MICROSPORE.** The smaller kind of spore where there are two kinds.
- MIDRIB.** The main vein of a leaf or of a leaflet.
- MONOECIOUS.** Having antheridia and archegonia on the same prothallium.
- MYCORHIZA.** A fungus living in symbiotic relation in the roots of a higher plant.
- OB.** In combination, meaning inversion.
- OBLIQUE.** Slanting.

- ORBICULAR.** Circular.
- OVAL.** Broadly elliptic.
- OVOID.** Shaped like a hen's egg.
- PALMATE.** Radiately lobed or compound.
- PEDATE.** Radiately lobed or compound with the lateral lobes or parts cleft.
- PELTATE.** Shield-shaped, with an attachment on the lower surface.
- PENICILLATE.** Tipped with fine hairs.
- PENTAGONAL.** Five-angled.
- PERENNIAL.** Having several or many years' duration.
- PERSISTENT.** Evergreen.
- PETIOLE.** The stalk of a leaf.
- PINNA.** A primary division of a compound leaf, a leaflet.
- PINNATE.** Compound and with the leaflets arranged on each side of a common rachis.
- PINNATIFID.** Pinnately cut.
- PINNULE.** A secondary pinna.
- PROCUMBENT.** Lying on the ground, but not rooting.
- PROTHALLUS.** A cellular thalloid structure resulting from the germination of a spore and bearing reproductive organs.
- PUBESCENT.** Having hairs.
- PUNCTATE.** Marked with depressions or internal glands.
- PYRIFORM.** Pear-shaped.
- RACHIS.** The axis of a compound leaf or of an inflorescence.
- RECEPTACLE.** An expanded structure that bears other organs.
- REFLEXED.** Bent abruptly downward.
- RENIFORM.** Kidney-shaped.
- RETICULATE.** Like a net-work.

- REVOLUTE. Rolled back from the edge or from the apex.
- RHOMB. An equilateral parallelogram having oblique angles.
- ROOTSTOCK. A subterranean stem.
- SCANDENT. Climbing.
- SEGMENT. A part of a cut leaf-blade.
- SERRATE. Having sharp teeth pointing forward.
- SERRULATE. Minutely serrate.
- SESSILE. Without a stalk.
- SIMPLE. Of one piece, as distinguished from compound.
- SINUS. The recess between two lobes.
- SORUS. A cluster of sporangia.
- SPATULATE. Gradually dilated upward to a rounded apex.
- SPERMATIZOID. The motile male reproductive cell.
- SPORANGIUM. A spore-case.
- SPORE. An asexual reproductive cell.
- SPOROPHYLL. A leaf bearing a sporangium, or a modified leaf or branch bearing numerous sporangia.
- SPUR. A sac-like or tubular extension, usually hollow.
- STELLATE. Star-shaped.
- STERILE. Unproductive.
- STROBILE. An inflorescence with imbricate scales like a cone.
- SUB-. In combination usually meaning slightly.
- SUBULATE. Awl-shaped.
- TERETE. Circular in cross-section.
- TERNATE. In threes.
- TERRESTRIAL. Growing on the ground.
- THALLOID. Resembling a thallus.
- TRI-. In combination, three or thrice.
- TRIQUETROUS. Having three salient angles.

- TRUNCATE. Abrupt, as if cut off transversely.
- TUBEROUS. Tuber-like.
- TUMID. Swollen.
- ULIGINOUS. Living in mud.
- UNDULATE. Having a wavy edge.
- URCEOLATE. Urn-shaped.
- VASCULAR. Having vessels or ducts.
- VEIN. A thread of fibro-vascular tissue in a leaf.
- VEINLET. A secondary vein.
- VELUM. The membranous indusium in *Isoetes*.
- VENATION. The arrangement of the veins.
- VERNATION. The arrangement of the leaf or leaf parts in a bud.

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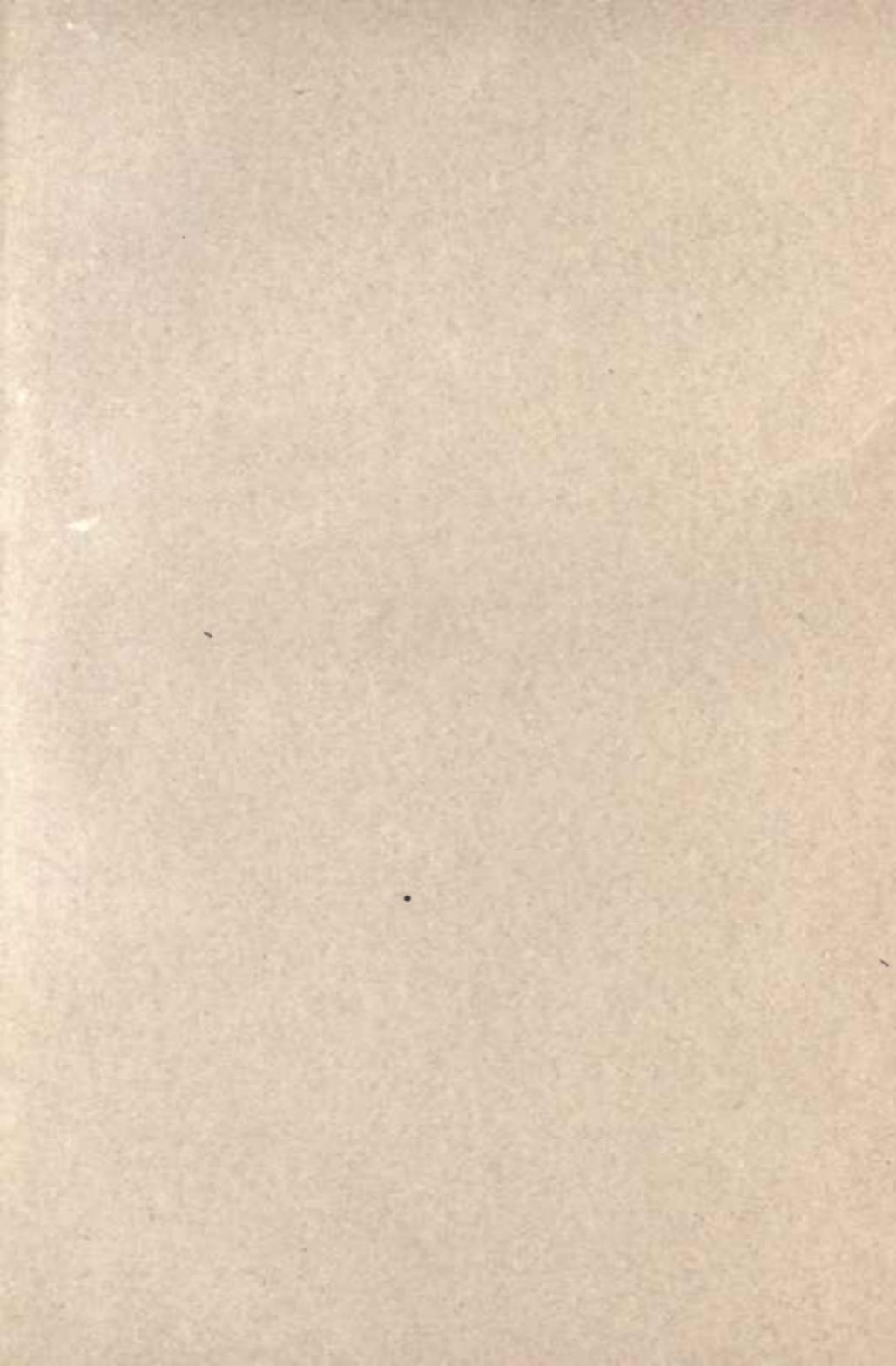
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