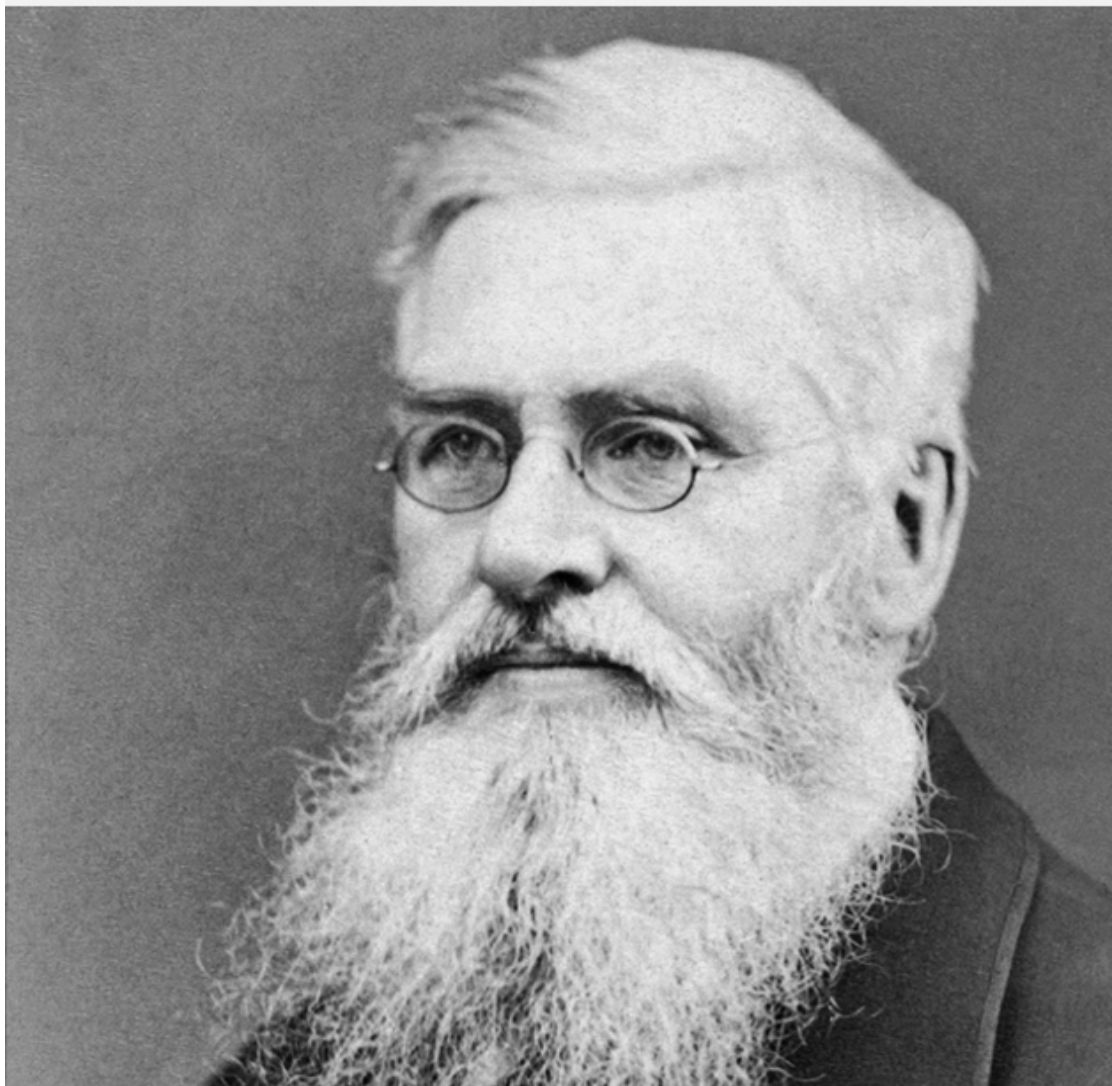




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Series Sixteen

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ALFRED RUSSEL WALLACE

(1823-1913)



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A handwritten signature in cursive script, reading "Alfred Russel Wallace". The signature is written in dark ink and features a long, horizontal flourish at the bottom.

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Version 1

The Complete Books of
ALFRED RUSSEL WALLACE



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Complete Books of Alfred Russel Wallace



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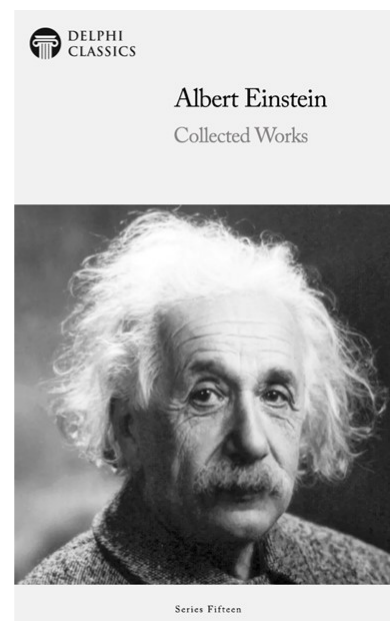
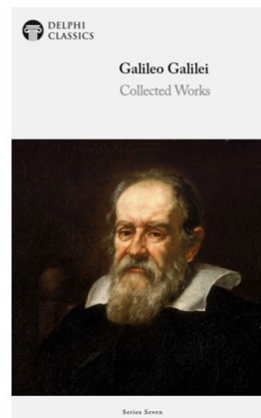
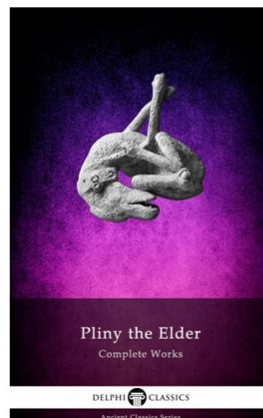
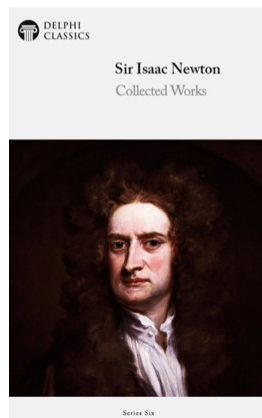
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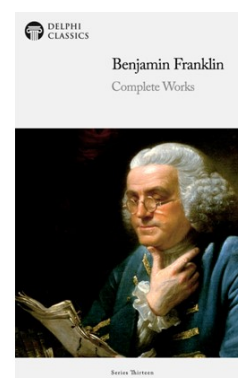
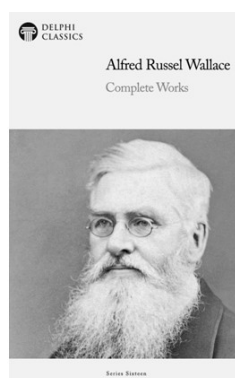
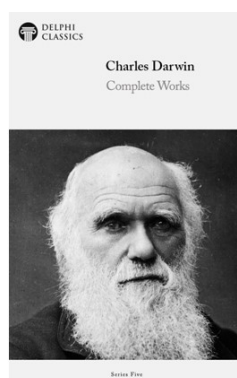
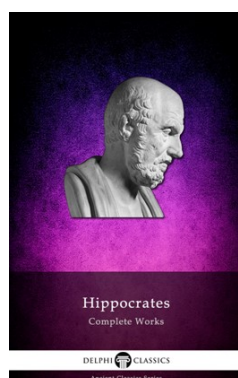


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The Books



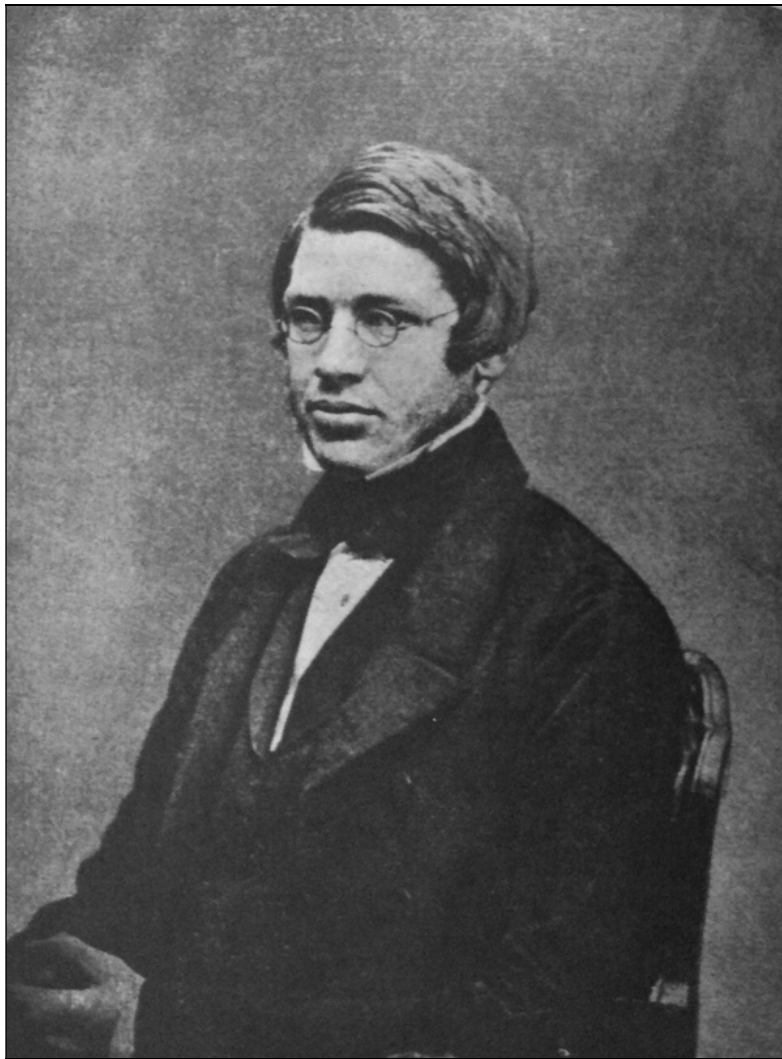
Llanbadoc, a village in Monmouthshire, Wales — Alfred Russel Wallace's birthplace



Llanbadoc Church, where Wallace was baptised



Wallace's parents



Wallace at the age of 24, 1848

Palm Trees of the Amazon and Their Uses (1853)



A celebrated late Victorian naturalist and explorer, Alfred Russel Wallace was born in 1823 in the small village of Llanbadoc, Monmouthshire, into a family facing severe financial hardship. He was the eighth of nine children born to Mary Anne Wallace (née Greenell) and Thomas Vere Wallace. His mother was English, while his father was of Scottish ancestry. His family claimed a connection to William Wallace, the famous leader of Scottish forces during the Wars of Scottish Independence in the thirteenth century. Wallace's father graduated in law, but never practised it. He owned some income-generating property, but bad investments and failed business ventures resulted in a steady deterioration of the family's financial position. Wallace's mother was from a middle-class family of Hertford, where the family moved to when Wallace was five years old. He attended Hertford Grammar School until 1837, when he reached the age of 14, the normal leaving age for a pupil not going on to university.

His formal education was abruptly cut short when his father's compounding debts forced young Alfred to leave school and enter the workforce. Sent to London to live with his older brother John, he worked briefly as an apprentice builder before joining another brother, William, as a land surveyor in the rugged countryside of Wales. It was during these long hours outdoors that his lifelong passion for nature was first ignited, as he taught himself botany using inexpensive guidebooks, while meticulously collecting wild plants. By 1844, while working as a schoolmaster in Leicester, Wallace met the young entomologist Henry Walter Bates, who introduced him to the obsessive world of beetle collecting and the controversial concept of the transmutation of species, sparking a mutual ambition to seek evolutionary answers in the field.

Driven by a desire to uncover the mechanisms of organic change, Wallace and Bates set sail for Brazil in 1848, commencing an exhausting four-year expedition through the uncharted depths of the Amazon basin. While Bates remained in the region, Wallace eventually chartered a brig named the *Helen* in 1852 to sail home with a large cargo of unique specimens, live animals and extensive field notes. Disaster struck three weeks into the voyage when the ship caught fire in the middle of the Atlantic, destroying virtually all his work and forcing Wallace to spend ten harrowing days adrift in an open lifeboat. Refusing to let the tragedy defeat him, Wallace returned to London and relied on a single salvaged tin box of pencil sketches to reconstruct his observations. This remarkable resilience culminated in October 1853 with the publication of his first book, *Palm Trees of the Amazon and Their Uses*, proclaiming the genius of a largely self-taught naturalist to the British scientific community.

The small book is a work of pioneering economic botany and ethnobotany. Written under harrowing circumstances, it provides an invaluable, beautifully illustrated record of the flora of the Amazon basin and the indigenous cultures intertwined with it. The text functions as an analytical guide to the diversity of the family Arecaceae across the Amazon basin. It features 48 lithographed plates based on Wallace's saved sketches, which were transferred to stone by the renowned botanical artist Walter Hood Fitch. Wallace systematically examines multiple genera of palms — including *Mauritia*, *Euterpe*, *Oenocarpus*, and *Leopoldinia* — outlining their botanical traits, biogeography, and ecological preferences. Crucially, the work shifts seamlessly between strict taxonomy and anthropology. For each species, Wallace describes its

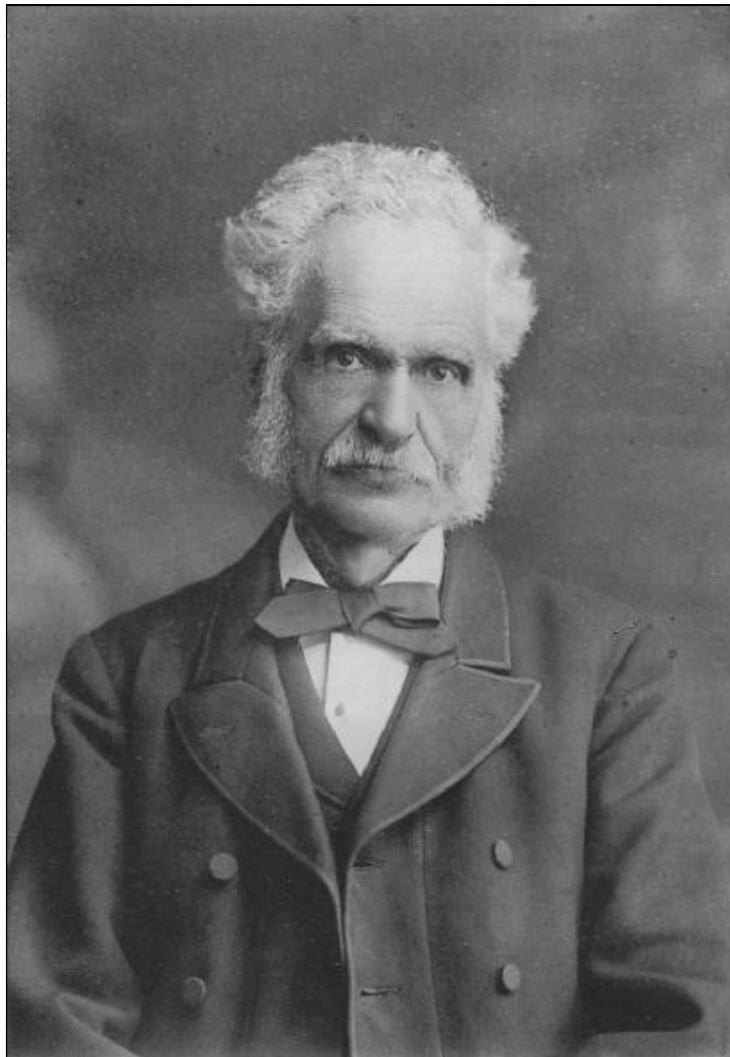
“uses,” heavily documenting how the Amazonian Indians utilised them. He details how leaves were woven into intricate thatch roofing and baskets, how the dense wood of certain trunks was carved into blowpipes or musical instruments, and how species like the açaí (*Euterpe oleracea*) provided vital sources of food, medicine and nutrient-rich pulp. One notable highlight is his discovery and naming of the Piassava fiber palm (*Leopoldinia piassaba*), emphasising its regional commercial value for producing water-resistant cables and brooms.

Since it was a self-funded and printed book, which appeared in a strictly limited run of only 250 copies, *Palm Trees of the Amazon and Their Uses* was largely unknown to the public. Among professional scientific circles, its reception was mixed, while some botanical experts were highly critical. Charles Darwin privately noted that Wallace’s concurrent travelogues lacked deep analytical substance. More upsettingly, Wallace’s friend and contemporary botanical explorer, Richard Spruce, thought poorly of the book’s botanical precision. Since Wallace was a self-taught naturalist rather than a trained academic botanist, and because his physical specimens had been burned at sea, critics noticed that some of his taxonomic classifications were slightly flawed or lacked formal morphological rigour. Nevertheless, some contemporary journals offered glowing endorsements. Reviewers in publications like the *Annals* and *Magazine of Natural History* strongly recommended the text, calling it a “highly valuable companion” to Carl Friedrich Philipp von Martius’s definitive masterwork on palms, praising Wallace’s lifelike illustrations for giving a lucid concept of the jungle’s overall aesthetic.

Overall, *Palm Trees of the Amazon and Their Uses* proved that Wallace could not be discouraged by disaster. It transformed a devastating shipwreck into a vibrant and enduring window into the nineteenth-century Amazonian wilderness.



Hertford Grammar School, c. 1900



Wallace's friend and fellow explorer: Henry Walter Bates, 1892

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PALM TREES OF THE AMAZON

AND THEIR USES.

BY

ALFRED RUSSEL WALLACE.

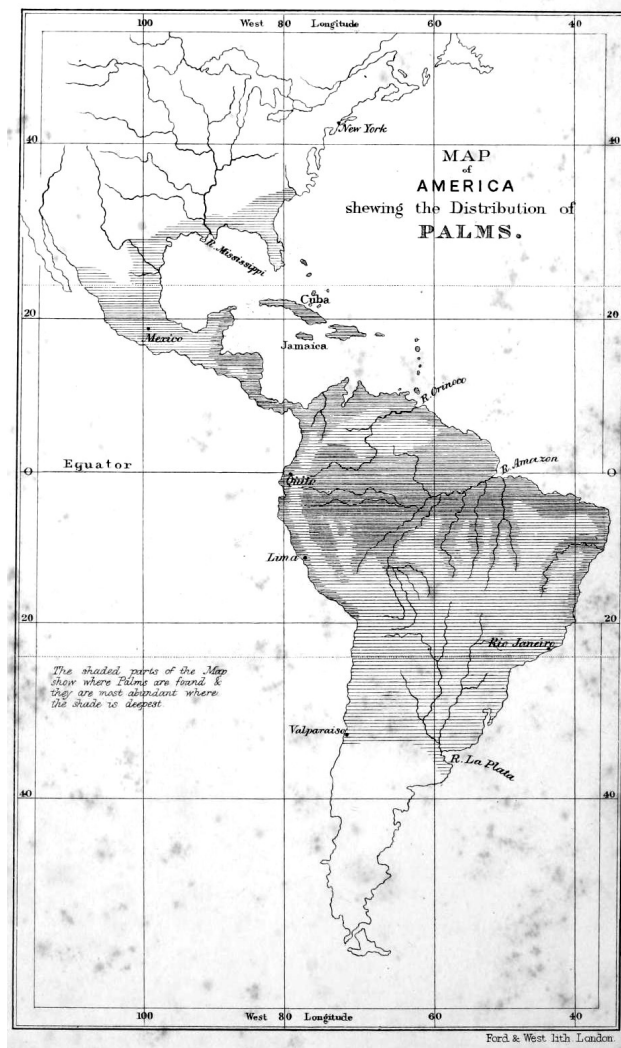
WITH FORTY-EIGHT PLATES.

LONDON:

JOHN VAN VOORST, 1 PATERNOSTER ROW.

1853.

The first edition title page



The original frontispiece

PREFACE.



THE MATERIALS FOR this work were collected during my travels on the Amazon and its tributaries from 1848 to 1852. Though principally occupied with the varied and interesting animal productions of the country, I yet found time to examine and admire the wonders of vegetable life which everywhere abounded. In the vast forests of the Amazon valley, tropical vegetation is to be seen in all its luxuriance. Huge trees with buttressed stems, tangled climbers of fantastic forms, and strange parasitical plants everywhere meet the admiring gaze of the naturalist fresh from the meadows and heaths of Europe. Everywhere too rise the graceful Palms, true denizens of the tropics, of which they are the most striking and characteristic feature. In the districts which I visited they were everywhere abundant, and I soon became interested in them, from their great variety and beauty of form and the many uses to which they are applied. I first endeavoured to familiarize myself with the aspect of each species and to learn to know it by its native name; but even this was not a very easy matter, for I was often unable to see any difference between trees which the Indians assured me were quite distinct, and had widely different properties and uses. More close examination, however, convinced me that external characters did exist by which every species could be separated from those most nearly allied to it, and I was soon pleased to find that I could distinguish one palm from another, though barely visible above the surrounding forest, almost as certainly as the natives themselves. I then endeavoured to define the peculiarities of form or structure which gave to each its individual character, and made accurate sketches and descriptions to impress them upon my memory. These peculiarities are often very slight, though permanent: — in the roots, the extent to which they appear above the ground; — in the stem, the thickness, which in each species varies within very definite limits, — the swelling of the base, the middle or the summit, — its generally erect or curving position, — the nature of the rings with which it is marked, — the number, direction and form of the spines or tubercles with which it is armed; — in the leaves, the erect or drooping position, the size and form of the leaflets, the angles which they form with the midrib, and the proportionate size of the terminal pair, are all important characters. The fruit spike or spadix is either erect or drooping, either simple, forked, or many-branched; and the fruits in closely allied species vary in size, in shape, and in colour, as well as in the bloom, down, hairs or tubercles with which they are clothed.

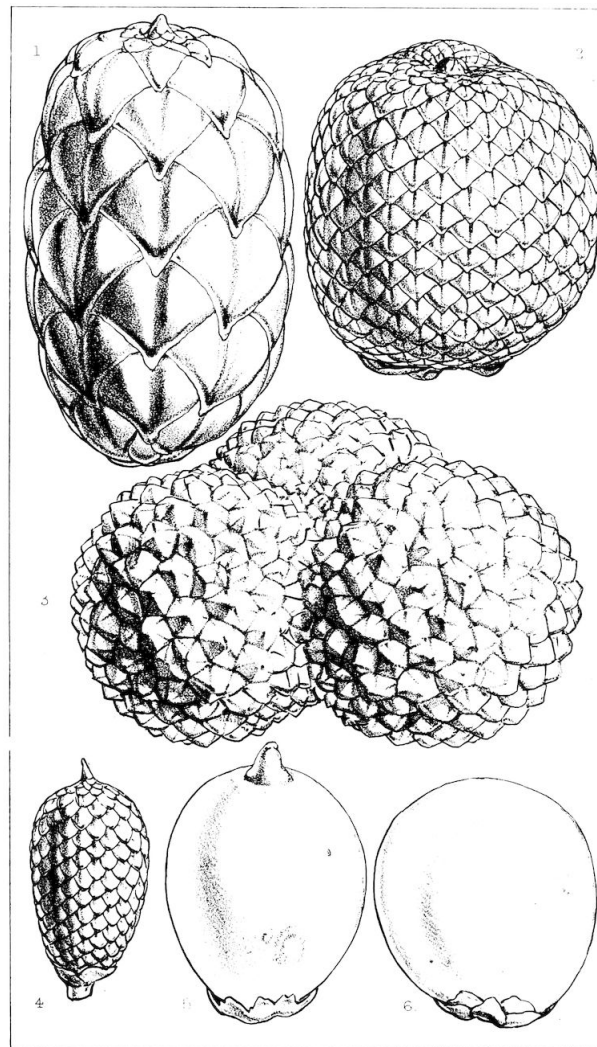
In this little work careful engravings from my original drawings are given, with a general description of each species, and a history from personal observation of the various uses to which it is applied, and of any other interesting particulars connected with it. Several of the species here figured are new, and among them is the Palm which produces the “piassába,” the coarse fibrous material of which brooms for street sweeping are now generally made.

For the determination of the genera and species, and for that part of the Introduction relating to the botanical characters and geographical distribution of Palms, I am indebted to the magnificent work of Dr. Martius. To the botanist I trust my little book may be of some use, in giving accurate figures of many entire plants, of which he is only acquainted with small portions, and in supplying an account of the uses to which they are applied in the distant regions where they grow. And to the general reader I hope it may not be uninteresting, as exhibiting a glimpse of a wild

and rude people in the lowest state of civilization, whose existence is intimately connected with the products of the surrounding forests, among which the plants under consideration hold so prominent a place; and of these it is hoped the accompanying Plates will give a more accurate idea than the stereotyped figures which often represent the “feathery palm trees” in our popular works.

Some of the fruits of which I had no drawings, have been figured from specimens in the Museum at Kew collected by Mr. R. Spruce, who is still investigating the Botany of the Amazon valley.

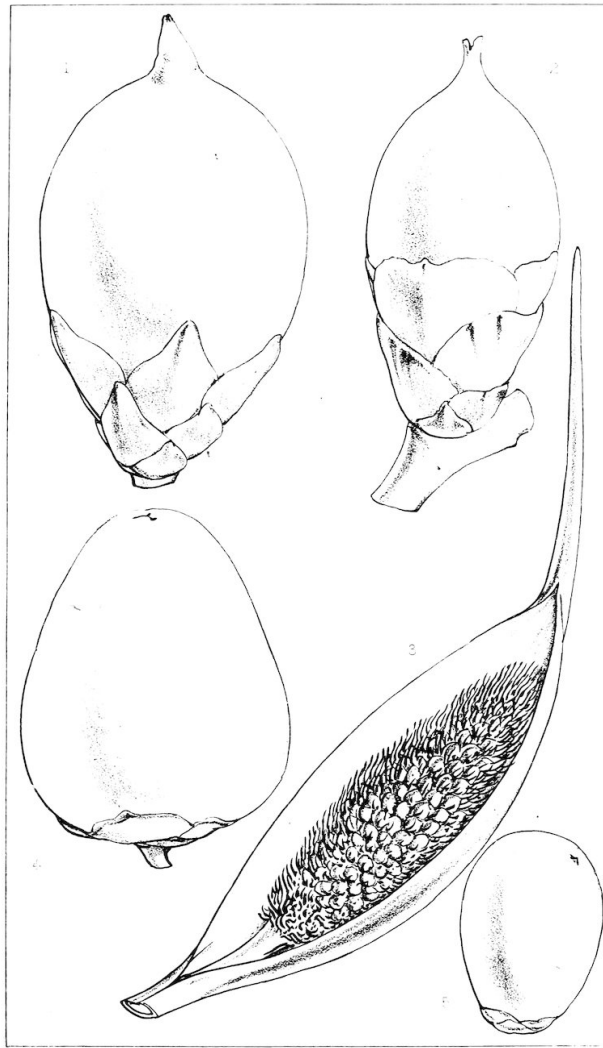
London, October 1853.



PL. II. PALM FRUITS

W. Fitch lith. Ford & West Imp.

1. *Raphia tædigera*.
2. *Mauritia flexuosa*.
3. *Manicaria saccifera*.
4. *Lepidocaryum tenue*.
5. *Astrocaryum tucuma*.
6. *Leopoldinia pulchra*.



PI. III. PALM FRUITS.

W. Fitch lith. Ford & West. Imp.

1. *Attalea spectabilis*.
2. *Maximiliana regia*.
3. Spathe of *Maregia*.
4. *Guilielma speciosa*.
5. *Iriarteia exorhiza*.

INTRODUCTION.



PALMS ARE ENDOGENOUS or ingrowing plants, belonging to the same great division of the Vegetable Kingdom as the Grasses, Bamboos, Lilies and Pineapples, and not to that which contains all our English forest trees. They are perennial, not annual like most of the above-named plants, and probably reach a great age. Their stems are simple or very rarely forked, slender, erect, and cylindrical, not tapering as in most other trees; they are hardest on the outside, and are marked more or less distinctly with scars or rings, marking the situation of the fallen leaves.

The leaves are generally terminal, forming a bunch or head at the summit of the tree; they are of very large size, have long petioles or footstalks, and are alternately placed on the stem. In shape they are pinnate or flabellate, or rarely simple, sheathing at the base, without stipules; and they have a plicate vernation, or are folded up lengthways before they open. The margins of the sheathing bases of the leaf-stalks are often fibrous, and give out a variety of singular processes.

The flowers are numerous, small, symmetrical, uncoloured, or obscurely so, six-parted, and hermaphrodite or polygamous. They are produced in a spadix from the axils of the leaves, and are generally enclosed in a spathe or sheath. The ovary or seed-vessel is three-celled or three-lobed, but the fruit is generally one-seeded from abortion, and the seed is large and albuminous with a fibrous or fleshy covering.

Palms are almost exclusively tropical plants, very few species being found in the temperate zone, and those only in the warmer parts of it, while the nearer we approach the equator the more numerous they become both in species and individuals. Dr. Martius, a Prussian botanist and traveller in South America, has published a magnificent work in three folio volumes, entirely devoted to the Botanical history of this family of plants. He divides the portion of the earth which produces palms into five regions, namely, —

The North Palm Zone, extending from the northern limit of Palms to the tropic of Cancer.

The transition North Palm Zone, from the tropic of Cancer to 10° north latitude.

The Chief Palm Zone, from 10° north to 10° south latitude.

The transition South Palm Zone, from 10° south latitude to the tropic of Capricorn, and

The South Palm Zone, from the tropic of Capricorn to the southern limit of the family.

The Northern limit of Palms is, in Europe 43° of latitude, in Asia 34°, and in America 34°.

The Southern limit is 34° in Africa, 38° in New Zealand, and 36° in South America.

To the north of the tropic of Cancer there are 43 species of Palms known, and to the south of the tropic of Capricorn only 13, while as we advance from either side towards the equator the number increases, until in the Chief Zone, between 10° north and 10° south latitude, there are more than 300 species (see Frontispiece Map).

In the Old World, the rich islands of the Eastern Archipelago produce the greatest number of Palms; in the New, the great valleys of the Amazon and Orinoco on the main land, are most prolific.

In proportion to its extent, America is the most productive palm country; for while the Old World, including Europe, Asia, Africa, and the Eastern Archipelago, with

New Holland and all the Pacific Islands, contain 307 species, the New World or America alone has 275 different kinds.

In the Old World the islands produce more species than the continents, the former containing 194, while the latter have only 113.

In the New World, however, the reverse is the case, the continent there containing 234, while the islands possess only 42 kinds of Palms.

The total number of Palms at present known is less than 600. Dr. Martius thinks that the probable number existing on the earth may be from 1000 to 1200; though, as similar calculations have hitherto almost invariably been proved, as our knowledge increased, to be far below the truth, it is not unlikely that a few years may render double this number a more probable estimate.

Palms present to our view the most graceful and picturesque, as well as some of the most majestic forms in the vegetable kingdom. Though many of them have a sameness of aspect, yet there is a sufficient contrast and variety of forms to render them interesting objects in the landscape. The stems in some species do not appear above the ground, in others they rise to the height of 200 feet; some resemble reeds and are no thicker than a goose quill, others swell out to the bulk of a hog's head. There are climbing palms too, which trail their long flexible stems over trees and shrubs, or hang in tangled festoons between them.

The trunks of some are almost perfectly smooth, others rough with concentric rings, or clothed with a woven or hairy fibrous covering, which binds together the sheathing bases of the fallen leaves. Many are thickly beset with cylindrical or flat spines, often 8 or 10 inches long and as sharp as a needle; and the fallen leaves and stems of these offer a serious obstacle to the traveller who attempts to penetrate the tropical forests.

The leaves are large and often gigantic, surpassing those of any other family of plants. In some species they are 50 feet long and 8 wide; these are pinnate or composed of numerous long narrow leaflets placed at right angles to the midrib, but in others the leaves are entire and undivided, and yet are 30 feet or more in length and 4 or 5 in width. But the most remarkable form of leaf is the fan-shaped, which characterizes a considerable number of species, and gives them such a completely different aspect, as to render it, to ordinary observers, the most palpable feature dividing the whole family into two distinct groups. The Palms having fan-shaped leaves are, however, comparatively few, being only 91 out of 582 known species.

The flowers are small and inconspicuous, generally of a white, pale yellow or green colour, but often produced in such dense masses as to have a striking appearance. They sometimes emit a very powerful odour, which attracts swarms of minute insects; and a newly-burst palm spathe may often be discovered by the buzzing cloud of small flies and beetles which hover over it.

The fruits are generally small, when compared with the size of the trees; the common cocoa-nut being one of the largest in the whole family. The kernel of many is too hard to be eaten, and the outer covering is often fibrous or woody; but in others the seeds are covered with a pulpy or farinaceous mass, which in most cases furnishes a grateful and nutritious food.

The purposes to which the different parts of Palms are applied are very various, the fruit, the leaves, and the stem all having many uses in the different species. Some of them produce valuable articles of export to our own and other countries, but they are of far more value to the natives of the districts where they grow, in many cases furnishing the most important necessities for existence.

The Cocoa-nut is known to us only as an agreeable fruit, and its fibrous husk supplies us with matting, coir ropes, and stuffing for mattresses; but in its native countries it serves a hundred purposes; food and drink and oil are obtained from its fruit, hats and baskets are made of its fibre, huts are covered with its leaves, and its leaf-stalks are applied to a variety of uses. To us the Date is but an agreeable fruit, but to the Arab it is the very staff of life; men and camels almost live upon it, and on the abundance of the date harvest depends the wealth and almost the existence of many desert tribes. It is truly indigenous to those inhospitable wastes of burning sand, which without it would be uninhabitable by man.

A palm tree of Africa, the *Æleis guianensis*, gives us oil and candles. It inhabits those parts of the country where the slave trade is carried on, and it is thought by persons best acquainted with the subject that the extension of the trade in palm oil will be the most effectual check to that inhuman traffic; so that a palm tree may be the means of spreading the blessings of civilization and humanity among the persecuted negro race.

Sago is another product of a palm, which is of comparatively little importance to us, but in the East supplies the daily food of thousands. In many parts of the Indian Archipelago it forms almost the entire subsistence of the people, taking the place of rice in Asia, corn in Europe, and maize and mandioca in America, and is worthy to be classed with these the most precious gifts of nature to mankind. Unlike them, however, it is neither seed nor root, but is the wood itself, the pithy centre of the stem, requiring scarcely any preparation to fit it for food; and it is so abundant that a single tree often yields six hundred pounds weight.

The canes used for chair bottoms and various other purposes, are the stems of species of *Calamus*, slender palms which abound in the East Indian jungles, climbing over other trees and bushes by the help of the long hooked spines with which their leaves are armed. They sometimes reach the enormous length of 600 or even 1000 feet, and as four millions of them are imported into this country annually, a great number of persons must find employment in cutting them.

A variety of species, in all parts of the world, furnish a sugary sap from their stems or unopened spathes, which when partly fermented is the palm wine of Africa and the Toddy of the East Indies; and a similar beverage is procured from the *Mauritia vinifera* and other species in South America. Indeed, at the mouth of the Orinoco dwell a nation of Indians whose existence depends almost entirely on a species of Palm, supposed to be the *Mauritia flexuosa*. They build their houses elevated on its trunks, and live principally upon its fruit and sap, with fish from the waters around them.

Among the most singular products of palm trees are the resins and wax produced by some species. The fruits of a species of *Calamus* of the Eastern Archipelago are covered with a resinous substance of a red colour, which, in common with a similar product from some other trees, is the Dragon's blood of commerce, and is used as a pigment, for varnish, and in the manufacture of tooth powder. The *Ceroxylon andicola*, a lofty palm growing in the Andes of Bogotá, produces a resinous wax which is secreted in its stem and used by the inhabitants of the country for making candles and for other purposes. Again, in some of the northern provinces of Brazil is found a palm tree called Carnaúba, the *Copernicia cerifera*, having the underside of its leaves covered with white wax, which has no admixture of resin, but is as pure as that procured from our hives.

The leaves of palms, however, are applied to the greatest variety of uses; thatch for houses, umbrellas, hats, baskets and cordage in countless varieties are made from

them, and every tropical country possesses some species adapted to these varied purposes, which in temperate zones are generally supplied by a very different class of plants. The Chip, or Brazilian-grass hats, so cheap in this country, are made from the leaves of a palm tree which grows in Cuba, whence they are imported for the purpose: the palm is the *Chamærops argentea*; and in Sicily an allied species, the *Chamærops humilis* (the only European palm), is applied in a similar manner to form hats, baskets, and a variety of useful articles.

The papyrus of the ancient Egyptians, and the metallic plates on which other nations wrote, were not used in India, but their place was supplied by the leaves of palms, on whose hard and glossy surface the characters of the Pali and Sanscrit languages were inscribed with a metallic point. The leaves of the *Corypha taliera* are used for this purpose, and when strung together, form the volumes of a Hindu library.

A favourite stimulant too of the Malays is furnished by a palm. The fruit of the *Areca catechu* is the betelnut, which they chew with lime, and which is their substitute for the opium of the Chinese, the tobacco of Europeans, and the coca of the South Americans.

One of the most recent introductions into our own domestic economy is the fibre of a palm, the Piassaba, which is now generally used for coarse brooms and brushes; and in the valley of the Amazon, of which it is a native, the same material is manufactured into cables, which are cheap and very durable in the water.

We have now glanced at a few of the most important uses to which Palms are applied, but in order to be able to appreciate how much the native tribes of the countries where they most abound are dependent on this noble family of plants, and how they take part in some form or other in almost every action of the Indian's life, we must enter into his hut and inquire into the origin and structure of the various articles we shall see around us.

Suppose then we visit an Indian cottage on the banks of the Rio Negro, a great tributary of the river Amazon in South America. The main supports of the building are trunks of some forest tree of heavy and durable wood, but the light rafters overhead are formed by the straight cylindrical and uniform stems of the Jará palm. The roof is thatched with large triangular leaves, neatly arranged in regular alternate rows, and bound to the rafters with sipós or forest creepers; the leaves are those of the Caraná palm. The door of the house is a framework of thin hard strips of wood neatly thatched over; it is made of the split stems of the Pashiúba palm. In one corner stands a heavy harpoon for catching the cow-fish; it is formed of the black wood of the *Pashiúba barriguda*. By its side is a blowpipe ten or twelve feet long, and a little quiver full of small poisoned arrows hangs up near it; with these the Indian procures birds for food, or for their gay feathers, or even brings down the wild hog or the tapir, and it is from the stem and spines of two species of Palms that they are made. His great bassoon-like musical instruments are made of palm stems; the cloth in which he wraps his most valued feather ornaments is a fibrous palm spathe, and the rude chest in which he keeps his treasures is woven from palm leaves. His hammock, his bow-string and his fishing-line are from the fibres of leaves which he obtains from different palm trees, according to the qualities he requires in them, — the hammock from the Mirití, and the bow-string and fishing-line from the Tucúm. The comb which he wears on his head is ingeniously constructed of the hard bark of a palm, and he makes fish hooks of the spines, or uses them to puncture on his skin the peculiar markings of his tribe. His children are eating the agreeable red and yellow fruit of the Pupunha or peach palm, and from that of the Assaí he has prepared a favourite drink, which he offers you to taste. That carefully suspended gourd contains oil, which he

has extracted from the fruit of another species; and that long elastic plaited cylinder used for squeezing dry the mandiocca pulp to make his bread, is made of the bark of one of the singular climbing palms, which alone can resist for a considerable time the action of the poisonous juice. In each of these cases a species is selected better adapted than the rest for the peculiar purpose to which it is applied, and often having several different uses which no other plant can serve as well, so that some little idea may be formed of how important to the South American Indian must be these noble trees, which supply so many daily wants, giving him his house, his food, and his weapons.

To the lover of nature Palms offer a constant source of interest, reminding him that he is amidst the luxuriant vegetation of the tropics, and offering to him the realization of whatever wild and beautiful ideas he has from childhood associated with their name.

In the equatorial regions of South America they are seldom absent. Either delicate species flourishing in the dense shade of the virgin forest; or lofty and massive, standing erect on the river's banks; or on the hill side raising their leafy crowns on airy stems above the surrounding trees, creating, as Humboldt styles it, "a forest above a forest;" in every situation some are to be met with as representatives of the magnificent and regal family to which they belong.

In the following pages the genera and species are arranged in the order adopted by Dr. Martius in his elaborate work already alluded to.

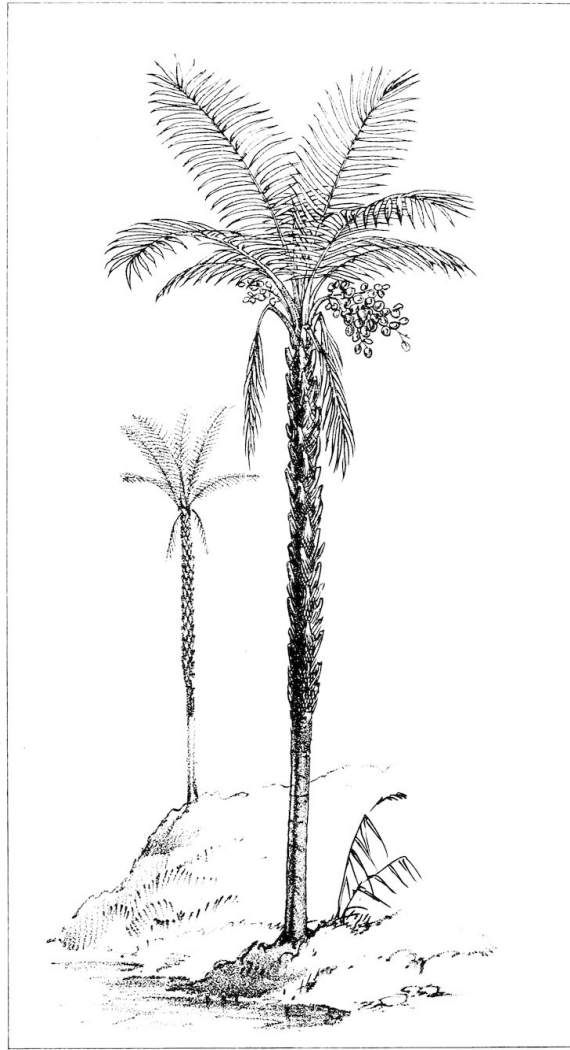
Natural Order PALMACEÆ.

Genus *Leopoldinia*, *Martius*.

This genus is characterized by having flowers containing stamens or pistils only, intermingled on the same spadix, and by not having a spathe. The male flowers have six stamens and no rudiments of a stigma. The female flowers have three sessile stigmas and rudimentary stamens. The spadix is much branched and decomposed.

The species are trees of a moderate size without any spines or tubercles, but remarkable for the netted fibres which spring from the margins of the sheathing petioles, and cover the stem half way down or sometimes even to its base. The leaves are terminal and pinnate, the leaflets spreading out regularly in one plane. There are often three or four spadices on a tree, bearing abundance of small flowers, and ovate compressed fruit, the outer covering of which is fleshy.

Four species are known, and they are all found in the same limited district near the Rio Negro, some extending to the tributaries of the Orinoco near its source, and one being found south of the Amazon nearly opposite the mouth of the Rio Negro. All however grow on the banks or in the immediate vicinity of black-water streams, which occur more extensively in South America than in any other part of the globe. Two species are described by Martius, one of which is here figured with two others, which are believed to be new. They are not found more than 1000 feet above the level of the sea.



Pl. IV.

W. Fitch lith. Ford & West Imp.

LEOPOLDINIA PULCHRA. Ht. 12 Ft.



End of Sample