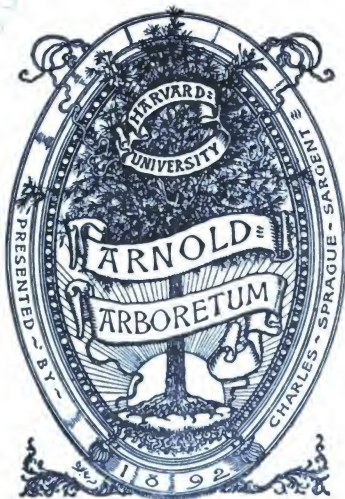






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AND THEIR ALLIES,

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For an account of the *Junco* + *12* see *Geol. Journ.*,
1851, p. 107. See also *Palmer*. See also *Palmer*, 1852,

PREFACE.

IN producing the present little Work I cannot say that I have yielded to any urgent solicitations of friends, but I must own that after having made known my resolution to write a Popular History of the Palms and their Allies, I received so much warm encouragement and ready assistance from all sides, that I feel I have undertaken a task in which many are interested. The late Dr. E. Stocks furnished me with notes on the Palms of Scinde, and other parts of India, with which he was familiar; Professor C. B. Heller, well known as a successful explorer of the South-eastern States of Mexico, drew up an account of the Palms of that region; Professor Göppert, one of the most accomplished palæontologists of the day, sent the necessary information about

the fossil Palms ; John Miers, Esq., the distinguished traveller and botanist, communicated notes on the Palms of Chile and Peru ; Dr. Carl Bolle, the indefatigable investigator of the Canary Islands, wrote an elaborate treatise on the Palms of that archipelago ; Dr. J. D. Hooker, the talented author of the 'Flora Antarctica' and other publications of high repute, readily opened some of the vast treasures of information accumulated during a voyage round the world and scientific journeys in the East Indies ; and lastly, though not least, Mr. John Smith, the intelligent curator of the Royal Botanic Gardens at Kew, and his son, the zealous curator of the Museum of Economic Botany at the same Institution, obligingly gave me the loan of a series of notes, containing extracts from works often not easily accessible, and information obtained from the lips of travellers, such as Purdie and others. I have also to acknowledge to the three last-named gentlemen, as well as to Mrs. Hooker, my deep sense of gratitude for assisting in seeing this Work through the press, and eradicating the mistakes and crudities which here and there had crept into the manuscript. Besides these sources of information,

my own circumnavigation of the globe in H.M.S. Herald, and travels in tropical countries, put me in possession of numerous facts bearing upon the subject. I have also consulted all the works I could obtain—and this number is nearly two hundred; but as no attempt has ever been made to collect such information as that contained in the present publication, this branch of botanical literature is of course very much scattered about, and it would be dishonest to pretend that the Popular History of the Palms, etc., contains an account of all that has ever been written on this subject. However, I may safely affirm, without the fear of contradiction, that there is no work in existence, in any language whatever, in which an equal amount of information, such as here given, is to be met with.

The quotations from other works, though they may appear between inverted commas, have in most instances been very much condensed; and as there was, as might be expected in information derived from so many different quarters, a great diversity in the terms employed, I have endeavoured to reduce them to uniformity, especially where the rules of modern botanical terminology rendered such a

proceeding imperative. For instance, the term "leaf" has been substituted for "branch" and "frond," "segment" for "pinnule" and "leaflet." Less stringency has been shown with words which did not interfere with those terminological laws; that of "kernel," for example,—to the use of which, in strictly scientific works, strong objections must be raised, as it denotes sometimes cotyledons, sometimes the albumen, sometimes the whole seed,—has been admitted, as it has a fixed meaning in popular language, and people will always know a kernel when they see one.

The illustrations have been adopted from the works of Martius, Hooker, Wallace and others, by M. J. Ch. Frank, to whom great praise is due for the skill shown in reducing them, mostly from large folio plates, to the small size of this volume, without sacrificing their minute characteristic features.

That I should have been desirous of dedicating this little Work to so great a man as Humboldt, will be found quite natural by those who know that it was Humboldt who more than half a century ago wrote the first popular account of the Palms, and that it was he who, by his glowing de-

scriptions of tropical scenery, did more than any one living to encourage that desire for the exploration of equinoctial regions, to which we owe indirectly so much of our knowledge of these Palms, and directly the elaborate works of Martius, Griffith, Blume, and other Botanists of eminence, more particularly devoted to them. How much Humboldt himself was pleased with the dedication will be evident from the following letter, which in justification of what I have stated cannot be very well withheld:—

“ Berlin, June 18, 1855.

“ My dear Friend and ‘ Travelling Companion,’* ”

“ Your kind letter of the 13th instant has been a source of great pleasure to me. I received it the moment of my return from Potsdam, early this morning, there being no postal delivery on a Sunday at Berlin. As there is only an hour left until the departure of the mail-train, and as you are pleased to long for a speedy answer, I must unfortunately be very brief in expressing my high sense of gratitude for the honour you intend to confer upon me. A dedication from you, dear Seemann, cannot but be extremely agreeable and flattering, and I gladly accept your favour, but on the express condition that you will simply call me your friend,

* A playful allusion to my academical name, “ Bonpland.”—*B. S.*

and avoid every species of titulation, which is quite contrary to my way of thinking. . . . Your Work will, I am convinced, go through several editions; it begins in a jovial strain, but never oversteps, according to my opinion, the boundaries of good taste; it may be called popular, because, without supposing the reader to be possessed of any great botanical knowledge, it supplies him with an agreeable literary recreation. The 'low connections' (p. 12) with the plebeian Grasses have not proved a serious disadvantage to your patrician, aristocratic Palms. . . . I have read line for line of the sheets you sent, and as a proof thereof note two unfortunate misprints, which I discovered at page 33 and 34. The first is *Moricheles*, instead of *Morichales*. The terminations indicative of forests (*Waldendigungen*) form themselves in Spanish always in 'al' or 'ar;' thus, Pino, Pinal or Pinar (Pine-forest); Olivo, Olivar (Olive-forest); Roble, Robledar (Oak-forest). The second misprint is *Cauca* and *Erenato*, instead of *Caura* and *Erevato*. Of the Caura, which flows into the Erevato, I have published a special chart. Caura, again, is a tributary of the Orinoco, whilst Cauca is a tributary of the Magdalena. You will perceive from this that I have carefully perused your instructive pages. The description of the great Palm-house at Kew, and especially the paragraphs which immediately succeed that, have pleased me very much indeed. Pray do not omit to mention the surprise travellers experience when beholding for the

first time European forms (*Pinus* for instance) growing together with tropical ones (Palms, etc.) in the same forest, as is the case at Chilpanzingo, on the western declivity of the Mexican tableland, or in that, on account of its mahogany, frequented Isle of Pines, south of Cuba. Peter Martyr (Angheria) states on the authority of one of Columbus's letters that *Pineta* and *Palmita* grew there together. The Conquistadores noticed a coniferous plant with fruit resembling Olives (*parezen azeytunos del Azarate de Sevilla*), which I take to be a species of the genus *Podocarpus*. As your Work will be much read, you must not forget to dwell upon the *oppositum* of the numerous littoral plants,—the little-known, small group of mountainous or alpine Palms (*Ceroxylon Andicola*, *Oreodoxa frigida*, and *Kunthia montana*). *Ceroxylon Andicola* I found in the cordillera of the Pass of Quindiu, between Ibague and Cartago, not lower on the declivity than 7930, not higher than 9700 English feet (you could say between 7900 and 9700 feet), in company of *Podocarpus*-trees and *Quercus Granatensis*.

“ I am, etc.,

“ ALEXANDER VON HUMBOLDT.”

I shall offer no apology for the numerous imperfections which, notwithstanding all the advantages I have enjoyed, may still appear in these pages. Those who have been en-

gaged in similar compositions will, I am sure, if they should happen to be among the number of my critics, deal leniently with me; whilst those who have not, will please to bear in mind that my "History of Palms" is not a purely literary production, but a scientific work, which, to meet the views of my publisher, has assumed a popular garb, in which mere literary considerations have been made subordinate to scientific accuracy.

BERTHOLD SEEMANN.

London, December 8th, 1855.

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POPULAR HISTORY
OF THE
PALMS AND THEIR ALLIES.



INTRODUCTION.

My first acquaintance with the Palms was not in the great conservatories of Europe, nor in the virgin forests of tropical America or Asia, where I had afterwards an opportunity of studying them, but in a dusty schoolroom of my native town. Acquaintance with them was, I may say, not sought by me; but, as the reader will presently see, quite forced upon me. Our schoolmaster, having to keep in order about fifty unruly boys, had always a number of canes, the excellence of which we had an opportunity of testing whenever we had been guilty of a misdemeanor. Deeming our master's possession of these light, flexible sticks, with their yellowish polish, a circumstance not very conducive to our comfort, we seized

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upon them whenever a fair chance presented itself. Having once laid hands upon them, they were, on the advice of some of the elder boys, cut into pieces about as long as cigars, lighted at one end, and thus used for practising smoking, so as to be perfect in that habit whenever the increased allowance of our pocket-money should admit of investing the requisite sum in the purchase of real cigars, genuine pipes, and unadulterated tobacco! Thus we succeeded in converting instruments peculiarly hateful to us into a great source of amusement; for such, I fear, I must call it. However, all our endeavours to exhaust the stock of our master were as ineffectual as if we had attempted to fill the leaky vessel of the Danaids. The supply was quite equal to the demand; and lo! to prove to us the utter uselessness of our illegal proceedings, we had one day, on leaving school, the satisfaction of seeing a whole waggon-load of those abominable canes entering the town. Some of us followed this interesting vehicle to the very door of the house in which the cargo was to be stored; and one of our number, bolder than the rest, actually ventured so far as to ask the person who took charge of it whence the sticks came, and what trees produced them, questions which drew forth the reply, that they had been sent from far across the

sea, and that they were the shoots of a species of *Palm*. This information had a most melancholy effect when repeated to our other school-fellows. Up to that moment, we had been labouring under the belief that the canes were the branches of some willows of our own county, and that, if we could only discover the place where they grew, we could easily destroy them, and thus free ourselves for ever from the tyranny of the magisterial sceptres. Even now, after their true source had been pointed out to us, those who had most strongly advocated the willow theory still clung to it; and as the point was one of vital importance to all, we determined to consult some book on the subject, so as to set our minds at rest. After a great deal of searching in the limited library at our disposal, we found in some encyclopædia a passage which, alas! confirmed the statement of the storekeeper. It informed us that the canes in question were slender stems of an East Indian Palm, belonging to the genus *Calamus*, and used for making bottoms of chairs, walking-sticks, etc. "Another species of this interesting genus" (very interesting, we thought), continued the book, "yields the famous 'Malacca canes' so much used in Europe." There was no appeal from such authority; and we, entertaining no longer any doubt about the true source

of our master's sticks, relinquished every hope of cutting off his inexhaustible supplies.

It was thus that my attention was first directed to that natural order of plants, the Palms, one of the largest, the most beautiful, as well as the most useful, of the whole Vegetable Kingdom. It was rather an odd introduction; but I daresay, if every one of my readers would only ask himself where and how he first came in contact with those plants of which the present work treats, narratives even more strange than the one related would probably be brought to light. Palms, indeed, supply so many of our wants, and administer so largely to our comforts, that those fully impressed with this grand truth, may well wonder how the human race can inhabit any parts of the globe whence they are excluded. It was therefore not merely a rhetorical figure when Linnæus, full of admiration for this noble tribe of plants, exclaimed—"Man *dwells naturally* within the tropics, and lives on the fruit of the Palm-tree; he *exists* in other parts of the world, and there makes shift to feed on corn and flesh." Take, for instance, a walk in the streets of London, and observe everywhere how substances originally obtained from Palms, and turned to useful purposes, meet your eye. That ragged boy, sweeping the crossing, and begging you

with a faltering voice, real or assumed, to 'remember poor Jack,' holds in his hands a broom, the fibrous substance of which was cut by the wild Indians of Brazil from the stems of a Palm; that gentleman, dressed in the tiptop of fashion, who playfully swings his 'Penang lawyer,' little thinks that, in carrying that walking-cane, he is in fact carrying a young plant of the *Licuala acutifida*; that fine lady's parasol-knob—what is it but a Coquilla-nut turned into that shape? Continue your walk, and you will find still more, worthy of notice in a Popular History of the Palms. Those "chip hats" so extensively worn on fine summer days, what are they made of?—the leaves of a Cuban palm (*Thrinax argentea*). Look at that stand, with heaps of dates upon it, gathered on the borders of the great Desert of Sahara, and eagerly purchased by the people; look at those fine coconuts, grown on the shores of the Indian Ocean and the Caribbean Sea, and here retailed in penny slices to the humbler inhabitants of the British metropolis. Step into a house, and there too will you observe many products obtained from Palms in the most remote corners of the globe. That thick brownish matting, now so generally used for covering halls, staircases, and offices, is woven from the husk (*mesocarpium*) surrounding the cocoa-nut. Those beautiful

pieces of furniture, which arrest your attention, are made of various kinds of palm wood. That elegant little plaything you see in the hands of yonder child, was skilfully manufactured of the bone-like kernels (*albumen*) of the Vegetable Ivory Palm. Those fine stearic candles illumining the room—what are they composed of but the fatty substance extracted from the fruit of the Oil Palm and the Cocoa-nut? That sago, which, under various disguises, appears at the dinner-table, it also is the produce, the pith, of Palms flourishing in the islands of the East Indian Archipelago. That arrack, pronounced by connoisseurs to be of excellent quality, it too is extracted from a Palm,—the Cocoa-nut. Be still more inquisitive, and ask of what that tooth-powder, so extensively applied, consists, and you will be told that its chief ingredients are Betel-nuts, previously reduced to charcoal, and dragon's blood,—both produced by palms; or examine our toilet soap, and you will find that the fatty substance, which enters so largely into the composition of it, has been derived from Palms. Everywhere you will meet numerous products of Palms, either in a raw state, or turned by the ingenuity of man to some useful purpose; and this too at a place thousands of miles from those regions which Palms principally acknowledge as their native

country. Even at such a distance, their benign influence is strongly felt ; and millions of people, whose privilege it has never been to obtain even a glimpse of a single Palm, entertain feelings of well-founded gratitude towards an order of plants which is to them a source of so much usefulness and enjoyment.

But if such is the case in a city like London, and in a country like England, where few Palms ever grow except within the walls of a well-managed conservatory, and under the careful treatment of a judicious gardener, it is much more so the case in regions like those of tropical Asia, Africa, America, and Australia, where these elegant members of the Vegetable Kingdom flourish in all their native splendour, where the inhabitants derive nearly every necessary of life from them, and where almost every action of a man's daily occupation comes more or less in contact with them ; associating them so closely with the traditions, the history, and the destiny of the countries in which they have taken up their abode, that it is quite impossible to treat of their religious, social, or political condition, without mentioning in a greater or lesser degree the Palms,—those splendid offspring of Tellus and Phœbus. To illustrate this more clearly, let us change the scene we behold on the banks of the Thames

for one of those on the Rio Negro, the great tributary of the Amazon. The background is a thick virgin forest, the wild domain of tiger-cats, tapirs, monkeys, and snakes; huge trees are densely crowded together; orchids, pepperworts, ferns, and other epiphytical plants cover their trunks; creepers are luxuriantly growing among them, here forming elegant festoons, there hanging slovenly, like ropes of a ship out of trim: all is teeming with vegetation. The foreground is an open spot with a few Indian huts and some isolated Palms, the dark green foliage of which, gracefully waving in the morning air, forms bold outlines, agreeably contrasting with the dark blue of the sky; a group of merry boys, almost entirely in the simple garb of nature, are playing around them, practising their bows and arrows, and reminding one of a petty army of young Cupids preparing for a conquering expedition.

A comparison of the scene with that we beheld in London is sufficient to create an interest for it. To learn more of an Indian's life becomes a prominent wish, and to visit one of these huts an irresistible desire. Let us enter then, guided by that enterprising traveller Mr. Wallace, one of those before us; the inmate is friendly disposed; he will make some allowance for our curiosity, and permits us to examine the

various articles which arrest our attention. The main supports of the building are stems of some forest-tree of heavy and durable wood, but the light rafters overhead are formed by the straight, cylindrical and uniform trunks of the Jara Palm (*Leopoldinia pulchra*). The roof is thatched with large triangular leaves, arranged in regular alternate rows, and bound to the rafters with sipos, or creepers; the leaves are those of the Caraná Palm (*Mauritia Carana*). The door of the house, a framework of thin hard strips of wood neatly thatched over, is made of the split stems of the Pashiuba Palm (*Iriarteia exorrhiza*). In one corner stands a heavy harpoon, for catching the cow-fish; it is formed of the black wood of the Pashiuba barriguda (*Iriarteia ventricosa*). By the side of it is a blowpipe, from ten to twelve feet long, and a little quiver full of small poisoned arrows, for procuring birds for food or for their gaily-coloured feathers, or even bringing down the wild hog or tapir; and it is from the stem and nerves of the petiole of two species of Palms that they are made. The great bassoon-like musical instruments, the Indian has 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 bowstrings, and his

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fishing-line are obtained from the fibres of different palm-leaves. The comb which he wears on his head, is ingeniously constructed of the hard wood 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 (*Guilielma speciosa*), and from that of the Assai (*Euterpe edulis*) he has prepared a favourite drink, which he offers to his guests. That carefully-suspended gourd contains oil, which is the produce of the fruit of another species; and that long elastic plaited cylinder, used for squeezing dry the mandiocca pulp, extracted from the root of a shrubby Euphorbiaceous plant, the *Manihot utilissima*, is made of the trunk of one of the singular climbing Palms, which resists for a considerable time the action of the poisonous juice it comes in contact with.

The curtain may be allowed to drop for a moment on this view of Indian life. Enough has already been shown to inspire the reader, if not as yet with love, at least with respect, for a tribe of plants which constitutes so important an element in the social life of both the most civilized nations and the rudest savages. To make him still more favourably disposed towards Palms, I will give a general description of

them ; add a summary of their geological and geographical distribution, and a brief notice of their cultivation in northern Europe ; and then enumerate the most prominent species, with detailed accounts of their aspect, structure, history, and uses.

GENERAL ACCOUNT OF THE PALMS.

Palms have been termed “the Princes of the Vegetable Kingdom.” This title, however poetical to some minds, is so far objectionable, as it may possibly lead those considering things in the abstract to the erroneous supposition that the Palms, like the chiefs of states, to whom they are thus compared, are placed pre-eminently at the head of the world of plants ; whilst, on the contrary, notwithstanding their beauty and usefulness, they occupy but a subordinate position in that classification of organized beings known as the Natural System of Botany. They belong, systematically speaking, to the *Endogens* or *Monocotyledons*, the same great division which comprises the Grasses, Sedges, Lilies, Orchids, and Screw-pines, and which stands about intermediate between the highest and lowest orders of the Vege-

table Kingdom. But the metaphor holds good in another sense: Palms may be said to be as exclusive as princes, forming close alliances amongst themselves, and acknowledging no *immediate* relationship with any of the numerous families of the great natural division amongst which they are classed. They seem to glory in isolation, proudly waving their graceful foliage amongst those with whom they are thrown together. Yet, as is often the case in every-day life, they have, like many noble families, low connections and poor relations. In their external structure, as well as in their internal organization, they approach nearest to the Grasses; plants which the same authority (Linnæus) who conferred upon Palms the dignity of princes, termed "the Plebeians." This relationship will probably be thought rather distant by those who, from want of other materials, compare the meadow-grasses of the temperate zones with the cocoa-nut trees of the tropics; but it will become more apparent when the huge Bamboo, as the representative of the Grasses, is placed by the side of some small Rattan, as that of the Palms. Indeed Nees von Esenbeck, one of the best systematic botanists of the present day, considers Grasses to be a sort of Palms of a lower grade; and he is not singular in that opinion. In habit, especially in the in-

stance cited, the two Orders have much in common : their leaves are formed upon exactly the same plan, the only difference being that those of the Palms are generally (not always) divided, and even the silicious secretions, so characteristic of Grasses, are observable in Rattans ; whilst, about their flowers, it may be said that those of the Grasses are those of the Palms, with the floral envelopes removed and only the bracts remaining.

Palms* are perennial and woody plants ; they are never

* The structure of the Palm has been well explained by various authors, and is generally looked upon as typical of that of Endogens in general. In the language of Lindley (*Vegetable Kingdom*, p. 95) it is as follows:—“In the beginning, the embryo of a Palm consists of a cellular mass of a cylindrical form, very small and not at all divided. As soon as germination commences, a certain number of cords of ligneous fibre begin to appear in the radicle, deriving their origin from the plumule. Shortly afterwards, as soon as the rudimentary leaves of the plumule begin to lengthen, spiral and dotted vessels appear in the tissue in connection with the ligneous cords ; the latter increase in quantity as the plant advances in growth, shooting through the cellular tissue, and keeping parallel with the outside of the root. At the same time, the cellular tissue increases in diameter to make room for the ligneous cords (or woody bundles, as they are also called). At last a young leaf is developed, with a considerable number of such cords in connection with its base ; and, as its base passes all round the plumule, these cords are consequently connected equally with the centre which that base surrounds. Within this a second leaf gradually unfolds, the cellular tissue increasing horizontally at the same time ; the ligneous cords, however, soon cease to maintain anything

annual and herbaceous. Most of them attain the size and assume the aspect of trees ; a considerable number however remain shrubby, and some even have quite the appearance, but nothing save the appearance, of perennial herbs. The

like a parallel direction, but form *arcs*, the extremities of which pass upwards and downwards, losing their extremities in the leaf on the one hand, and on the other in the roots, or in the cellular integument on the outside of the first circle of cords ; at the same time the second leaf pushes the first leaf a little from the centre towards the circumference of the cone of growth. In this manner leaf after leaf is developed, the horizontal cellular system enlarging all the time, and every successive leaf, as it forms at the growing point, emitting more woody bundles, curving downwards and outwards, and consequently intersecting the older arcs at some place or other ; the result of which is that the first formed leaf will have the upper end of the arcs which belong to it longest and much stretched outwardly, while the youngest will have the arcs the straightest ; and the appearance produced in the stem will be that of a confused entanglement of woody bundles in the midst of a quantity of cellular tissue. As the stem extends its cellular tissue longitudinally while this is going on, the woody arcs are consequently in proportion long, and in fact usually appear to the eye as if almost parallel, excepting here and there, where two arcs intersect each other. As in all cases the greater number of arcs curve outwards as they descend, and eventually break up their ends into a multitude of fine divisions next the circumference, where they assist in forming a cortical integument, it will follow that the greater part of the woody matter of the stem will be collected near the circumference, while the centre, which is comparatively open, will consist chiefly of cellular tissue ; and when, as in many Palms, the stem has a limited circumference, beyond which it is its specific nature not to distend, the density of the circumference must, it is

various modifications of the trunk, or stem, determine this part of their habit; for, while the trunk of some species hardly shows itself aboveground, it attains in others the length of 500 feet; while in some it seems to have no

obvious, be proportionately augmented. It is however a mistake to suppose that the great hardness of the circumference of old Palm-wood is owing merely to the presence of augmenting matter upon a fixed circumference; this will account but little for the phenomenon. We find that the woody bundles next the circumference are larger and harder than they originally were, and consequently we must suppose that they have the power of increasing their own diameter subsequent to their first formation, and they also act as reservoirs of secretions of a hard and solid nature, after the manner of the heart-wood of Exogens. When the growth of the stem goes on in this regular manner, with no power of extending horizontally beyond a specific limited diameter, a trunk is formed, the sections of which present a singular appearance. There is a number of curved spots crowded together in a confused way, most thick and numerous at the circumference, comparatively small and thinly placed at the centre; and the only regular structure that is observable with the naked eye is that the curves always present their convexity to the circumference. Never is there any distinct column of pith, or medullary rays, or concentric arrangement of the woody arcs; nor does the cortical integument of the surface of the stems assume the character of bark, separating from the wood below it; on the contrary, as the cortical integument consists very much of the finely-divided extremities of the woody arcs, they necessarily hold it fast to the wood, of which they are themselves prolongations; and the cortical integument can only be stripped off by tearing it away from the whole surface of the wood, from which it does not separate without leaving myriads of little broken threads behind."

power to raise itself upwards, but remains a low creeping caudex, it towers in others to the height of 200 feet, displaying a vigour altogether prodigious; while in some it is hardly as thick as a goosequill, it measures in others from three to five feet in diameter; while in some it is climbing and seeking for support among the surrounding vegetation, it exists in others quite independent of all other plants; while in some it is cylindrical and undivided (simple), it is in others—as the Doom or Gingerbread-tree of Egypt, the Palmetto of Mexico, and the Sago Palm of New Ireland—more or less forked; while in some it is perfectly smooth or even brightly polished, it is in others rough with concentric rings; and again, while in some it is armed with spines of greater or lesser length and thickness, it is in others covered with hairy fibres.

The foliage, that part of the Palms which renders them objects of such beauty and elegance, generally forms a magnificent crown at the end of the trunk. The leaves, supported on petioles, or leaf-stalks, sheathing at the base, are alternate, coriaceous, and often of such gigantic size,—measuring, as they do in some species, fifty feet in length and eight in width,—that they surpass in the latter respect those of any natural order of plants. Their structure may be summed

up in a few words:—they are simple, and furnished with a midrib, from which parallel veins branch off. This structure, best seen in some species of *Geonoma*,—*G. simplicifrons*, Willd., for instance, where it appears in all its normal simplicity,—is common to all Palms, but assumes in different species different forms, easily recognized by accomplished botanists wont to look upon the Vegetable Kingdom with a morphological eye, but not so readily traced by those who have made only a limited progress in phytological studies. In some species—as, for example, in the species of *Geonoma* just quoted—the blade of the leaves is quite entire; while in others, of which the Cocoa-nut may be cited as the type, it is cut into long segments (pinnatisect), giving it the appearance of the plume of a feather: occasionally, in the genus *Caryota*, these segments are again divided (bipinnatisect), their ultimate divisions resembling in shape the fin or tail of a fish. The midrib in these three forms, it must be observed, extends throughout the whole length of the leaves; when the contrary is the case, namely when the midrib is less developed, palmate or fan-shaped leaves are the result. This however does not happen very frequently; for, out of 582 known species, only ninety-one have fan-shaped leaves.

The leaves are green, generally on both sides, as in the

different species of *Chamadorea*, but occasionally on the under side of a silvery white, as in the *Copernicia Miraguama* and *C. cerifera*; sometimes the middle of some leaves is adorned with concentric bands of yellow and blue in the manner of a peacock's tail, as in the prickly *Mauritia*, discovered by Bonpland, on the banks of the Rio Atabapo. The direction of the leaves is a character of no less importance than that of form and colour. The segments are either ranged in a comb-like manner close to one another, with a stiff parenchyma, allowing the solar rays to play over their surface, and causing them to shine with a brilliant verdure in the Cocoa-nut Palm, and with a fainter, ashy-coloured hue in the Date-tree; or they have a more flexible, grass-like texture, and are curled near the extremity. Another peculiarity is also notable: the more acute the angle made by the leaves with the upper part of the stem—the nearer the leaves approach the perpendicular,—the bolder and nobler is the aspect of the species to which they belong. This will at once be evident by comparing the pendent leaves of the Palma de Covija (*Copernicia tectorum*) with the more horizontal leaves of the Cocoa-nut Palm, and the lofty heavenward-pointed foliage of the Jagua, the Cucurito, and Pirijao.

In Palms with feathery (pinnatisect) leaves the petioles either burst from the dry, rough, ligneous portion of the stem, —as, for instance, in the *Cocos nucifera* and *Phoenix dactylifera*,—or there rises in the rough part of the stem a grass-green, smooth, and thinner shaft, like one column above another, from which the leaf-stalks spring, as is the case in *Oreodoxa regia*. In the Fan Palms the living foliage often rests on a layer of dead leaves, imparting to the tree a character of melancholy solemnity and grandeur.

Palms, after having arrived at the proper age, flower either every year until they die, or only *once* during the whole course of their existence. The spathe, or sheath enclosing the flowers, consists of one or many valves, is occasionally of a woody texture, and presents, according to the testimony of Alexander von Humboldt and Richard Schomburgk, the curious phenomenon of bursting suddenly open with an audible report, reminding one of Pindar's Dithyrambus on Spring, and of the moment when, in the Argive Nemæa, "the first opening shoot of the Date Palm announces the coming of balmy Spring." The flowers themselves are produced on either a simple or a branched spadix, appearing in the axil of the leaves or at the end of the stem (being terminal), and in the latter instance fore-

shadowing, as Palms have not the power of forming regular side-branches, the death of the individual graced by their presence.

The flowers, supported by scaly bracts, are polygamous, or occasionally hermaphrodite; they are small and inconspicuous, generally of a white, pale-yellow, or green colour; but, as if to make up for this defect (if we may use that term), they emit sometimes a very powerful odour, which attracts such swarms of insects that a newly-burst spathe may, in most cases, be discovered by the buzzing cloud of them hovering around it; and moreover they are mostly produced in such masses as to present an eminently striking and imposing appearance. A single spathe of the Date Palm contains 12,000 male flowers; *Alfonsia amygdalina* has been computed to have 207,000 flowers in a spathe. A still greater number is observable in *Sagus Rumphii*, a single spathe of which has, according to the calculations made by Professor Agardh, Mr. Alexander Smith, and myself on one of the specimens in the Botanical Museum at Kew, no less than 208,000 flowers, or about 624,000 upon a single tree!

The sepals,—or outer perigonal leaves, as some authors term them,—three in number, are fleshy or leathery, and

persistent ; the petals, or inner perigonial leaves, alternate with; and are often larger than, the former ; both calyx and corolla, or inner and outer perigonial leaves, are sometimes united throughout the greater part of their length (connate), so as to consist only of a single piece. The stamens are definite, mostly six in number ; in some instances that number is trebled, and very rarely reduced to three. The filaments are quite free, or in a few exceptional cases form amongst themselves a kind of tube. The anthers are turned inwards, and two-celled. The ovary is free, and usually composed of three, or rarely of two or only one, carpellary leaves ; the ovules are solitary, or occasionally in single pairs, erect, and orthotropal, or anatropal in various degrees. The styles are continuous with the carpels, and equal to them in number. The fruits, being drupaceous, or nut-like, or berried, often covered with a fibrous rind, are almost of every colour, and occasionally very numerous ; a single spathe of the Seje Palm of the Orinoco bears as many as 8000 of them. Compared with the size of the plants, they are generally small ; some are in this respect like peas. The common Cocoa-nut is one of the largest ; and the double Cocoa-nut of the Seychelles, measuring about four feet in circumference, is probably

surpassed in its dimensions by none hitherto discovered ; the seed, filling the cavity in which it grows, is often reticulated ; and the albumen—of which the white fleshy part inside the Cocoa-nut may serve as an illustration—fills the kernel, and is frequently ruminant. The embryo is undivided, and conical or cylindrical.

Such is a general account of Palms,—plants which, at the present day, we associate with all that is poetical and beautiful. We introduce them frequently as rhetorical figures, and thus involuntarily bear testimony to the great influence they exercise over our minds. We speak of “palmy days” when wishing to allude to times of glory ; we say of a man that “he has carried off the palm” when desiring to express his having achieved an honourable victory over an adversary ; we give the name of “Palm Sunday” to the festival on which we celebrate the triumphal entry of Jesus Christ into Jerusalem, as much on account of the transcendent ideas connected with that event as on account of the palm-leaves stated to have been used on that occasion. It would be an interesting, though a difficult, inquiry to find out how long Palms have thus been associated with these and similar ideas and sentiments. The first step towards a satisfactory result in that direction

would be to endeavour answering the questions :—“ How long is it since the term ‘ Palm ’ has been used as a general or collective one for the plants now called so ? ” “ Has it, or any synonym, always been applied to them, or has that been the case only in modern times ? ” The latter is the most probable. The Romans—not to go further back—from whom we obtained the name, originally gave it solely, it would seem, to the dwarf Fan Palm (*Chamærops humilis*, Linn.), a plant growing in considerable abundance near the Mediterranean Sea, probably on account of a certain resemblance of its leaves to the human hand (*palma*), in the same way as the Aztecs applied to their singular *Cheirostemon platanoides*, H. B. K., the term “ Macpalxochitlquahuitl,” or hand-flower tree. Afterwards it appears to have been gradually extended to the other members of the Order, until it has become incorporated as a collective term with most modern European languages. The Indian Amarishina has called the Palms “ Kings among Grasses,” a title as objectionable as that of “ Princes of the Vegetable Kingdom,” but so far valuable as it shows an attempt at finding some general term for the whole of them ; for although the Palms, with scarcely any exceptions, have specific names in their native countries, they

are always without any general (collective) ones, unless the latter are derived from the sources indicated. A few words will explain this circumstance. The presence of specific vernacular names in barbarous countries is a sure proof that the plants bearing them have attracted the attention of the natives, either by their noxious or useful qualities, or by their odour, colour, beauty of form, or some other peculiarities; for whenever the contrary is the case, the plants have remained without names. The absence of general vernacular terms in uncivilized countries is not confined to Palms, but is common to all other things, and proves that the nations destitute of them never had any use for them; or, in other words, they never began to generalize, never attempted to reason. This remark applies also to civilized countries, and accounts for our occasionally hearing there unthinking men expressing surprise when a fish is called an animal, and a tree a plant. If therefore we find people or persons inventing or using a general (collective) term for the plants named by us Palms, it indicates a step in popular progress towards a more perfect knowledge of them, the importance of which can scarcely be overrated. It plainly shows that they have commenced to think about them; and that is exactly

the movement which those who, from choice or compulsion, hold the office of popular instructors, are desirous of bringing about.

GEOLOGICAL AND GEOGRAPHICAL DISTRIBUTION OF PALMS.

During the last, and even the first quarter of the present century, so little was known of the structure of Palms, and all that was known appeared so abnormal to the scientific men of those days, that they were only too readily inclined to class with them almost all fossil plants presenting strange and curious forms. This remark applies with full force to *Sigillaria* and *Lepidodendron*, genera belonging to palæozoic formations; and, startling as it may be, it cannot be very surprising to us, when we consider that even in our own times notions equally erroneous prevail to an almost incredible extent. For instance, a principal share in the formation of coal is still ascribed by the generality of geologists to the Ferns, although it was proved some years ago, by a series of careful observations on numerous carboniferous formations, that such can be claimed only for the *Sigillarias* and *Stigmarias*; that merely a sub-

ordinate share is due to the Araucarias and Calamites contained in anthracite coal, and a still more insignificant one to the Lepidodendrons, the Ferns, and the other members of the flora of the carboniferous period.

A diligent study of the extinct flora has demonstrated that the Palms occur more rarely than was thought in the transition rocks and the carboniferous formation, and more frequently than was believed in more recent formations. Generally speaking, we know at present only trunks, leaves (both fan-shaped and pinnatisect ones), and a few fruits of the fossil Palms; flowers have not as yet been discovered, and spathes, which have been disinterred, have hitherto not been satisfactorily proved to belong to this order. These fragments, remnants of members of former creations, have been distributed under nine genera and seventy-eight species.

The classification itself is very simple. For the trunks, there have been adopted the genera *Palmacites*, Brongn. (with two species), and *Fasciculites*, Cotta (with twenty-four species), the former not differing essentially from the latter. For the leaves, the genera *Flabellaria*, Sternb. (twenty-two species), with fan-shaped leaves; *Zeugophyllites*, Brongn. (two species), with pinnatisect leaves, the segments of

which, resembling those of *Calamus* and *Desmoncus* of the present flora, are opposite, and have an unequal, well-marked nervation; *Phenicites*, Brongn. (ten species), with pinnatisect leaves, the segments of which are opposite, and have not such strong nerves as those of *Zeugophyllites*, but they have a midrib; and *Amesoneuron*, Gœpp. (five species), with pinnated leaves, the segments of which are furnished with nerves either equally thick, or alternately thick and thin, and they are besides without a midrib,—hence the name. For the spathes, the genus *Palæospatha*, Unger (four species), which, as has already been stated, is founded upon doubtful materials. For the fruits, the genera *Baccites*, Zenk. (three species), resembling somewhat *Syagrus botryophora*, Mart., and *Castellinia*, Massalong. (six species), related, according to Massalonga (author of 'A Synopsis of Fossil Palms'), to the *Cocoinæ* tribe of Martius. The genus *Burtinia*, Endl., placed by Unger among these plants, belongs, without a doubt, to *Nipadites*, among *Pandaneæ*.

Although our present imperfect knowledge of fossil plants renders it an almost useless task to speak of the proportion which the number of Palms bears to that of other members of the extinct flora, yet it may be re-

marked, that if the number of species of the Fossil Flora is assumed to be 4000 (there are actually at present 3945 described), Palms constitute about an eighty-fourth part of the whole.*

In the transition rocks no remnants of Palms have as yet been discovered. In the carbóniferous formation five species have been noticed; in the "Kupfersandstein," or Permian formation, only two have been collected; in the secondary class of rocks, which succeeds (Keuper, Bunter Sandstein, Muschelkalk, Lias, Jura, and Wealden formation), none have been gathered, except three in the cretaceous formation, specially in the "Quadersandstein." The greatest number has been found in the tertiary class of rocks, viz. sixty, twenty-nine of which belong to the Eocene, and thirty-one to the Miocene formation. The habitat of nine species remains still unknown.

It will be seen from this synopsis that there was a geological period when Palms were entirely wanting in the extinct flora, or when, after their first appearance, they vanished again, and after a lapse of time appeared once

* Of these 4000 species 1100 belong to the Palæozoic, 538 to the Secondary, 200 to the Cretaceous formation, and according to a calculation made by Dr. Göppert in August, 1854, 2095 to the whole Tertiary class of rocks.

more : a state of things which, if confirmed, would certainly be highly curious, and is one which has never before been observed in a like manner in any large group of plants. No species is common to two formations. Several species show a remarkable degree of resemblance to those of the now existing flora, especially some of those discovered by Jung-huhn, and described by Göppert in the 'Tertiary Flora of Java,' as, for instance, *Amesoneuron calyptrocalyx*, Gœpp., *A. dracophyllum*, Gœpp., *A. fagifolium*, Gœpp., and *A. anceps*, Gœpp. But it would be rather bold, perhaps injudicious, to attempt identifying them, from the fragments hitherto collected, with species of the present flora. The result hitherto obtained only entitles us to say:—Palms make no exception to the rule laid down, that the laws governing the Vegetable Kingdom were the same in all periods of our earth's history when plants existed; and that the species of Palms have a very local geological, as they have a very local geographical, distribution.

The Palms of our present flora may be said to be almost exclusively tropical plants, being most numerous, both in species and individuals, towards the equator, and decreasing on receding from it. Few extend their range into the warmer parts of the temperate zones, and none, it is

hardly necessary to add, venture within the limits of the Arctic and Antarctic Circles. The true Palm climate has a mean annual temperature of 70° to $81^{\circ} 5'$ Fahr.; but the Date Palm vegetates in the South of Europe, in districts the mean annual temperature of which is only from 59° to $62^{\circ} 4'$ Fahr. Martius has divided the Palm region into five zones, which he has named and circumscribed as follows:—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 the 10th degree of north latitude; the Chief Palm Zone, from the 10th degree of north to the 10th degree of south latitude; the Transition Palm Zone, from the 10th degree of south latitude to the tropic of Capricorn; and the South Palm Zone, from the tropic of Capricorn to the southern limits of the family. The northern limit of Palms is, in Europe, the 43rd degree, in Asia and America the 34th degree of north latitude; the southern limit in Africa the 34th, in Australia (New Zealand) the 38th, and in America the 36th degree of south latitude. To the north of the tropic of Cancer forty-three species of Palms are known to exist; to the south of the tropic of Capricorn only thirteen. Advancing from either side towards the equator, the



JC Frank & Co Lith

Vincent Brooks Imp

number increases, until in the Chief Zone, between the 10th degree of north and south latitude, there are more than three hundred species. In the Eastern Hemisphere, the islands of the Indian Archipelago; in the Western, the valleys of the Amazon and Orinoco on the mainland, produce the greatest number of Palms. In proportion to its extent, America is the most prolific country in Palms; for while the Old World—including Europe, Asia, Africa, and Australia, with their islands—contains 307 species, the New World—that is to say, America alone—can boast of 275. In the Old World the islands produce more species than the continents, the former containing 194, the latter only 113; in the New World however the reverse is the case, the continent possessing 234, the islands only 42. The species have generally a very local geographical distribution: only a few, such as *Elæis melanococca*, *Hyphæne Thebaica*, *Acrocomia sclerocarpa*, and *Borassus flabelliformis*, possess an extensive range; but none of the species,—if we except the *Cocos nucifera* (the Cocoa-nut tree), about the native country of which there are grave doubts,—are found in a wild state in both hemispheres, rendering cosmopolitanism in this family an impossibility.

The localities in which Palms grow are as diversified as

everything else connected with these extraordinary plants. While some are closely confined in the hotter regions of the tropics to the shores of the ocean, and are scarcely able to extend their range beyond the limits of the sea-breeze, others flourish luxuriantly far inland on the tops of mountains 14,000 feet high, and in the immediate neighbourhood of perpetual snow; while some seek the moisture, shade, and gloom of the virgin forest, others take up their abode in arid deserts, where they are exposed to the full influence of the scorching rays of an equinoctial sun; while some luxuriate in swamps, others only live in well-drained soil; while some form extensive woods by themselves, and seem to expel from their society all other large plants, others, adopting more social habits, live harmoniously in company with other members of the Vegetable Kingdom of equal size with themselves, but not in any way connected with them by ties of relationship; while some are intermingled with oaks and pines,—representatives of the flora of the temperate zones,—others keep company with *Scitamineæ*, *Ingas*, arboreous *Rubiaceæ*, tree-ferns, gigantic Arums, and epiphytical *Orchideæ*,—forms typical of the vegetation of the Tropics: in fine, almost every species grows under circumstances peculiar to itself; hence the difficulty, nay im-

possibility, of generalizing on the habitat of the Order; but hence also the interest connected with this topic.

How many species of Palms are scattered over the face of the globe, is still an open question. Many plains will have to be traversed, many mountains to be climbed, ere sufficient data will have been brought together for a final and satisfactory answer. Only fifteen species were known at the time of the death of Linnæus; Ruiz and Pavon added eight, while Humboldt and Bonpland described twenty new ones, and distinguished a great many more, which they named, without however being able to procure their blossoms in a perfect state, an object occasionally attended with considerable difficulties.* Of later years great

* "The difficulties," says Humboldt, "of reaching and procuring the blossoms of Palms are, in fact, greater than can well be conceived. Most of the Palms flower only once a year, and this period near the equator is generally about the months of January and February. How few travellers are likely to be in the region of Palms precisely during this season! The period of blossoming of particular trees is often limited to a few days, and the traveller commonly finds, on his arrival in the region of Palms, that the blossoms have passed away, and that the trees present only fructified ovaries, and no male flowers. In an area of 32,000 square miles, there are often not more than three or four species of Palms to be found. Who can possibly, during the brief period of flowering, simultaneously visit the various Palm regions near the Missions, on the Rio Caroni, in the Moricheles, at the mouth of the

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additions have been made by the indefatigable labours of Martius, Liebmann, Griffith, D'Orbigny, Blume, Spruce, Wallich, and others, so that we are acquainted at present with about six hundred species, scarcely one half of which

Orinoco, in the valley of Cauca and Erenato, on the banks of the Atabapo and the Rio Negro, and on the declivity of the Duida? There is moreover great difficulty, when the trees grow in thick woods, or on swampy shores (as at the Jemi and Juamini), in reaching the blossoms, which are often suspended from stems, formidably armed with huge thorns, and rising to a height of between sixty and seventy feet. Those who contemplate distant travels from Europe, for the purpose of investigating subjects of natural history, picture to themselves visions of efficient shears and curved knives attached to poles, ready for securing anything that comes in their way, and of boys who, obedient to their mandates, are prepared, with a cord attached to their feet, to climb the loftiest trees. Unfortunately, scarcely any of these visions are ever realized, while the flowers are almost unattainable, owing to the great height at which they grow. In the missionary settlements of the river network of Guiana, the stranger finds himself amongst Indians who, rendered rich and independent by their apathy, their poverty, and their barbarism, cannot be induced, either by money or presents, to deviate three steps from the regular path, supposing one to exist. This stubborn indifference of the natives provokes the European so much the more from his being continually a witness of the inconceivable agility with which they will climb any height when prompted by their own inclination; as, for instance, in the pursuit of a parrot, an iguana, or a monkey, which, wounded by their arrows, saves itself from falling by its prehensile tail. In the month of January the stems of the *Palma real* (*Oreodoxa regia*, H.B.K.) were covered with snow-white blossoms in all the most frequented thoroughfares of the Havana and in the

are, according to Hermann Wendland,* under cultivation in European gardens. Martius, whose authority in all matters concerning Palms is of weight, thinks that the whole number existing on our earth may amount to about one thousand species, which, considerable as it appears, may be far below the truth; I say, may be, as similar calculations have invariably been proved by our increasing stock of knowledge to be erroneous.

immediate vicinity of the city; but although we offered, for several consecutive days, a couple of piastres for a single spadix of the hermaphrodite blossoms to every Negro boy we met in the streets of Regla and Guanava-coa, it was in vain; for in the Tropics no free man will ever undertake any labour attended by fatigue, unless he is compelled to do so by imperative necessity. The botanists and painters of the Royal Spanish Commission of Natural History, under Count Don Jaruco y Mopox (Estevez, Boldo, Guio, Echeveria), confessed to us that for several years they had been unable to examine these blossoms, owing to the absolute impossibility of obtaining them." (*A. v. Humboldt's Ansichten der Natur*). My learned friend has here stated, very circumstantially, the difficulties presenting themselves in collecting flowering specimens of Palms, but he has omitted to mention that some botanists have it perfectly in their power to escape at once from the distressing position alluded to in the latter part of his statement, namely, by themselves climbing the trees, the blossoms of which they are desirous of obtaining.

* 'Index Palmarum, Cyclantheorum, Pandanearum, Cycadearum, quæ in hortis Europæis coluntur, synonymis gravioribus interpositis. Cura Hermannii Wendland.' Hannoveræ, 1854.

CULTIVATION OF PALMS IN NORTHERN EUROPE.

Most of the Palms are too closely confined to the hotter regions of our globe to grow in the open air of cold countries like England or Germany. Only one species, *Phoenix dactylifera* of Northern Africa, has been naturalized in Italy and other parts bordering the Mediterranean Sea; and only two species, *Chamærops humilis* of Southern Europe, and *C. excelsa* of Northern China, have proved hardy in some of the milder districts of Great Britain; and although there is reason to suppose that several others may be able to bear a European winter without being injured by frost, yet the greater portion of them can only be cultivated in our latitudes under the crystal roofs of conservatories, specially built for their reception. It requires therefore, particularly as the Palms are nearly all plants of great dimensions, considerable means to become the owner of a living collection of them; and those who cannot afford to spend large sums of money have, unfortunately, to desist from the accomplishment of such an object. But the proverb, "Where there's a will there's a way," remains not without application in this instance. The admirers of Palms have discovered long ago that several species may,

in the absence of better accommodation, be grown to considerable perfection in a room; and I have a Continental friend,—a gentleman of more taste for plants than means of gratifying it,—who has devoted one corner of his study to a regular bower, composed of Date-palms, Chamædoreas, and other members of this order, all flourishing luxuriantly in company with *Dracænas*, India-rubber trees, Arums, Ivy, and *Begonias*. During the winter, when all nature is reposing in her icy bed, and white flakes of snow are drifted against the windows, he may often be observed sitting in that charming corner, reading, writing, or carrying on some other rational occupation, and now and then looking up, enjoying the sight of the fire blazing in the stove, and the green foliage by which he is surrounded.

Yet as even the cultivation of a few types of the order of Palms in the manner indicated is a luxury which only a limited class of people is able to enjoy, and as the number of those who possess a predilection for these elegant members of the Vegetable Kingdom is considerable, it is a matter of congratulation that in so many public and private gardens in nearly every civilized part of Europe “Palm-houses” are built, some of them of such dimensions, and their contents arranged with so much care and judgment,

as to make their visitors fancy themselves transported into the midst of those virgin forests, of which Palms, tree-ferns, and Scitamineous plants form the characteristic features. It is unnecessary at this place to inquire which of these buildings deserves to be considered as the best, and which collection is the most extensive,—the office of a Paris is one so thankless, that I can scarcely be blamed for trying to escape from it; nor is it necessary to notice the rivalry for pre-eminence observable in this respect amongst the various horticultural establishments,—a feeling to be encouraged rather than deprecated: it is sufficient for the purpose in view, to mention, as an example of a fine Palm-house, and as a noble collection of Palms, that of the Royal Botanic Gardens of Kew, an establishment which, since it has become national property and has been placed under the judicious direction of Sir W. J. Hooker, has acquired a degree of fame, completely putting into the shade that by which the “Hortus Kewensis” was formerly identified with botanical science.

The Palm-house or Palm-stove of the Royal Botanic Gardens of Kew, built from a design of Decimus Burton, Esq., was completed in the year 1848. The shell, or external frame, consists of a centre and two wings, occupying

an open area 362 feet in length; the centre is 100 feet wide, and 66 feet in height to the summit of the lantern; the wings are 50 feet wide and 30 feet high. The whole is of iron, stone, brick, and sheet-glass, the latter slightly tinged with green, to temper the too powerful rays of light. The extent of glass covering this vast building is about 45,000 square feet. The ribs, inserted in enormous blocks of Cornish granite, are placed on the most solid concrete. The central portion of the building,—a space 138 feet long and 100 feet wide,—has a substantial gallery all round, at the height of 30 feet from the floor, ascended and descended by spiral staircases, enabling visitors to view the plant from above, by bringing them on a level with the summits of many of the loftiest. The whole interior is heated by hot-water pipes and tanks, distributed under the tables and beneath the level of the floor. To avoid the ugliness of a chimney attached to so noble a structure, or even placed near it, the smoke is conveyed by an underground flue, within a brick tunnel, to a distance of 479 feet from the house, where the most part of it is consumed, and the remainder ascends by means of a shaft or ornamental tower 96 feet high, so situated and of such a form as to be an

architectural object when seen from the main walk of the Garden.*

On entering this magnificent building, the visitor suddenly finds himself in the midst of a tropical vegetation. Broad-leaved Plantains, Bananas, Strelitzias and Uranias, Feathery Bamboos, Tree-ferns and Tamarind-trees, Spiny Screw-pines and Cactuses, are mingled with numerous Palms of all dimensions and sizes; the whole being gracefully interwoven and surrounded by creeping and winding plants,—Passion-flowers, Bauhinnias, Jessamines, Aristolochias, and others,—and agreeably relieved by the vivid green of densely crowded Lycopodiums, covering like turf the ground between them. The two loftiest Palms arresting the attention are species of Cocoa-nut (*Cocos plumosa* and *C. coronata*), both good examples of the extensive group bearing pinnatisect leaves; the two stoutest, a species of Sabal (*S. umbraculifera*), equally good examples of another less numerous group, distinguished by its fan-shaped leaves. There are besides in this collection:—the Date Palm (*Phoenix dactylifera*), producing the dates of commerce

* For further details of this fine building, see 'Kew Gardens, or a Popular Guide to the Royal Botanic Gardens of Kew.' By Sir W. J. Hooker. 12th edition. London, 1854.

and of Scripture ; the Palmyra Palm (*Borassus flabelliformis*), one of the most difficult of Palms to rear ; the African Oil-palm (*Elæis Guineensis*), which yields Palm-oil ; the Cocoa-nut (*Cocos nucifera*), the uses of which are said to be more numerous than the days of the year ; the American Cabbage Palm (*Oreodora oleracea*), the young leaves of which are an excellent esculent vegetable ; the Betel-nut tree (*Areca Catechu*) ; the Wild Date of India (*Phoenix sylvestris*), supplying Palm-wine and sugar ; the Ivory-plant (*Phytelphas macrocarpa*), the seeds of which resemble animal ivory in appearance ; the Wax Palm of the Andes (*Ceroxylon andicola*), of which the full-grown stem is covered with a waxy substance ; and lastly the Broom Palm (*Attalea funifera*), the coarse fibre of which is used for making brooms and brushes.

It would lead us too far, and we should be obliged to anticipate too much of what is about to be discussed in the following pages, were we to extend our sketch of this remarkable collection. Enough has been said to convince the student of Palms that the Great Conservatory in the Royal Botanic Gardens at Kew is a place worthy of his attention, and a school where much valuable information may be obtained. For the purposes of study, no doubt a

bright sunny day is to be recommended; but to see the Palms to their greatest advantage, in an æsthetic point of view, a dull or rainy day should be selected, especially when the shades of evening are approaching,—a time when they always look best, owing partly in Kew to some local causes,* but principally to the fact that the generality of Palms are intended for the gloom of the virgin forest, and are therefore, like some pictures, not well adapted for bright and strong lights. If at such a time the visitor will take up his position in the gallery, and cast his eye upon the thick foliage filling the vast area of the building, his thoughts cannot help wandering to those far-off regions whence the beautiful objects before him have with so much difficulty and care been imported. If he know anything of the history of botany, the names of Humboldt, Wallich, Bonpland, J. D. Hooker, Purdie, Wilson, Griffith, Linden, Hartweg, and others, who, disregarding dangers and mental and bodily exertions, explored trackless forests, climbed steep mountains, traversed pestilential swamps—the abode of myriads

* The plants, having to be syringed with water from the Thames, which is charged with a considerable quantity of alluvium, are covered with a minute crust of dust, hardly seen when they are moist, as in the evenings, when the process of syringing is applied, or on damp days, but rather conspicuous when they are quite dry, which is always the case during clear weather.

of mosquitos,—and crossed dreary deserts and monotonous steppes, will flash before his memory as having been instrumental in bringing together this magnificent collection,—magnificent from its numerical size, its excellent condition, and its noble associations: and whilst admiring the heroism displayed by them in facing savage people and ferocious animals often obstructing their passage, and the patient endurance they exhibited in dragging scarce plants from the entangled masses of virgin forests and the remote recesses of the highest mountains, he cannot but feel grateful to those men who thus strove to satiate that irresistible thirst for knowledge felt by every human being, laboured so strenuously towards completing the grand survey of those finite things, calculated in such eminent degree to inspire us with love and reverence for the infinite! Gradually, whilst giving rise to such and similar reflections, the verdant masses will assume before his mind's eye more extensive dimensions than they actually possess, become endless forests, where strange animals and barbarous people have taken up their abode. The more he looks, the more new beauties, fresh charms, will be revealed; and the more he reflects, the more uses, the more properties beneficial to mankind, will be discovered; until, fully impressed with the

grandeur of the subject before him, he will exclaim:—
“What a pity that our northern countries are deprived of Palms, plants alike beautiful and useful! I wonder why this is,—why a country should not be able to supply all the wants of its own people, and thus ensure the perfect independence of one nation from another. Why have we to go to Africa for our dates, to America for our cocoa-nuts, and to Asia for our sago?” Nature does nothing without an object, and must, in acting thus, have intended to convey a lesson. What can that lesson be? A great and glorious one, repeated in all her works, even in the smallest details! She has never lavished on one country all the productions which its inhabitants require, nor heaped—to quote another instance—upon an individual human being all the talents and beauties of our species, though she may have been occasionally extremely liberal, but sown them broadcast over the whole face of the earth, divided them judiciously amongst the whole race of man. She has, by distributing her gifts in such a manner, wished to point out the mutual dependency of one country or one man upon another, thus practically teaching us peace, humility, love!—the three great watchwords, without which human society cannot prosper, and human happiness becomes an impossibility.



1 Our Frankish & Ich.

ATROCA catechu Linn.

Vincent Brooks Imp.

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DETAILED ACCOUNT OF THE PALMS.

Genus I. ACROCOMIA, *Martius*.

THE traveller in tropical America, after disentangling himself from the dense jungle of the virgin forests, and entering once more the open country,—the campos, savanas, llanos, prairies, and pampas,—often finds the landscape dotted with Palms, which a closer inspection readily identifies with those occasionally seen on the banks of rivers bordering the forests just left behind. Their stem, seldom exceeding the height of fifty feet, is often swollen in the middle, and clad, as are the petioles and spathes, with long brown or black spines; their leaves, forming a dense crown at the top of the trunk, are pinnatisect, of a lively green, and considerable dimensions; their spathes, appearing between the lower leaves, enclose a simply-branched spadix, bearing small green or yellow flowers; and their fruits (drupes) are round, of a greenish-olive, and contain dark-coloured nuts. These Palms belong to the genus *Acrocomia* of Martius.

They have long been known to botanists, being mentioned by Aublet, Gärtner, and Jacquin; and have always, it would seem, been familiar to the natives of the districts in which they grow, as all of them, principally on account of the oil extractable from their nuts, are of considerable value in domestic economy. About seven different species have been recognized in systematic works, three of which, *A. Cubensis*, Lodd., *A. lasiospatha*, Mart., and *A. sclerocarpa*, Mart., have been introduced into European gardens; but that number will probably have to be reduced, as the differences between them insisted on by some authors, appear to be of too insignificant a nature ever to receive the general sanction of the botanical world.

The different species are known in their native countries by the names of Macaja, Macajah, Macaw, Macoja, Macahuba, Macauba, Mocaja, and Mucuja, all variations of one original term, the diffusion of which over the West Indies and the whole eastern part of South America, shows that there is a very striking habitual character in this genus, or else the semi-barbarous people who apply it would never have been able to trace these Palms over so extensive a tract of land. The most important species of *Acrocomia* is *A. sclerocarpa*, Mart. (*A. aculeata*, Lodd., *vide* J. Smith,

Cocos fusiformis, Swartz, *C. aculeata*, Jacq., *Bactris globosa* (*minor*), Gærtn., *Geonoma Pohliana*, Hortor.), the Great Macaw-tree of the West Indies, the Macoya of the Guianas, and the Macahuba of the Brazils: a Palm occurring in considerable abundance in Jamaica, Trinidad, and the adjacent islands, as well as the eastern parts of South America as far as the latitude of Rio Janeiro. It is from twenty to thirty feet high, has leaves measuring from ten to fifteen feet in length, and bears a fruit, the nut of which, susceptible of a very high polish, is sometimes fancifully carved by the Negroes. It is on account of the fruit, which yields oil, that the Great Macaw-tree becomes notable. The oil is extracted by the following process:—The fruit, having been slightly roasted, is ground to a paste, first in a mill and then on a levigating stone. This paste, having been gently heated and mixed with three-tenths of its weight of boiling water, is put into a bag, and pressed between two heated plates of iron: it yields about seven-tenths or eight-tenths of oil. The oil, if discoloured, can be purified, when melted by filtration. It is then of the consistence of butter, of a golden yellow hue, has an odour like violets, and a sweetish taste. If well preserved, it will keep several years; if spoiled, it loses its golden hue and delightful aroma. It

is frequently sold in the shops as "Palm-oil," and at present enters largely into the composition of toilet soaps. As an emollient it is considered to be useful in some painful affections of the joints: the Negroes deem it a sovereign remedy for "bone-ache."

Less important in an economical point of view is *Acrocomia lasiospatha*, Mart., the Mucuja of the Brazilians; a tree which, according to Wallace,* is common in the neighbourhood of Pará, but which is also found in various other parts of Brazil. Its trunk is about forty feet high, smooth, and ringed; its leaves are drooping; its fruit, which is of the size of an apricot, globular, and of a greenish-olive colour, has a thin layer of firm edible pulp (mesocarpium), of an orange colour, covering the nut (putamen), and which, though oily and bitter, is much esteemed and eagerly sought after by the natives.

Of still less importance than the foregoing species is *Acrocomia Mexicana*, Karwinsky (*A. Zapotecis*, Jangangha), of which my friend Professor C. B. Heller says (Bonplandia, vol. ii. p. 157), "I met with this noble tree, vernacularly termed 'Coyoli,' repeatedly in Tabasco and Chiapas, two

* 'The Palm-trees of the Amazon and their Uses.' By Alfred Russel Wallace. With forty-eight plates. London, 1853.

states particularly rich in Palms, growing isolated on the slopes of hills, but more frequently on the banks of rivers. The trunk, which is from twenty to thirty feet high, and from six inches to a foot in diameter, bears a magnificent and very regular crown of leaves, often seen above the tops of the surrounding trees. The fruit, which is termed 'Coquito habroso,' is eaten by the inhabitants, but not much esteemed."

Genus II. ARECA, *Linnaeus*.

The European, when beholding for the first time the Bengalese, or still more the Malays and Burmese, cannot help noticing, with a feeling of regret, mingled with disgust, the offensive appearance of their mouths, their brick-red lips, and their black teeth,—discolourments brought about by chewing the Betel or Areca-nut, together with lime, tobacco, gambir (an astringent substance extracted from the foliage of *Uncaria Gambir*, Roxb.), and the leaves of various species of pepper. The plant yielding it belongs to *Areca*, a genus composed of about twenty species, unarmed trees, inhabiting the Eastern hemisphere, chiefly the islands; generally growing in groups, and always produ-

cing slender, annulated trunks, about fifty feet high, and crowned with elegant pinnatisect leaves, having linear, entire segments, and bunches of drupes, containing single seeds, scarcely ever larger than a hen's egg. *Areca Catechu*, Willd., the well-known Betel or Areca-nut Palm, from which the genus takes its name, and which the Hindoo poets have likened to "an arrow shot from heaven," is cultivated throughout the East Indies, especially towards the sea-coast, near which alone it comes to perfection. It is termed in Sanscrit *Goorvaka*, in Bengalee *Gooa*, in Arabic *Foolful*, in Persian and Hindustanee *Soopara*, in Telingee *Poka Chelloo*, in Malayan *Pinang*, and in the languages spoken in the Philippine Islands *Bonga* and *Luyos*. As is the case with all plants which have been long in cultivation, a great many varieties of this tree exist, all of which are distinguished by the natives by particular names, meriting, as Griffith justly observes, as much attention as those of the Cocoa-nut. The Betel-nut tree has been well described by various authors, but perhaps in the most popular manner by Bennett, in his 'Wanderings,'* who, when speaking of Sumatra and its productions, says:—

* 'Wanderings in New South Wales, Batavia, Pedir Coast, Singapore, and China,' etc. By George Bennett. London, 1834.

“The Areca Palm is of elegant growth, rising with a very erect and slender trunk to the height of forty or even sixty feet, the summit terminating in a tuft of dark-green foliage; the trunk is seldom more than eighteen inches to two feet in circumference; when young of dark-green, and when old of a dark-grey colour; the circles formed by the clasping petioles of the leaves being very visible upon it. The fruit ripens only once during the year, at which period the tree, with its long bunches of orange oval-shaped fruit, pendent from the upper part of the trunk, contrasted by the dark-green foliage, has a beautiful appearance. The Areca-nut, when planted, takes three years to arrive at a sufficient size to produce fruit. Each fruit is about the size of a small hen's egg; the external covering (*sarcocarpium*) is thick and fibrous, which, on being cleared away, shows the nut surrounded by its shell (*putamen*), often difficult of removal. The nut is conical, but varies, in some having an elevated apex and small base, in others a large base and very slightly elevated apex.

“Many of the common drinking and baking utensils in the boats, and vessels for holding water, not dissimilar to those made by the Australian natives from the bark of the Gum-trees (*Eucalypti*), are made from the spathe; it is also

nailed upon the bottoms of the boats, and I have often seen on this coast, as well as in Java, small bunches of the abortive fruit placed as an ornament at the stern and bows of the native boats.

“The nuts vary in size; their quality however does not at all depend upon this property, but upon their internal appearance when cut, intimating the quantity of astringent matter contained in them. If the white or medullary portion, which intersects the red or astringent part, be small, has assumed a bluish tinge, and the astringent part is very red, the nut is considered of good quality; but when the medullary portion is in large quantity, the nut is considered more mature, and, not possessing as much astringency, is not esteemed so valuable.

“The quantity of nuts produced on the coast of Sumatra is stated to be 80,000 piculs.* When there is no immediate demand for this article, it is not shelled, but preserved in the husk, as it is considered not to be so liable to be destroyed by the worm in that state; but I have seen nuts destroyed totally by the worm, while in the husk, in the space of two months. The produce of the first month or month and a half, amounting usually to 40,000 piculs, the natives

* One picul = 133½ lbs. English.

informed me, is exported; and the second gathering, amounting to about the same quantity, is consumed in the country."

When speaking of Southern China, the same author says :—" The quantity of Areca-nut imported by the Chinese amounts to 45,000 or 48,000 piculs annually, exclusive of that brought from Cochin China, the amount of which is not known. In 1832, from a failure of the usual supply of nuts from Cochin China, 48,000 piculs, imported from other places, sold so high as $4\frac{3}{4}$ dollars the picul ; the price it usually fetches in the China market is from 2 dollars to $3\frac{3}{4}$ dollars the picul. The principal consumption of the nut as a masticatory, in conjunction with the leaf called betel, produced from a Pepper-vine (the *Piper Betle*, Linn.), is in the provinces of Quang-tong (Canton of Europeans), Quang-si, and Che-keang, and it may be seen exposed for sale, on little stalls, about the suburbs of Canton, with the other additional articles used in the preparation ; it is also used as a mordant for coarse dyes. The Areca-nuts brought from Cochin China are considered by the Chinese the best imported. This may however arise from prejudice in favour of a country so nearly allied to them. In the central provinces of Hoo-kwang and Kiang-si, the nut is, after being bruised and pounded, mixed with the green food of

horses, as a preventive against diarrhœa, to which that kind of food sometimes subjects them. It was likewise mentioned to me by a Chinese, that it is used as a domestic medicine in the north of China, small pieces being boiled, and the decoction administered in various visceral affections.

“A cargo of this article generates so much heat as to raise the thermometer in the hold of a ship 40° above that on deck; and from this circumstance, and the quantity of steam generated, the crew are prevented from sleeping between decks.

“The Areca-nut is commonly known in Southern China by the very prevailing Malay name of *Pinang* or *Pinong*, but in the Acheneese language it is called *Pénu*, and the tree *Ba pénu*. The ripe Areca-nut is called also *Pénu massa*, and the green, *Pénu mudr*; the Gambir used with the Betel, *Gambé*; the Betel-leaf, *Ránu*; and the lime, *Gahu*; the tobacco, *Bákun*.

“The mastication of the Betel is considered very wholesome by those who are in the habit of using it. It may be so; but the black appearance it gives to the teeth, although it is said to be an excellent preserver of them, together with the brick-red lips and mouth, give anything but an agreeable appearance. Its use certainly does not im-

part additional beauty to the native females, who habituate themselves to an equal extent to those of the opposite sex."

When in Singapore, I often saw the Malays chewing the Betel-nut, together with gambir, tobacco, lime, and the leaves of the Siri (*Piper Siriboa*, L.), and the Chinese practising the same filthy habit, with the only difference that they used the foliage of the black pepper (*Piper nigrum*, L.), instead of that of the Siri. This statement however applies only to the Chinese colonists in the island; in the southern parts of the Celestial Empire, the people avail themselves of the leaves of *Piper Betle*, L. Though the quantity of tannin contained in the Betel-nut must exercise an injurious influence, yet it is a mistake to suppose that the mere chewing of it gives to the mouth an offensive appearance; unless the other ingredients are added, the saliva hardly changes its natural colour.*

Low, in his 'Borneo,' says:—"The graceful Betel or Areca-nut Palms do not grow in such abundance in Borneo as to form an article of exportation; on the contrary, large

* In this remark I am fully borne out by Bennett and Blanco, the latter of whom states: "Es digno de notarse que el compuesta de la bonga, del buyo, y de la cal, hace la saliva encarnada, y no sucede esto, cuando falta alguna de las tres cosas."

quantities are imported ; for, like the Cocoa-nut trees, they were destroyed during the wars which, previous to Sir James Brooke's arrival, desolated the country. The nut is only used for chewing,—a practice universal in the Indian Archipelago. The male flowers are deliciously fragrant ; they are in request for all festive occasions, and are also considered a necessary ingredient in the medicines and charms employed for healing the sick.”

Manuel Blanco* gives a detailed account of this Palm in the Philippine Islands, in which the following passages occur:—“ I think the Areca might be used for making red ink, and it is not improbable that it is already thus employed in India. . . . In combination with the Alparroso it makes black ink, which however is inferior to that obtained from the Aroma (*Acacia Farnesiana*, Willd.). The lower part of the petiole, vernacularly termed ‘ talupac,’ is very clean, white, and flexible, and serves for wrapping up things, and for other purposes, on account of which it is sold by the natives. The heart of the leaves is eaten as a salad, and has not a bad flavour ; but, gathering it, the tree dies. When the natives are in want of Areca-nuts for chewing they use as a substitute the bark of the Gua-

* ‘Flora de las Filipinas,’ etc. Por Manuel Blanco. Manila, 1845.

yabo (*Psidium Guayaba*, Raddi), or that of the Antipolo." The same necessity seems to compel various other Asiatics to have recourse to different other species of *Areca*; for instance, the convicts confined on the Andaman Islands use the nuts of *Areca laxa*, Hamilt.; the Nagas and Abors of eastern Bengal use those of *A. Nagensis*, Griff.; and the natives of the mountainous districts of Malabar those of *A. Dicksoni*, Roxb., instead of those of *A. Catechu*, Linn. So much are these people attached to the Betel-nut, that they would rather forego meat and drink than relinquish the mastication of it. They entertain the notion that by means of it the teeth are fastened, the gums cleansed, and the mouth cooled, and this notion, unfounded as it is, may in some degree have influenced those Europeans who, of late years, have recommended Areca-nut charcoal as a tooth-powder; at least, so far as we know, it can have no particular value over ordinary charcoal, except perhaps that derived from its greater hardness.* On account of the

* It is very doubtful whether any of the extracts called *Catechu* are derived from *Areca Catechu*, Linn. Blume (*Rumphia*, vol. ii. p. 67) denies it altogether, and says that the error has arisen from the circumstance that old and dry Areca-nuts, broken in small pieces, are macerated in rose-water in which Catechu has been dissolved. J. D. Hooker, T. Thomson, and myself have never *seen* Catechu as prepared from Betel-nuts. Pereira (*Elements of*

large quantity of tannin which these nuts contain, they have been employed in some parts of India for dyeing cotton cloths; some medical men also consider them useful in cases of dysentery. In Malabar an inebriating lozenge is prepared from the sap of the tree, and in Khasia the natives measure distances, according to Dr. J. D. Hooker's statement, by the number of mouthfuls of Betel-nut chewed on the road.

The exact native country of the Betel-nut is unknown, but is supposed to be the Sunda Islands; the tree from time immemorial has been extensively cultivated in all parts of the East Indies, so that we are at present unable to trace it back to the spot whence it originally may be supposed

Materia Medica, vol. ii. part i. p. 1045, ed. iii.), speaking of Arca-nut Catechu, says:—"In the southern parts of India, and probably in Ceylon, an extract called Catechu is procured from Arca-nuts. The mode of preparing it has been described by Herbert de Jäger and Heyne. The last-mentioned author states that it is largely procured in Mysore, about Sirah, in the following manner:—"Arca-nuts are taken as they come from the tree, and boiled for some hours in an iron vessel. They are then taken out, and the remaining water is inspissated by continued boiling. This process furnishes *Kassu*, or most stringent *Terra Japonica*, which is black, and mixed with paddy (rice) husks and other impurities. After the nuts are dried, they are put in a fresh quantity of water, boiled again, and the water, being inspissated, like the former, yields the best or dearest kind of Catechu, called *Coury*. It is yellowish-brown, has an earthy fracture, and is free from

to have come. It has also found its way into European gardens, where it is grown, together with *Areca alba*, Bory, *A. sapida*, Soland., *A. crinita*, Mart., *A. Madagascariensis*, Mart. (from the ashes of which the natives of Madagascar extract salt), *A. monostachya*, Mart. (*Livistonia inermis*, Hort., and *Seaforthia præmorsa*, Hort.), *A. pumila*, Mart. (*Pinanga Nenga*, Bl.), *A. rubra*, Bory (*Euterpe globosa* and *E. pisifera*, Hort.), and *A. triandra*, Roxb.,—plants of great beauty, but possessing, except *A. sapida*, few peculiarities which entitle them to a special notice in a work of such limited extent as the present. *A. sapida*, Soland. (*A. Banksii*, Mart., *A. sapida*, Banks et Soland., *Kentia sapida*, Mart.) deserves consideration, on account of its being the southernmost of all

the admixture of foreign bodies.' None of the extracts brought from India, under the denomination of Catechu, are distinguished by any name by which they can be referred to the Areca-nut. It is probable, however, that some of those which come over in the form of *round and flat cakes*, and also in *balls*, and which are more or less covered with paddy husks, are obtained from this seed. A decoction of some of these kinds of Catechu yields, when cold, a blue colour on the addition of iodine, indicating the presence of starch. The presence of fatty matter in them is considered by Guibourt to be a proof that the Areca-nut has been employed in their production. I think it is probable that the Colombo or Ceylon Catechu of commerce, in the form of round flat cakes, covered by paddy husks, is the *Kassu* of Heyne; and Guibourt is of opinion that the *dull reddish Catechu in balls*, partially covered by paddy husks, is the *Coury* of Heyne." Compare also genus *Borassus*.

Palms,—found in New Zealand as far as latitude $38^{\circ} 22'$ south. It is, according to J. D. Hooker (*Flora of New Zealand*, vol. ii. p. 261), a small Palm, the trunk of which is from six to ten feet high, and six to eight inches in diameter, bearing leaves from four to six feet long, and a glabrous, much-branched, densely flowered spadix, enclosed in two boat-shaped spathes. It grows principally in the Northern Island and the north part of the Middle Island, where the natives, who eat the young inflorescence, term it “Nikau.” As there exists in most works a great deal of confusion amongst the synonyms of this plant, I cannot do better than make an extract from the excellent *Flora* quoted, in which J. D. Hooker has set this perplexing subject, it is to be hoped, finally at rest. “Mr. Allan Cunningham has applied to this Palm Endlicher’s description, drawn up from Ferdinand Bauer’s drawings of Norfolk Island specimens. This does not agree with the New Zealand plant in the shape of the drupe, which is said to be globose in the Norfolk Island species. Mr. John Smith, curator of the Royal Botanic Gardens at Kew, has both in cultivation, and has shown me a very considerable difference in habit and in the breadth of the segments of their leaves, those of the Norfolk Island Palm being twice as broad as



J.C. Frank del et lith

Vincent Broeks del

Arenga saccharifera, Labill & *Nipa frutescens*, Thunb

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those of the New Zealand one; but there is great variation in these respects with both species. Dr. von Martius also separates them, but gives Forster's name to the Norfolk Island plant, whereas Forster figured the New Zealand one only, to which the name *sapida* must remain attached, whilst that of *Baueri* may be given to the Norfolk Island species, if it should prove really distinct. There is as much difference between the narrow and broad segments of specimens of *A. sapida*, growing in Kew Gardens, as between the latter and those of *A. Baueri*."

Genus III. ARENGA, *La Billardière*.

This genus numbers at present, if we exclude the doubtful *Arenga Manillensis* (*Saguerus Manillensis*) of the gardens, five species—*A. obtusifolia*, Mart. (*Gomutus obtusifolius*, Blume, *Saguerus Langkab*, Blume), *A. saccharifera*, Labill., *A. Westerhoutii*, Griff., *A. Wightii*, Griff., and *A. Griffithii*, Seem.,* all of which are handsome trees. Their trunks are

* I have given this name to the species from the second Kioukdweng, or mountain defile, of the Irawaddy, described, but not named, at p. 168 of Griffith's 'Palms of British India,' the northernmost species of the genus hitherto discovered, growing in company with *Hæmatospermum*, *Dillenia*, *Campanula*, and *Æsculus*.

ringed, and occasionally decumbent; their petioles are furnished with copious black, rigid fibres, and they are sometimes prickly; their leaves are pinnatisect, the segments of which being linear, often with lobed bases, and more or less toothed and divided apices, and always dark green on the upper, and dirty white on the under surface. All *Arengas* flower only once during the term of their existence. Their spikes are pendulous, often in bundles like the tail of a horse; their flowers are large, monœcious, and generally, but not always, in different spadices; their stamens are indefinite, their ovary trilocular, and their fruit, a green and round berry, is depressed and three-cornered at the apex, imperfectly three-lobed and three-seeded. They chiefly inhabit the islands of the Indian Archipelago, but are also met with on the Asiatic continent; their favourite localities being dense shady forests and the neighbourhood of rivers and rivulets.

The genus, though composed of several species, is rendered famous by only one—the *Arenga saccharifera*, Labill. (*Saguerus Rumphii*, Roxb., *Borassus Gomutus*, Lour., *Gomutus saccharifera*, Spr.), which occurs in great abundance in a wild state throughout the islands of the Indian Archipelago, but is more common in the interior, principally in

the hilly districts, than on the sea-coast, and it is also very generally cultivated by the various people who inhabit that region. It has been called one of the most useful of all the Palms; and how well it deserves that epithet may be judged from a perusal of the accounts published by Roxburgh, Griffith, Marsden, Low, and, above all, by Crawford.* Like all plants enjoying a wide geographical distribution, this tree is distinguished by names as numerous as the languages of the countries which claim it as a member of their flora. With the usual copiousness of these languages on similar occasions, each useful part of the plant is designated by a special name. In Malay the tree is called *Anao* (*Anowe* according to Griffith, and *Anau* according to Bennett), the liquor (toddy) obtained from it *Tuwak* or *Nera*, the soft brown scurf found at the base of the petioles *Barum* (*Baru* ?), and the horsehair-like material covering the latter *Iju* (*Ejoo* or *Eju*) or *Gomuti*. It is this last name which some botanists have applied as a generic, others as a specific one to the whole plant. In Javanese the tree is called *Aren*, the material like horsehair *Duk* (occasionally spelt *Doh*), the gossamer-like substance *Kawul*, and the sap *Lagen*, which means the *sweet* material by distinction. In the

* History of the Indian Archipelago. London, 1820.

Amboynese language the tree is called *Nawa*, the horsehair-like material *Makse*. In the Ternati language the tree is called *Seho*, in the Bali *Jahaka*, and in the Bima *Nawn*. In the Macassar language the tree is termed *Monchono*, the sap or toddy *Juro*; and in the Mandar, the former *Akel* and the latter *Ki*. The Portuguese, and other European nations following their example, call the tree and its liquor *Sagwire*, though no one knows for what reason.

The Sagwire or Gomuti—we had better adopt the latter name, as being the most euphonious—attains a height of thirty to forty feet, is without spines, and bears a dense crown of pinnatisect leaves, which have rather a sombre aspect; their segments are generally fasciculate, the middle ones five feet long, about four inches broad, linear-ensiform, dark green above, white underneath, with distant spinescent teeth, and a bilobed or bifid, eroso-dentate apex. When very young, they are eaten, like those of the American Cabbage Palm (*Oreodoxa oleracea*, Mart.). The petioles are very stout, and it is at the base of these, and completely embracing the trunk of the tree, where the horsehair-like material, which co-operates to render this Palm so valuable, is produced. This fibrous substance, superior in quality, cheapness, and durability to that obtained from the husk of the

Cocoa-nut, and renowned for its power of resisting wet, is used by the natives of the Indian islands for every purpose of cordage, domestic and naval, a practice in which Europeans have of late years imitated them. The coarser parts—or “small twigs,” as some authors call them—found with this “vegetable horsehair,” are used by all the tribes who write on paper as pens, and they are the arrows used by others to discharge, poisoned or otherwise, from blow-pipes or arrow-tubes. Underneath this material is found a substance of a soft gossamer-like texture, which is imported into China. It is applied as oakum in caulking the seams of ships, and more generally as tinder for kindling fire: it is for this latter purpose that it is chiefly in request among the Chinese.

The substance of the foregoing account of this fibre is chiefly derived from Crawford, but he is not the only author who bears testimony of its excellence and value. Marsden, in his ‘Sumatra,’ says:—“It is bound on as a thatch, in the same manner we do straw, and not unfrequently over the *galoompye* (bamboo thatch); in which case the roof is so durable as never to require renewal, the Ejoo being of all vegetable substances the least prone to decay; and for this reason it is a common practice to wrap a quantity

of it round the ends of timbers or posts which are to be fixed in the ground. . . . The Ejoo exactly resembles coarse black horsehair, and is used like it, among other purposes, for making ropes, and mixing with mortar." Low, in his 'Borneo,' whilst corroborating this statement, adds:—"The hairy filaments are plaited by the natives into ornaments for the arms, legs, and neck, which are more pleasing in their deep black hue and neat appearance (at least to eyes of Europeans), than the beads and brass with which these people are fond of adorning their persons." Bennett, in his 'Wanderings,' also gives a highly favourable description of this fibre, and throws out the suggestion that it may be the same as that called "Cabo negro" by the Spaniards at Manilla.

The principal production of the Gomuti Palm is the toddy,* which, according to Crawford, is procured in the following manner:—One of the spadices is, on the first appearance of fruit, beaten on three successive days with a small stick, with the view of determining the sap to the wounded part. The spadix is then cut off a little way from its root (base), and the liquor which pours out is received in pots of earthenware, in bamboos, or other vessels. The

* Derived from the Sanscrit word "*Tûde*."

Gomuti Palm is fit to yield toddy when nine or ten years old, and continues to yield it for two years, at the average rate of three quarts a day. When newly drawn the liquor is clear, and in taste resembles fresh must. In a very short time it becomes turbid, whitish, and somewhat acid, and quickly runs into the vinous fermentation, acquiring an intoxicating quality. In this state great quantities are consumed; a still larger quantity is immediately applied to the purpose of yielding sugar. With this view the liquor is boiled to a syrup, and thrown out to cool in small vessels, the form of which it takes, and in this shape it is sold in the markets. This sugar is of a dark colour and greasy consistence, with a peculiar flavour: it is the only sugar used by the native population. The wine of this Palm is also used by the Chinese residing in the Indian Islands in the preparation of the celebrated Batavian arrack.

In Malacca, the Gomuti, there termed Kabong, is cultivated principally for the juice which it yields, for the manufacture of jaggery (sugar). The 'Journal of the Indian Archipelago' for November, 1849, says:—"Like the Cocoa-nut tree, it comes into bearing after the seventh year. It produces two kinds of mayams or spadices—male and female. The female spadix yields fruit, but no juice, and

the male *vice versa*. Some trees will produce five or six female spadices before they yield a single male one, and such trees are considered unprofitable by the toddy collectors; but it is said that in this case they yield sago equal in quality, though not in quantity, to the *Cycas circinalis*, although it is not always put to such a requisition by the natives; others will produce only one or two female spadices, and the rest male, from each of which the quantity of juice extracted is the same as that obtained from ten coconut spadices. A single tree will yield in one day sufficient juice for the manufacture of five bundles of jaggery, valued at two cents each. The number of mayams shooting out at any one time may be averaged at two, although three is not an uncommon case. When sickness or other occupation prevents the owner from manufacturing jaggery, the juice is put into a jar, where, in a few days, it is converted into excellent vinegar, equal in strength to that produced by the vinous fermentation of Europe. Each mayam will yield toddy for at least three months, often for five, and fresh mayams make their appearance before the old ones are exhausted; in this way a tree is kept in a state of productiveness for a number of years, the first mayam opening at the top of the stem, the next lower down, and so

on, until at last it yields one at the bottom of the trunk, with which the tree terminates its existence." The fruit, according to Crawford, is about the size of a medlar, and produced in such abundance that a single spadix is more than a load for a man. The fleshy outer covering of the fruit affords a juice of a highly stimulating and corrosive nature, which, when applied to the skin, occasions great pain and inflammation. The inhabitants of the Moluccas were in the practice of using, in their wars, in the defence of posts, a liquor afforded by the maceration of this fruit, which the Dutch appropriately denominated "hell-water." The seed, or rather the albumen, freed from this noxious covering, is made into sweetmeat by the Chinese.

Like the true Sago-palm, continues the last quoted author, the Gomuti affords a medullary matter, from which a farina is prepared. In Java, it is the only source of this substance, which in the western and poorer part of the island is used in considerable quantity, and offered for sale in all the markets. It is smaller in quantity than the pith of the true Sago-tree, more difficult to extract, and inferior in quality; having a certain peculiar flavour, from which the farina of the true sago is free.

Griffith, who has given a good description and figure

of this Palm, says :—“ Mr. Lewis informs me that trees that have died after the ripening of the whole crop of fruit, —which is the natural course of events,—are almost hollow, and particularly adapted for making troughs, spouts, or channels for water, and that they last extremely well underground. In short, it is so valuable a Palm, that it early attracted Dr. Roxburgh’s attention, who introduced it largely into Hindostan. The natives of Bengal however have never taken to it, preferring the coir of the Cocoa-nut, and the toddy and sugar of *Phoenix sylvestris*. The following are Dr. Roxburgh’s words :—‘ With respect to the various important uses of this most elegant Palm, I have nothing to offer myself, but refer to what Rumphius and Marsden have written on the subject. At the same time, I cannot avoid recommending to every one who possesses land in India, particularly such as is low and near the coasts, to extend the cultivation thereof as much as possible. The wine itself and the sugar it yields, the black fibres for cables and cordage, and the pith for sago, independent of many other uses, are objects of very great importance.

“ From observations made in the Botanic Garden at Calcutta, well-grown, thriving trees produce about six leaves annually, and each leaf yields from eight to sixteen ounces

of the clean fibres. In the same garden there are now (1810) many thousand plants and young trees, some of them of above twenty years' growth, with trunks as thick as a stout man's body, and from twenty to thirty feet high, exclusive of foliage. They are in blossom all the year; one of them was lately cut down, and yielded about 150 lbs. of good sago-meal.' ”

Genus IV. ASTROCARYUM, *G. F. W. Meyer.*

“ There is no rose without thorns,” and, it may be added, no *Astrocaryum* without spines. Trunk, foliage, fruit-stalks, spathes, and, in some cases, even the fruit of every species of this genus are armed with acute spines. It has been said that thorny and spiny plants are indicative of a poor soil or an arid climate, but that induction, though holding good as a general rule, is, like all such rules, subject to particular exceptions, and the genus *Astrocaryum* is one of them. Instead of growing as, according to *our* rules it ought to do, in a meagre soil, or a country rarely visited by vivifying rains and refreshing dews, it is generally found in moist places, often on the banks of rivers, exposed to occasional floods,

in virgin forest, luxuriating in rich vegetable mould. *Astrocaryum* is composed of about sixteen species, natives of the north-eastern parts of South America, chiefly Brazil. They resemble in habit, as well as in every other respect, the various *Acrocomias*; most of them are trees, some attaining the height of forty feet; and only a few, as, for instance, *A. acaulis*, Mart., the Iú of the Brazilians, stemless plants. Their trunks are covered with rings of black or dark brown spines, occasionally a foot long; their leaves, which are terminal, pinnatisect, and have linear, entire segments, of a dark-green above, and generally of a silvery-white underneath, form a dense crown, from the lower parts of which, generally from the axils of the old decayed leaves, the spathes are developed. The latter, during the flowering season, are in most cases erect, but finally, when the fruit has increased in size and weight, they always hang down; their flowers, appearing in simple or branched spadices, are yellowish or green; their drupes are round and oval, of a yellow or orange colour, occasionally agreeably scented, and contain solitary stony seeds. We cultivate in our gardens, as far as I have been able to ascertain, seven species of *Astrocaryum*, viz. *A. aculeatum*, G. F. W. Mey., *A. Ayri*, Mart. (*Toxophænix aculeatissima*, Schott), *A. campestre*, Mart., *A.*

Murumuru, Mart., *A. rostratum*, Hook., *A. Tucuma*, Mart., and *A. vulgare*, Mart.

From the number of spines with which these Palms are clad, they have rather a repulsive aspect, yet nevertheless, and notwithstanding their being "armed to the teeth," it has not prevented man from approaching them, and finding out their various useful properties. *Astrocaryum vulgare*, Mart. (*A. Awarra*, Hort.),—every part of which, even the edges of the segments of the leaves, bristles with sharp spines,—is of great importance to the Indians of Brazil, who term it Tucum, and cultivate it in their mandioc-fields and about their huts,—not for the sake of its fruit, for that is scarcely eatable, but for the sake of its unexpanded leaves, from which they manufacture cordage, superior in fineness, strength, and durability to that procured from the Miriti (*Mauritia flexuosa*, Linn.), and serving for bow-strings, fishing-nets, hats, fans, and other purposes where fineness, combined with strength, is required. The Brazilians of the Rio Negro and the Upper Amazon make beautiful hammocks of Tucum-thread, knitted by hand into a compact web of so fine a texture as to occupy two persons three or four months in the completion of one hammock. These sell at about £3 each, and when ornamented with

feather-work borders, at double that sum. Most of them are sent as presents to Rio Janeiro.

The Tucum has occasionally been confounded with the Tucuma (*Astrocaryum Tucuma*, Mart.), to which indeed it is nearly allied, and in company with which it is often seen in the dry forest land (*terra firme*) of the Upper Amazon and Rio Negro. The Tucuma is never used for making cordage, but the fleshy part of its fruit is esteemed for food by the Indians, and the stony seeds are turned into rings, "birros" (or knitting pins), and other smaller articles for which bones are employed. Two other species of this genus also produce edible fruit: I mean the Iú (*A. acaule*, Mart.), an almost stemless Palm inhabiting the Catinga forests of the Upper Rio Negro, and from the outer portion of the leaf-stalks of which the Indians make baskets; and the Murumurú (*A. Murumuru*, Mart.), growing in humid places of the Brazilian forest. The fruit of the latter has—I quote Kunth's description—an agreeable flavour, and, at first, a scent resembling musk, but afterwards that of a melon. Wallace, too, states that the fleshy covering of the fruit is rather juicy, and eatable, but he does not mention the agreeable fragrance to which the former author alludes; nor does he dwell much upon the partiality of man to this



J. G. Franck del. et lith.

Vincent Brooks sculp.

Borassus flabelliformis, Linn. & *Corypha umbraculifera*, Linn.

fruit, but gives instead some account of the high favour in which beasts hold it. "On the Upper Amazon," he says, "cattle eat the fruit of the Murumurú, wandering about for days in the forests to procure it. The hard stony seeds pass through their bodies undigested, and become thickly scattered over the pastures of that district; they are so hard that it is almost impossible to break them, except by a powerful blow with a large hammer; the kernel (*albumen*) is also very hard, nearly approaching to vegetable ivory. Yet pigs are very fond of these seeds, and on one estate on the Upper Amazon, where I was staying, they had scarcely anything to eat, during a part of the year, save those which had already passed through the stomachs of the cows. They might constantly be seen cracking the shell (*putamen*) with their powerful jaws, and grinding up the hard kernel, on which the teeth of few other animals could make any impression. They not only existed on this food, but in some cases actually got fat upon it.

Genus V. ATTALEA, *Humboldt, Bonpland, and Kunth.*

Of late years the streets of London have been, in places at least, kept peculiarly neat and clean, by brooms and brushes made of a new material,—those of the machines as well as those employed by hand. If the question is asked, what is this new material, the reply often heard is, “Whalebone, I suppose.” But, no; it is not of animal, but of vegetable origin. Piassaba,* the coarse black fibre of a species of *Attalea* (*A. funifera*, Mart.), a genus composed of about twenty members, ten of which (*A. amygdalina*, H. et K., *A. Butiros*, Lodd., *A. Cohune*, Mart., *A. compta*, Mart., *A. coronata*, Lodd., *A. excelsa*, Mart., *A. funifera*, Mart., *A. Maripa*, Mart., *A. speciosa*, Mart., and *A. spectabilis*, Mart.) are cultivated in our gardens; they are all natives of the American Continent, where they range from the mouth of the La

* Wallace has declared the Piassaba to be a species of *Leopoldinia*. Sir W. J. Hooker (Hook. Journal of Bot. and Kew Misc., vol. i. p. 121), in common with other botanical writers of high repute, consider it as the *Attalea funifera* of Martius. I have looked upon Wallace's *L. Piassaba* as identical with *Attalea funifera*, as I cannot discover in anything Wallace has written upon the subject, either a positive or a negative proof to lead me to a contrary conclusion. Wallace himself informs us that he neither saw the flower nor the fruit of his new *Leopoldinia*. “How,” botanists ask, “could he know then that it is a *Leopoldinia*, and not an *Attalea*?”

Plata to the British colony of Honduras, but chiefly congregate in the neighbourhood of the Amazon and its tributaries: their favourite habitat is the forest. They are erect trees, generally of middle size, with thick, irregularly ringed trunks, terminated by a crown of large pinnatisect leaves (between which the spathes appear), yellowish flowers, and ovate or elliptical fruits (drupes), of a brown or greenish-brown colour, each of which contains generally three, but sometimes four or five edible seeds.

Attalea funifera of Martius (*Leopoldinia Piassaba*, Wallace, *Cocos lapidea*, Gærtn., *Lithocarpus cocciformis*, Targ.-Tozz.), termed by the Brazilians Piassaba, and by the Venezuelians Chiquichiqui, has a very extensive distribution on the eastern side of South America, where it grows in swampy or partially flooded lands on the banks of rivers.*

* Wallace, speaking of the distribution of this Palm, in those parts with which he is more intimately acquainted, says:—"It grows in swampy or partially flooded lands, on the banks of black-water rivers. It is first found on the river Padauari, a tributary of the Rio Negro, on its northern side, about four hundred miles above Barra, but the waters of which are not so black as those of the Rio Negro. The Piassaba is found from near the mouth to more than one hundred miles up, where it ceases. On the banks of the Rio Negro itself not a tree is to be seen. The next river, the Darahá, also contains some. The next two, the Marahivá and Cubaburis, are white-water rivers, and have no Piassaba. On the south bank, though all the rivers have black

The trunk reaches twenty to thirty feet in height. The leaves are very large, and their leaflets rigid, but slightly drooping at the tips: they form an excellent thatch. The dilated base of the petioles separates, like that of *Arenga saccharifera*, into a long, coarse fringe, which is collected by the natives, and partly used for home consumption, partly exported to Europe, tied up in bundles of several feet in length, and sold in London at the price of about £14 the ton, under the name of Piassaba (*Piaçaba*).

This fibre is an extensive article of commerce in the country where it grows, and it seems to have been used from a very early period to form cables for the canoes na-

water, there is no Piassaba till we reach the Marié, not far below St. Gabriel. Here it is extensively cut for about one hundred miles up, but there is still none immediately at the mouth, or on the banks of the Rio Negro. The next rivers, the Curicuriari, the great river Uaupés, and the Isánna, though all black waters, have none; while further on, in the Xié, it again appears. On entering Venezuela, it is found on the banks of the Rio Negro, and is abundant all up to its sources, and in the Témi and Atabapo, black-water tributaries of the Orinoco. This seems to be its northern limit, and I cannot hear of its again appearing in any part of the Amazon or Orinoco, or its tributaries. It is thus entirely restricted to a district about three hundred miles from north to south, and an equal distance from east to west. I am enabled so exactly to mark out its range from having resided more than two years among people whose principal occupation consisted in obtaining the fibres of this tree."—*Wallace's 'Palm Trees,'* p. 19.

vigating the Amazon: it is well adapted for this purpose, as it is light—the cables made of it not sinking in water—and very durable. It twists firmly into cordage, from the fibres being rough-edged; and as it is very abundant, and is procured and manufactured by the Indians, ropes made of it are much cheaper than any other kind of cordage. The price in the city of Barra, in June, 1852, was 400 reis (one shilling English) for 32 lbs. of the fibre, and 800 reis (two shillings) for every inch in circumference of a cable sixty fathoms long,—the standard length they are all made to. Before the independence of Brazil, the Portuguese Government had a factory at the mouth of the Paduarí, one of the tributaries of the Rio Negro, for the purpose of making these cables, for the use of the Pará arsenal, and as a Government monopoly. Until the last few years, the fibre was all manufactured into cordage on the spot, but it is now taken down, in long conical bundles, for exportation from Pará to England. It is cut by men, women, and children, from the upper part of the younger trees, so as to secure the freshest fibres; the taller trees, which have only the old and half-rotten portion within reach, being left untouched. The trees are much infested by venomous snakes, a species of *Craspedocephalus*, and

the Indians, when at work, are not unfrequently bitten by them, sometimes with fatal consequences.

The nuts of the Piassaba are also an article of commerce, long brought to England under the name of "Coquillas." Being excessively hard, beautifully mottled with dark and light brown, and capable of taking a very high polish, they are extensively used for turnery-work, especially in making the handles of bell-pulls, the knobs of walking-sticks and umbrellas, and similar articles.

Another *Attalea*, the commercial importance of which has only lately become apparent, is *Attalea Cohune* of Martius, the northernmost species of the genus. In speaking of this Palm, Mr. R. Temple, Chief Justice of British Honduras, in a letter addressed to Mr. Le Nève Forster, dated Belize, April 15, 1854, and published in the 'Journal of the Society of Arts' (vol. ii. no. 81, p. 500), says:—"My chief object in addressing you is to draw your attention, and through you that of the public, to a valuable article of commerce, hitherto much neglected, and growing in Honduras spontaneously, and in profuse abundance; I allude to the nut of the Cohune Palms.* The Cohune resembles in appearance the Cocoa-nut Palm, but it is not

* Written also Cahoun.

nearly so high as that tree, and the trunk is considerably thicker. The order and regularity in which it grows is surprising. I have seen rows of it presenting the appearance of having been planted with the greatest care, long avenues which closely resembled the nave and aisles of a cathedral, the arched leaves meeting overhead, and producing an exact imitation of the vaulted roofs, and, if the sun was declining, the horizontal rays, shining at intervals through one side of the avenue, created the splendid effulgence of the most richly painted window.

“This tree bears a fruit about the size of a large hen’s egg, which grows in clusters, each cluster resembling a bunch of grapes. The kernel tastes somewhat like that of the cocoa-nut, but is far more oleaginous, and the oil extracted from it is infinitely superior. No other oil except that of the cohune and the cocoa-nut is burnt in this country, but a pint of the former will last double the time that the same quantity of the latter will. The Cohune oil congeals at a temperature of seventy-five degrees. There is no question whatever that if it were known to the public in general it would completely supersede the use of the cocoa-nut oil.

“Honduras consists principally of two kinds of land ;

the one is called a 'Pine ridge,' the other a 'Cohune ridge.' The former is, generally speaking, sterile and sandy, and but here and there interspersed with patches of greater fertility, 'green spots' in the midst of a sandy wilderness, the resort of immense herds of deer and antelopes, the flesh of which bears not the least resemblance to the succulent, well-fed venison of England, but is dry, white, stringy, and an utter stranger to fat. This ridge,—densely covered with pines, which are very much more resinous than the red pines of North America,—might yield any quantity of pitch, of an excellent quality, for commercial purposes. The Cohune ridge differs materially from the Pine ridge. The soil of the latter, as I have said, is sandy and unproductive; whereas that of the former is rich and loamy, and possesses every agricultural capability. There is no tropical plant which cannot be grown in great abundance upon these ridges. The Cohune there abounds: for miles and miles you have nothing but forests of it; and yet with all these trees, bearing 'nuts' from which a most valuable oil can be extracted—an oil for which there would be a ready market in every town of Europe and America—no one has yet been found to turn them to a profitable account. Not one single bottle of oil has ever been exported to Europe, or

elsewhere, as an article of commerce. Over these vast fields of wealth a few old Negro women occasionally wander, picking up the nuts which have fallen accidentally to the ground, from which, in their rude and clumsy way, they manufacture as much oil, and no more, as will serve to satisfy their personal wants, and purchase for them a few *luxuries*, such as pickled pork and gin, pipes and tobacco.

“I should be glad if some enterprising individual would undertake to develop the riches of this country, and establish this new branch of trade. Mahogany and logwood now engross, as they have always done, the entire attention of the merchants settled in Belize; but a much more profitable, a more certain, and a more durable trade awaits those who have courage and capital to open this new vein of wealth. British Honduras contains numerous navigable rivers and creeks, and on the banks of all those rivers the Cohune is found in abundance. The river Hondo, the New River, the Northern River, the Belize, the Sibun, Manatee River, Mullin’s River, Sette River, Monkey River, Deep River, Golden Stream, Rio Grande, Moho River, and the River Sarstoan, are all navigable, and by these cohune oil could be conveyed from the place where it is manufactured to the sea.”

Annexed to this interesting account is a letter from Mr. J. H. Faber, Crown Surveyor, dated Belize, January 10, 1854, containing some valuable observations on the same Palm. It runs as follows:—"By the latest computation the settlement of Honduras contains 37,500 square miles, two-fifths of which, I have no hesitation in asserting, are composed of what are commonly called Cohune ridges (*Corozales* in Spanish). These Corozales, or Cohune groves, are mostly along the banks of the rivers, and possess the richest virgin soil; some of them are only a quarter of a mile in depth. The cohune-trees grow at an average distance of fifty yards from one another, thereby forming arches of evergreens, which soften the ardent rays of the tropical sun, and give a grand air to these forests, the silence of which is only broken by the twitter of bright-plumaged birds, or the solitary cries of some wild mammal roaming in these wildernesses.

"The cohune-trees yield one crop every year; this crop consists of generally three, and sometimes four, bunches of nuts, as close together as grapes; the nuts are of the size of a small turkey's egg, and on an average there are eight hundred nuts in one bunch. The people here extract the oil from them in the following manner:—when the nuts

are what they term full, they break, between two stones, the shell, which is very hard, then pound the kernel in a wooden mortar; then put the sediment in a boiler with water, and boil it down until all the oil or fat floats; they skim the oil off, fry it in an iron pot, so as to disengage all the aqueous particles, and then bottle it; by this process the average yield is one quart bottle of oil from a hundred nuts. With improved machinery more oil can be extracted, and if any one with some capital at his command, and having a ready market for his produce, would undertake such a manufactory, there is no doubt that the staple article, that is to say nuts, will not be found wanting; there would always be an abundant supply on hand, because the women and children who live along the banks of the rivers, having nothing else to do during the dry season, and being certain of a trifling remuneration, would vie with one another to bring to such an establishment the produce of their labour, which only consists in gathering the nuts."

These two articles naturally attracted the attention of Mr. G. F. Wilson, the intelligent superintendent of Price's Patent Candle Company, at Vauxhall, London, who, on the 30th October, 1854, addressed a letter, of which the following is the substance, to the 'Journal of the Society of Arts.'

He says :—" As the introduction of new fats and oils for manufacturing purposes into England has long been a hobby of mine, I trust that you will not suspect me of any wish to discourage the manufacture of cohune oil, suggested by Mr. Temple, when I repeat that the cohune oil will not be worth more for manufacturing purposes, whether for soap, candles, oil, or grease, than the fine cocoa-nut oil of the Malabar coast, which comes to England in large quantities. The reason why Mr. Temple finds the oil expressed in Honduras from the cohune nut superior to that of the cocoa-nut, is probably the fact that the cohune-nuts, being small and without *milk*,* would be dried whole, and thus be protected by their brown skin from any risk of mould, which, unless some care and attention is taken during drying, the cocoa-nuts are liable to at the inside, and where broken. These carelessly dried kernels would yield an oil, if not of so low a quality

* What is called, in popular language, the milk of Palm-nuts, is the albumen of the seed in a liquid state, which, when the fruit is *quite* ripe, appears as a solid white or yellowish mass, and is *then* termed the kernel. The reason why cocoa-nuts have generally such a great quantity of milk is that they are gathered from the trees before they have arrived at maturity, and the reason why the cohune-nuts, of which Mr. Temple speaks, are destitute of milk is that they are collected after they are ripe, indeed after they have fallen from the tree; compare the two fruits in the same state of growth, and the amount of milk will be found proportionately the same in both.—*B. S.*

as that known as Sydney cocoa-nut oil, at any rate not superior to the lowest quality of Ceylon oil, which will not bear comparison with the cohune. As to the question, how to separate the oil from the dried kernel, Mr. Temple must add a 0 to his figure of the steam-power necessary, if a regular mill is to be erected. Some years ago, not being able to obtain from other sources sufficient supplies for our works at Vauxhall, we established a large mill, with perfect machinery, in Ceylon, but we found that after a time the natives of the Malabar coast, with their rude sort of pestle and mortar, beat us, making better oil, not costing more than ours; the native-made oil being supplied at so near the cost of the quantity of dried kernel required to produce it, as not to leave margin for interest and charges of machinery. There is no fear, for many years to come, of the supply of fats like the cohune being so great as to make their judicious extraction an unprofitable business. I should recommend a number of Malabar coast mills being tried in the first instance, and, rather than any running into expensive machinery, that a supply of nuts, thoroughly dried, should be tried by the seed-crushers in England. I had a discussion with an intelligent gentleman from Venezuela, and a South American merchant, on the comparative merits of

the Cocoa and Cohune oil, which they knew well, and of which they spoke highly."

To this communication Mr. Temple replied in a letter, dated Belize, December 15, 1854, and published in the same Journal (vol. iii. p. 159), from which the following is an abstract:—"Mr. Wilson's letter does not at all discourage me nor cause me in the slightest degree to relax my efforts to make the cohune oil more generally known and used by the public. Notwithstanding Mr. Wilson's opinion respecting the merits of that oil,—without presuming to differ from him upon a subject to which he has devoted so much attention,—from all that I have read, and seen, and heard, I have arrived at the conviction that cohune oil is destined, at no very distant date, to take the highest rank amongst vegetable oils. Mr. Wilson (very naturally) forms his opinion from the specimen which was sent to him. But I warned your readers that the specimens forwarded to you were not to be regarded as fair representations of the cohune oil, because they were manufactured in a very imperfect and unscientific manner; nevertheless, the manager of the British Sperm Candle Company places it—so far as it is applicable to the manufacture of candles—in a higher niche than the best cocoa-nut oil.

“Mr. Wilson says, ‘The cohune oil will not be found, for manufacturing purposes, whether for soap, candles, oil, or grease, worth more than the fine cocoa-nut oil of the Malabar coast, which comes to this country in large quantities.’

“The general manager of the British Sperm Candle Company gives a practical opinion upon the subject, for, having actually made three candles from the oil which you sent to him, he says, ‘I consider the cohune-nut oil superior to cocoa-nut oil for making composition candles, for the odour is more pleasant and the compound is less oily’ [that is, not so liquid]. ‘The *best cocoa-nut oil*’ [including, I presume, the Malabar oil,] ‘is now selling in London at 5*l.* per *cwt.*, and I think there would be no difficulty in selling the cohune-nut oil at a higher rate in very large quantities.’

“Now, here are two very different opinions expressed by gentlemen, both of whom are well acquainted with the subject on which they write; and each occupies too high a position to permit us to suppose for an instant that either of them would give expression to anything but a conscientious conviction. The testimony is conflicting. How is it to be reconciled? The manager of the Sperm Candle

Company founds his opinion upon experiment. Mr. Wilson would appear to have formed his in the absence of such experiment; at all events, it is not in evidence that he made any. Under these circumstances I would say, *Utrum horum mavis accipe.*

“But I am content to take the opinion of Mr. Wilson. He says that the cohune oil, for the purposes which he mentions, will not be found *to be worth more* than the fine cocoa-nut oil of the Malabar coast. From this mode of expression, I think it may be inferred that Mr. Wilson is of opinion, at any rate, that it is *worth as much*. If, then, that be so,—if the cohune oil and the Malabar cocoa-nut oil be placed upon the same footing as regards quality, with which can the English market be the most readily and cheaply supplied? The time occupied in the passage from Malabar to London is, I suppose, from four to five months; the voyage from Honduras to England is performed in six or seven weeks. This circumstance then, I should imagine, must give to the cohune oil what may be termed a collateral advantage over the Malabar cocoa-nut oil, and *cæteris paribus* must render the former the more desirable commodity.

“Mr. Wilson says, ‘The reason why Mr. Temple finds



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Veron's Bot. Mag.

Chamærops humilis, Linn

the oil expressed in Honduras' [I am sorry to say it is not *expressed*] 'from the cohune palm nut is superior to that from the cocoa palm nut is probably this:—The cohune-nuts, being small and without milk, would be dried whole, and thus be protected by their brown skin from any risk of mould, which, unless some care is taken, *the cocoa-nuts are liable to at the inside, and where broken.*' This is very valuable testimony in favour of the cohune-nut, and the fact mentioned by Mr. Wilson undoubtedly gives it another advantage over the cocoa-nut. The shell of the cocoa-nut is thin in proportion to its size, and is consequently easily broken. Falling from no very great height, its own weight would occasion it to be fractured. Not so with the cohune-nut. The shell of that nut is remarkably hard, and, though probably not thicker than that of the cocoa-nut, the texture is altogether different. Then again, being so much lighter and smaller (the cocoa-nut being the size of a cannon ball, and the cohune-nut not much larger than a hen's egg), it is not liable to so many accidents. The shell admits of a most beautiful polish, and is capable of being turned into a great variety of useful and ornamental articles. Mr. Wilson speaks of the *milk* of the cocoa-nut: I presume he means the water which that nut contains. This water, when the nut is

taken from the tree early in the morning, and whilst the dew is yet upon it, is a cool and delicious draught. It is slightly effervescent and greatly aperient. The milk is made from the kernel itself, and for this purpose the kernel is grated, a little warm water is poured over it, and the liquid is then filtered through an open cloth. This milk is excellent with coffee, and indispensable to a curry.

“But Mr. Wilson gives me more credit than I deserve, in supposing that I derive my opinion of the superior merit of the cohune-nut by such a scientific mode of reasoning as that which he suggests. I will state in a few words why I think that the cohune-nut is, and must be, superior to the cocoa-nut. In the first place, the cocoa-nut tree prefers an arid, sandy soil,—a soil in which nothing else will grow: there it grows spontaneously—there it luxuriates. On the desolate beach, where no other tree or shrub of any kind, or patch of green, presents itself to the eye, these trees are seen in groves, their leaves waving in the wind like the nodding plumes of a hearse, and, as the gale sweeps past them, giving utterance to wailing, melancholy, funereal sounds. There is something indescribably solemn and ghost-like in the appearance of a large avenue of cocoa-nut trees on the sea-beach by moon-

light, more particularly if there be a fresh breeze blowing at the time. The cohune tree is found only on the most fertile land: it is never to be seen on the sea-coast, nor within eight or nine miles of it. Where this tree grows, there is the richest pasture—there plants and fruits of every variety flourish in great profusion—there you see flowers of surpassing beauty and fragrance—and there also birds of the brightest plumage. Well, then, we have it on the authority of Lucretius that ‘*ex nihilo nihil fit* ;’ and a greater authority has said, ‘Do men gather grapes of thorns, and figs of thistles?’ What inference do I draw from this? Simply, that as the cocoa-nut tree derives its nutriment from a sandy, sterile soil, and the cohune tree receives its sustenance from the richest materials, the fruit of the latter must be very much superior to that of the former.* This is one reason why I think more highly of the cohune-nut than of the cocoa-nut. There is another: if you chew a portion of the kernel of the cocoa-nut, the flavour is agreeable, and the process of mastication produces in the mouth a lacteous substance. But if you submit the kernel of the cohune-nut to the same dental process, the

* Science does not countenance the conclusion here arrived at by Mr. Temple.—*B. Seemann.*

result is a positive oil. But the strongest argument in favour of the superiority of the cohune-nut, is the broad fact that one bottle of the oil extracted from it will burn as long as two bottles of oil made from the cocoa-nut. The trunk of the cocoa-nut is very lofty, and the leaves grow only at the top. The cohune is much shorter, and the leaves commence at the root. These leaves, when a tree is cut down, are eagerly devoured by the cattle. It is a singular circumstance that the bees generally select the top of the cohune trees in which to build their hives and deposit their honey.

“Mr. Wilson says that he had a conversation with an intelligent gentleman from Venezuela, who knew the cohune oil well, and spoke highly of it. If the cohune tree grows in Venezuela, it is rather remarkable that Humboldt, in his account of that country, makes no mention of it.* I am glad to find that, through the publicity given to cohune oil by means of your Journal, a demand has already been created for that article. Messrs. Hyde and Company, one

* Mr. Wilson did not state that the intelligent gentleman from Venezuela told him the Cohune grew in that country, but only that he knew it well. It is however not at all unlikely that it is found in Venezuela, as it was met with by me in the latitude of that republic (Isthmus of Panama), and has probably a much more extensive geographical range than we are at present aware of. Humboldt not mentioning it is no proof that it is not a member

of the oldest mercantile houses connected with Honduras, possessing a large capital, and animated by a warm desire to develop the resources of the country, and contribute to its general prosperity, have determined to give their aid to a more extensive and more perfect production of cohune oil. Mr. Travis, the representative of that firm, has communicated to me the following extract from a letter addressed to him by Mr. Hodge:—

“The high price for oil in consequence of the Russian war, has caused a demand for cocoa-nuts and oil, and we have also inquiries for cohune-nuts and oil. As an experiment, we have promised to bring here five tons of cohune-nuts in the shell, which please ship in one of our own vessels for London. Should it succeed, we shall send machinery for crushing, etc.’

“Mr. Travis writes to me as follows:—‘ We informed them in answer that there were abundance of cohune-nuts, but our difficulty would be labour, as this country is so thinly

of the flora of Venezuela, as every botanist knows; for Humboldt did not remain sufficiently long in Venezuela to be able to write a complete enumeration of its flora. All he and Boupland could do was to collect a number of plants, which, however great it was, is far inferior to that which has since come to light, by the indefatigable labours of Wagener, Karsten, Eduard Otto, Moritz, Warszewicz, Linden, and others.—*B. Seemann.*

populated, and labour high. In time, if the men living on the banks of the rivers were to find that they could always sell the cahoun-nuts in Belize, a steady supply would be obtained, which would increase every year.' Mr. Sheldon, the head of another mercantile house connected with Honduras, has also resolved to try the experiment. He has directed ten tons of nuts to be sent to him.

"I have sent to England, in order that they may be forwarded to you, ten bottles of cohune oil, which I think will be found to be of a better quality than that previously transmitted. Perhaps you will be good enough to send one of them to Mr. Wilson. But even this oil, not being artistically made, is very far inferior to what it ought to be, and what it would be if it were properly expressed."

The Cohune is also a native of the Isthmus of Panama, where I often had opportunities of seeing it, and where it is termed "Palma real" and "Corozo gallinazo." Its trunk is about forty feet high, seldom higher; its leaves are thirty feet long, and each leaflet three feet long; I measured them accurately. From the trunk Palm-wine is prepared; the unexpanded leaflets are used for wrapping up cakes of Indian corn (*tortillas*) previous to boiling them in water; the expanded leaves serve as thatch, and play an important

part in the religious ceremonies observed on Palm Sunday throughout the country: from the fruit an oil is extracted.

All we know of the economical properties of the other species composing the genus *Attalea* is, that their leaves, like those of most Palms, are used for thatch, and that their seeds are eaten by the natives of the countries in which they grow. The fruit of *Attalea excelsa*, the Urucuri of the Brazilians, is, according to Wallace, burnt, and the smoke employed to blacken newly-made India-rubber. The kernels of various other species of *Attalea*, when rubbed in water, form an emulsion, used by the inhabitants of Brazil both externally and internally.

Genus VI. BACTRIS, *Jacquin*.

Bactris, *Calamus*, *Chamædorea*, and *Geonoma*, the four genera which, numerically, are the largest of the whole order of Palms, are, curiously enough, those of the economical properties of which we know least. Neither the rude savages, who come in almost daily contact with them, and hand down, by means of tradition, the uses which they may happen to discover; nor the intelligent northern travellers

who have, from time to time, observed them in their native countries, have accumulated much information on those points. More than forty species of *Bactris* are described in systematic works; yet out of the whole number, only a few deserve notice on account of their uses to mankind. The trunks of *Bactris minor*, Jacq., a native of New Granada and the West Indies, produce walking-sticks, occasionally imported into Europe, under the name of Tobago canes; *B. major*, Jacq., also an inhabitant of that region, bears an edible fruit, which has a pleasant acid flavour,—a peculiarity it enjoys in common with the Brazilian Maraja (*B. Maraja*, Mart.),—and from it the inhabitants prepare a vinous beverage.

Bactris, like the other genera alluded to, with which it must naturally share the contempt of the utilitarian, grows generally in forests, where it performs the menial office of underwood. The species composing it are all inhabitants of tropical America, chiefly the eastern parts; they are mostly only a few feet high; but some, assuming the character of trees, attain a height of forty feet, and even more. In many cases they have several trunks, forming thickets difficult to penetrate, especially as all the species are more or less covered with spines; and the foliage, instead of be-

ing, as in most Palms, confined to the top, is scattered over the whole surface of the trunk. The leaves are pinnatisect, and their segments generally linear and entire, but in some instances—for example, in *Bactris caryotæfolia*, Mart.—delta-shaped and eroso-dentate. The flowers are either axillary or terminal, of a dark yellow, green, or rose colour; the drupes are ovate or nearly round, generally of a dark blue, and contain a white pulp enclosing a solitary, black seed. Most members of this genus being small, they are easily accommodated in conservatories; about twenty are cultivated in Europe.*

Genus VII. BORASSUS, *Linnaeus*.

Remarkably straight trunks, often seventy feet high, fan-shaped leaves, with spiny petioles, diœcious flowers ap-

* Hermann Wendland, in his 'Index,' gives the following list of them:—*B. acanthocarpa*, Mart., *B. Caracasana*, Lodd., *B. caryotæfolia*, Mart., *B. chætorhachis*, Mart., *B. Corozillo*, Hort., *B. cuspidata* (?), Mart., *B. Macanilla*, Hort., *B. macracantha*, Mart., *B. major*, Jacq., *B. Maraja*, Mart., *B. martineziformis*, Hort., *B. minax*, Miq., *B. pallidissima*, Mart., *B. Poiteauana*, Hort. Paris., *B. setosa*, Mart., *B. simplicifrons*, Mart., *B. Varinensis*, Hort., and three other species, not yet determined.

pearing in the axils of the leafstalks, and large brown drupes, containing three seeds (*pyrenæ*) each, are the most characteristic features of *Borassus*, a genus found in Africa and Asia. Little is known of the African species (*B. ? Æthiopum*, Mart.), which grows between the latitude of the Cape de Verd Islands and Benin, and the young seedlings and fruits of which are eaten; but we possess vast stores of knowledge about the Asiatic species (*Borassus flabelliformis*, Linn.), a plant cultivated in our gardens. The terms "vast stores of information" were used advisedly; for so much has been written upon this Palm, that William Ferguson* was able to produce a pamphlet of nearly one hundred closely printed pages on the subject.

Borassus flabelliformis—best known in the countries in which it abounds by the names of Tal, Tala, Tal gaha, Trinrajan, Lontar, Palmeira, or Palmyra,—is one of those Palms enjoying the widest geographical distribution. A glance at one of the maps in Berghaus's or Johnston's Physical Atlas, showing the range of the most remarkable plants,

* 'The Palmyra Palm (*Borassus flabelliformis*). A popular Description of the Palm and its products, having special reference to Ceylon. With a valuable Appendix, embracing extracts from nearly every author that has noticed the tree. Illustrated by wood-engravings, etc. By William Ferguson.' Colombo, 1850.

will help to illustrate this fact. There will be found the word *Borassus flabelliformis* written in a curve beginning on the north-eastern parts of Arabia, in about 20° north latitude and 54° east longitude, extending through the Indian Ocean and the southern parts of Hindostan, and ending in about 20° north, and 93° east, in the Bay of Bengal. The Palmyra is met with on both sides of the Persian Gulf. Immense groves of it are found on the Malabar coast, extending from Cape Comorin through Travancore, Calicut, Goa, and the Bombay Presidency, on through Gujerat, and up some distance on the banks of the Indus in Scinde. But what are emphatically called the Palmyra regions may be included in a line extending along the Coromandel coast from Cape Comorin to Madras, including the northern portion of Ceylon, thus passing through Tinnevely, Tanjore, Pondicherry, etc., and from Madras all along, taking in a considerable belt of the coast between that and Point Palmyras, and then passing up to Gya on the 85^{th} degree of east longitude, and nearly 25° of north latitude. After that the line should be carried on about due east until it reaches Ava, the capital of Burmah, below which, on the banks of the Irrawaddy, there are immense groves of this Palm. From Ava the line should pass down south-

east, through the Malayan Peninsula and the Indian Archipelago, including Sumatra, Borneo, Celebes, Floris, Ceram, Amboyna, the Molucca Isles, and perhaps the Island of New Guinea. The extent of this distribution, in a south-easterly direction, from Arabia, in about 54° , to New Guinea, in about 140° east longitude, is about 86° ,—5160 geographical miles, or about one-fourth of the circumference of the earth! The Palmyra extends in various parts of Asia to between the 25th and 30th degrees of north latitude; the island of Timor is its southern limit; so that it may be said that the region of this Palm is situated between 10° south and 30° degrees north latitude, and 54° and 140° east longitude.

The Palmyra is found in various parts of the mountain districts of Ceylon, including the vicinity of Kandy and of Badulla, at elevations of 1680 and 2450 feet respectively, and having a mean annual temperature of about 74° at the former, and, by calculation of the difference in altitude, a mean annual temperature of $71\frac{1}{2}^{\circ}$ at the latter. Yet although, as already stated, immense groves of this Palm are met with on the banks of the Irrawaddy, from the sea-coast up to nearly as far as Ava or Amarapoorain Burmah, and as far inland as Gya in Bengal, and in isolated patches through-

out Ceylon, still the most congenial places for its development are low sandy plains, scarcely elevated above the level of the sea, exposed to the burning sun and the force of at least one of the monsoons. Such are Jaffna, with the surrounding islands, and other portions of the northern province of Ceylon ; such the district of Tinnevely, with portions of the Madura Collectorate ; portions of the Madras and Bombay Presidencies, and of the Indian Archipelago.

An estimate may be formed of the number of Palmyras existing on the globe by Ferguson's calculation of those living in the Jaffna peninsula and the islands adjacent. He says :—"The area of Jaffna peninsula and the islands is about seven hundred square miles : I think we may safely assume that one-fourteenth of this surface is covered with Palmyras. If so, fifty square miles, equal to 32,000 acres, at the moderate average of two hundred to an acre (according to my calculation, three hundred trees can be *planted* on an acre), would give a total of 6,400,000 trees ; the population being 200,000, this estimate, if correct, gives thirty-two trees for each individual person."

Few trees are better adapted for sheltering animals than the Palmyras, and hence they are resorted to by birds at night, and by rats, squirrels, mongooses, monkeys, ma-

ranayas (*Felis Vivenina*,) etc., during the daytime. When a tree has its old leaves undisturbed, the number of bats sometimes found occupying it is incredibly great. The grooves of the petiole, and the whole construction of the leaves, are well adapted for conveying the rain; and everything falling upon the foliage towards the trunk of the tree, gives nourishment, especially on trees in a wild or unpruned state, to numerous species of epiphytical plants, orchids, ferns, figs, etc. In Ceylon an Orchid, termed by the natives Parang Cataté, often encircles the trunk at various heights, displaying beautiful tassels of pink-coloured flowers. But the most generally conspicuous and interesting union of the Palmyra with other plants is that formed with ten or twelve species of fig, including the Bogaha (*Ficus religiosa*, Linn.), the Gan-Attika (*F. glomerata*, Roxb.), and the Nuga-gaha, the true Banyan-tree of the English (*F. Indica*, Linn.). In Ceylon and India Proper many of these united trees are met with. There is especially one remarkable specimen of a Banyan having two or three Palmyra trees growing in it, at Kaythady, four or five miles from Jaffna, on the road to Chavagacherry, which covers one and one-twelfth acre of ground. This is perhaps the largest Banyan-tree in Ceylon, and a favourite resort for



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Vincent Brooks Ing.

Cocos nucifera, Linn.

pleasure parties from Jaffna. It probably commenced its existence in the leaves of one of the Palmyras, the coronets of which now surmount its foliage and thousand stem-like aerial roots. The knowledge we possess of the way in which these unions originate warrants us in presupposing this; for, when the fruits of the Banyan are ripe, various species of birds flock to eat them, and these, when they alight on the Palmyras, drop the seeds in the axils of the leaves, where they germinate and extend their roots, so as in time to embrace the parent Palmyra, except its upper parts. The top of very old Palmyras is just seen issuing from the stem of the Banyan, as if it grew from there, whereas it runs down through the centre, and has its roots in the ground, the Palm being the oldest. For such a union the Hindoos entertain a religious veneration, saying it is a holy marriage, instituted by Providence.

The number of uses for which the Palmyra is employed, may be said to be almost infinite; indeed one of the eastern languages, the Tamil, spoken in a portion of the region which the tree acknowledges as its native country, possesses a poem, entitled 'Tála Vilásam,' enumerating no fewer than 801 different purposes to which the Palmyra may be applied, and this poem by no means exhausts the catalogue. The

roots are perhaps the only parts of the plant to be regarded as worthless in an economic point of view ; that is, if we reject the information of the natives, according to whom their sap, as well as that of the trunk, is used to cure sores created by the "falling of spittle," and also in cases of dysentery. The young plants, namely those about two or three months old, called Kelingoos in Ceylon, are an article of food, and cultivated for that purpose ; the seeds being sown in six to eight layers, under loose sandy soil. These Kelingoos, if not eaten fresh, are deprived of the parchment-like covering in which they are enveloped, dried in the sun, and thus kept for future use. Those dried in this manner are, when raw, emphatically called Odials ; and after they are boiled, Poolooc Odials. It is the former which, reduced to flour or meal, serve for the preparation of the favourite *Cool*, or gruel of the Singalese. The Kelingoos roasted, boiled, or cut into slips and fried like those of the Bread-fruit, are eaten by the natives of Ceylon, and are to be found in the bazaars of Colombo and other parts of the island throughout the year. It is of the Odials, according to Bennett, that the flour, once so prized by the Dutch, is made : I say, once so prized, for at the present day we never hear of its being sent to the Cape of

Good Hope, Holland, or any other countries inhabited by the Dutch. The Singalese also prepare a dish called Putoo, considered a great delicacy, of the Kelingoo flour. To the meal is added a little water, some prawns or small fish, scrapings of cocoa-nut kernels, unripe Jack-fruit (the produce of *Artocarpus integrifolia*), etc.; this mixture is put into an ola (*i.e.* Palmyra-leaf) basket, placed on the top of a pot of boiling water, covered over with a chatty, and cooked by the steam. Putoo is occasionally eaten with rice as a curry, and also with jaggery (or Palm-sugar).

A full-grown Palmyra is from sixty to seventy feet high; its trunk at the bottom is about five and a half feet, at the top two and a half feet, in circumference. Its wood is favourably known in Ceylon and the maritime ports of India. Large quantities of it are exported from Point Pedro and other parts of Jaffna to Madras and Colombo. At certain seasons of the year, the felling, splitting, dressing and exporting of it give work to thousands of the Tamil people of the northern peninsula of Ceylon. The trees have to arrive at a considerable age before they are of use for timber; when a hundred years old, they are excellent; but it is a well-known fact, that the older they get, the harder and blacker does the wood become. Its

durability has also been well tested : there being doubtless many buildings in Ceylon which have rafters more than a century old. Its specific gravity is, according to Mr. Mendis, sixty-five pounds per solid foot. Pillars and posts for the verandahs of the houses, well-spweeps, etc., are made of this timber. In the sandy parts of Jaffna, where water is found near the surface, and where, from the strong winds and other causes, the wells are liable to be filled up, a hollowed part of the trunk of a Palmyra is inserted, and forms a well, from which many a thirsty traveller refreshes himself. Palmyra trunks split into halves, with the heart scooped out, are used as spouts for various purposes, but more especially for carrying away the water from the eaves of houses. The thick parts of the trunks are generally taken for rafters, the thinner or tops for reepers (laths). The trunks of young trees or the tops of old ones are often cut into pieces, split, and placed where game is plentiful, as in the Patchelepalla district of Jaffna. The wild hogs and hares are very fond of the soft, white, spongy hearts of the logs, and in resorting to them to eat, are frequently shot by the natives. The dark outside wood of very old trees is used to some extent in Europe for umbrella-handles, walking canes, paper rulers, fancy boxes, wafer-stamps, and other articles. The work-

man operating on this wood has to be extremely careful, as when split some of the wiry fibres get loose, and are apt to run under the nails of his fingers, or into the flesh of his hand. It is stated that that side of the trunk exposed to the south wind is the thickest, hardest, and best. The natives, if not quite certain of the age or quality of the trees to be felled, often cut a notch in the trunks near the ground, to see how far the black wood extends, a test which in most instances holds good. From the wound thus made, a large quantity of sap frequently runs, which must not be confounded with the toddy obtained from the spathes; it forms a slimy, useless jelly on the tree, and is not, as has been asserted, the bdellium. Rumphius, whose authority is generally quoted to cover this mistake, has not written a word which could support such a statement,—a statement, as Ferguson justly remarks, as preposterous as the supposition that *Areca Catechu* yields the catechu of commerce.

But to return to the timber. It is well known in India that the female tree produces the best and hardest, and that that of the male, notwithstanding Rumphius' assertion to the contrary, is considered so inferior that, unless the trees are very old, it is never used. Buyers and sellers of the Palmyra rafters should always choose the blackest and heaviest, but

bear in mind that the natives add weight and colour to the white rafters of young trees and those of male ones, by steeping them in salt water. If there is any suspicion that such a fraud has been practised, an adze or axe should be used. If the timber is good, it will be found very hard, and fly away in chips, displaying the ends of the dark wiry fibres thickly packed together: if bad, or if it has undergone the "salt-water cure," it will be found soft and spongy, with the fibres far apart, and the other parts composed of fecula or farina like sago. Vessels are never built exclusively of Palmyra wood; they would be too heavy to float with a cargo, but the rails or bulwarks and the roofs or decks of Dhonies are often made of it. In Jaffna, where Palmyras are plentiful, they sell at from three shillings to six shillings each; a single tree will yield from three to four rafters, and if cut entirely into reepers (laths), the number is fifteen. One hundred rafters, sixteen cubits in length, sell at Colombo for about £17. 10s.

The trunk is generally simple, but occasionally it is more or less divided. Ferguson says:—"The first of such trees I saw had four heads then upon it, but with marks where three or four others had been. These divisions began about twenty-five or thirty feet from the ground. I noticed one

near Oodooville with six heads on it. One of them grew nearly in a line with the body of the tree, while the other five formed a whorl, but bending somewhat outward before they could attain their upright posture. There were marks where other three had been. The Palm-tree mentioned by Forbes in his 'Oriental Memoirs,' as having about forty heads, was probably a Palmyra."

The leaves (or olas), on trees in the jungle, or at a distance from human habitations, will be found extending until the tree attains a height of twenty-five to forty feet from bottom to top, the older ones displaying their stalks only, the blade or fan part having rotted away. A tree thus armed with the silicious and serrated edges of the petioles (which latter are from three to four feet long) is a formidable object to encounter, as he who has to ride through groves of them readily admits; a Tamil proverb says, "What he saw was a snake, but what bit him was a Palmyra leaf." The foliage is distributed on the trunk in three spiral rows, beautifully ascending from right to left in some, and from left to right in others. The blade of the leaf has from seventy to eighty rays, diverging from the end of the stalk in nearly an entire circle, but are not able, from the breadth of the leaf, to spread horizontally, thus giving a section of

the leaf a serpentine form. Each tree has from twenty-five to forty fresh green leaves upon it at a time, and of these the natives frequently cut off twelve or fifteen annually, or a greater number once in two years, to be devoted to various purposes, as well as with the view to enable the fruit to ripen and increase in size.

When the leaves are intended for thatch, or for making fences, they are placed flat on the ground in layers over each other, and often with weight upon them, to assist in the process of flattening them. The thatch formed of them does not last longer than two years, nor is it so handsome as that made from the plaited Cocoa-nut leaves. They make very close and elegant fences. In Jaffna, and doubtless in India, the blades of the leaves are put into the ground of the rice-fields until they rot off, and thus yield an excellent manure, giving a quantity of siliceous and other matter to the soil. Mats are made of Palmyra leaves, and are used instead of carpets on floors, for ceilings, for drying coffee and punatoo upon, and for packing chilies and other articles of exportation. A Tamil proverb says, "Witchcraft is the easiest of all arts, and Ola Barkel the easiest of all plait." Bags, baskets, water-baskets (employed in irrigation), winnows, hats and caps (the latter are worn, for instance, by the Catamaran

men at Madras), fans, umbrellas, etc.,—all are made of these leaves. But one of the most singular purposes to which they are devoted is that of writing upon. The oldest Hindoo author who mentions writing on *Olas* is Panniny-rishee. He lived, according to Hindoo reckoning, about the year 790 of the Caliyugam, or about 4160 years ago, and resided at Arittuwarum, near the source of the Ganges. Pliny (lib. xiii. cap. 2) says expressly that the most ancient way of writing was upon the leaves of Palms. Indeed, that such was the case with those of Palms, as well as other plants, admits of no doubt, and hence, it is believed, the *leaf* of a book came to be synonymous with that of a plant. The leaves of the Palmyra are not the only ones used for writing upon in India; those of the Cocoa-nut tree (*Cocos nucifera*, Linn.) and those of the Talipot (*Corypha umbraculifera*, Linn.) serve the same purpose. Palm-leaves, when they are prepared to receive the impression of the stylus, are called *Ollahs*. The natives write letters upon them, which, neatly rolled up, and sometimes sealed with a little gum-lac, pass through the post-office. During the operation of writing, the leaf is supported by the left-hand, and the letters scratched upon the surface with the stylus. Instead of moving towards the right the hand which performs the

writing, the leaf is moved in a contrary direction, by means of the thumb. To render the characters more legible, the engraved lines are frequently filled by smearing the leaves with fresh cow-dung, which is tinged black by rubbing the lines over with Cocoa-nut oil, or a mixture of oil* and charcoal-powder. The Palmyra books are never much beyond two feet in length and two inches in breadth, as the parchment-like webs between the little ribs will not admit of their increase in size. The statements respecting the age of Palmyra manuscript-books are conflicting: whilst some authors attempt to prove that they do not last longer than a century, others are ready to show that they may be preserved for four or five hundred years.

The male and female flowers of the Palmyra are generally produced on two different trees (diœcious), but sometimes, as in the case stated by Ferguson, they are found upon one individual tree (monœcious). The difference of sexes in the trees is not observable until the inflorescence has ap-

* Mr. G. H. K. Thwaites, the intelligent Superintendent of the Royal Botanic Gardens, Peradenia, has sent to the Museum of Economic Botany at Kew a specimen of oil, called "Doomunale Tel," and distilled from the Doom-male resin, which is dug out of swampy places, in which at present no trees grow. "This oil," he says, "is used by the Cingalese for making legible the writing on the Palmyra-leaf, by rubbing it on with a burnt rag."

peared. The appearance of this organ, about the twelfth or fifteenth year after the trees have been planted, marks an epoch in the life of the Palmyras. They may be said to have come of age, and henceforward begin to play an important part in the domestic economy of the natives. They now yield toddy, a beverage almost as famous for its use as notorious for its abuse, and obtained by a very singular process.

At the season when the inflorescence begins to appear, and before the spathes have had time to burst, the *toddy-drawer* is at work in the Palmyra groves. His practised eye soon fixes on those trees fit for the "scalping-knife," and if they have not dropped the footstalks of the leaves, the first operation, if the trees are valuable, is to wrench them off. This done, the toddy-drawer, armed with his leathern protector for his breast, his raceme-batten of wood, his small thongs, straight and crooked knives, with the side leather-pouch to contain them, procures a piece of tough jungle vine, or a strip of the stalk of a young Palmyra or Cocoa-nut tree, which he converts into a sort of loop, of such dimensions as to admit of his feet getting through to a space large enough to allow them to clasp the tree. This done, he puts his feet in this thong, stands close to the tree,

stretches himself at full length, clasps it with his hands, and pulls his feet up as close to his arms as possible; again he slides up his hands, and repeats the same process, until, by a species of screw-process, he ascends to the summit of the tree. When the trees are high, use is occasionally made of hoops, of the same material as that of the thong, large enough to encircle both the tree and the toddy-drawer, so that it affords always a support to the body while the climber is in the act of taking a fresh grasp. Arrived at the summit, amongst the leaves, the toddy-drawer lays his climbing apparatus across a leafstalk, and commences the pruning and phlebotomy. Leaving one or two of the lower leaves as a support for his own body until the operation he is about to perform is completed, he frees the tree, by means of a crooked knife (on a small scale resembling a reaping-hook), of all the accumulated dirt, and cuts off all the leaves, except three or four and the top bud of the tree. Besides the removal of all this, the crooked knife is now used in shearing off the outer covering of that part of the tree from which spring the foliage and inflorescence. The various spathes are supported during this operation by being tied up by several thongs to the footstalks of the uncut leaves. The pruning having been completed, all or most

of the spathes are effectually encompassed from end to end by thongs, to prevent the inflorescence from bursting forth. Thus tied, they are beaten and crushed between the wooden battens. This operation is repeated for three successive mornings, and on each of the following four a thin slice is cut from the points of the spathes ; and all this is done in order to keep them from bursting and to encourage the flow of sap. On the eighth morning a clear, sweet liquor begins to flow from the wounded parts, which is indicated by the toddy-birds (*Artamus uscus* ?) and crows fighting and chattering among the trees. The toddy-drawer then ascends again in the morning with chatties, or toddy-receivers, in which he places the ends of the spathes, and leaves them until the evening, when they are found to contain a quantity of this liquor. The operation of attracting the juice is repeated every morning and evening, or in the mornings only, until the whole spathe is sliced away. The trees are drained in this manner for several months in the year ; but it is said, that if the operation is repeated on the same tree three successive years, without allowing any of the spathes to burst, the trees die. According to Mrs. Tucker, a spathe continues to give toddy for five months; and while it is seldom that three spathes are yielding toddy on the Cocoa-nut

tree, seven or eight will yield juice at once on the Palmyra. An expert climber can draw toddy from about forty trees in a few hours. In Jaffna a distinction is made between "toddy" and "sweet toddy;" the former, called by the Tamils "culloo," is the fermented, the latter the unfermented juice. It is amusing to notice the various comparisons to which toddy, in general, has given rise. Sir William Jones compares it, fresh from the tree, to Poubon water, fresh from the fountain, or to the best mild champagne; Malcolm, the American, associates its taste with his native cider; while Johnson, a traveller in Abyssinia, ranks it no higher than ginger-beer! It is possible that it bears a certain resemblance to all three, and indeed a good deal of the Ceylon ginger-beer is made from toddy. The result of partaking of it early in the morning is, upon most constitutions, a listless, drowsy sensation, much the same as that of beer when drunk in the heat of the day,—of course, only within the tropics.

Toddy serves extensively as yeast, and throughout Ceylon no other is employed by the bakers; large quantities of it are also converted into vinegar, used for pickling gherkins, limes, the undeveloped leaves of the Cocoa-nut and Palmyra trees, and other substances; but by far the greatest quantity is

boiled down for jaggery or sugar.* It appears that in the time of Menu, upwards of four thousand years ago, the Hindoos knew how to make sugar from the flowers of the Madhuca (*Bassia latifolia*, Roxb.), and this being the case, there is reason to suppose that sugar was made from some of the Palms at a much earlier period. Sugar-candy is alluded to by Megasthenes under the name of "Indian-stone;" and to this day, the crystals formed either by jaggery or the juice of the sugar-cane, are called "cat candoo," or stone-sugar. The common Indian name for the finer sorts of sugar is "Cheenee," and has been supposed to point to the Chinese origin of the production. Be that as it may, it seems certain that sugar, in various shapes, was used by the people of India at a very remote period of history.

The usual process of making jaggery, as pursued at Jaffna, is very simple:—The "sweet toddy" is boiled until it becomes a thick syrup, when a small quantity of scraped Cocoa-nut is thrown in, to ascertain, by the feel, whether the syrup has attained the proper consistency; if that be the case, it is poured into small baskets of Palmyra leaf, in which it cools and hardens into jaggery, and is either kept for home con-

* Both these words are derived from the Sanscrit *Sakar*, whence also the Arabic *Shkar*, the Latin *Saccharum*, the German *Zucker*, etc.

sumption, sent coastwise to Columbo, or shipped beyond sea to be refined. In the year ending January 5th, 1850, the total export of jaggery from Ceylon was 9580 cwts., bearing a custom valuation of £1937, fully two-thirds of which consisted of the produce of the Palmyra. To make *vellum*, or crystallized jaggery, used for medicinal purposes, the process is nearly the same as that just described, only the syrup is not boiled for so long a time. The pot which contains it is covered, and put aside for some months, at the end of which period the crystals are found in abundance. The juice of the Palmyra possesses a greater quantity of saccharine matter than that of most other Palms; about three quarts of it suffice for boiling into 1 lb. of jaggery. The chief fault of the jaggery made at Jaffna seems to arise from the superabundant application of lime, a small quantity of which is of course absolutely necessary to prevent fermentation. Jaggery, according to Malcolm and Crawford, forms an article of commerce from the upper and lower provinces of Burmah. In Sawnu, when the crops fail, the inhabitants derive subsistence from jaggery; and the people of Timur depend, during part of the year, chiefly upon it as their principal article of food. It is stated that sugar which is chiefly the produce of the Palmyra, is more granulated and



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Copernicia cerifera, Mart.

higher prized than that obtained from the sugar-cane, and that large quantities of it are imported from Madras and Cuddalore into Europe. The export of sugar from Madras is about nine thousand tons annually, and a considerable proportion of that is supposed to be the produce of the Palmyra.

The fruits of the Palmyra vary, in different trees, in form, colour, smell, and taste, and are classified by the natives in several varieties, each of which bears a distinct name. The fruit, when it falls ripe from the trees, is sometimes eaten raw, but it is more generally roasted; and the scene exhibited at such a roasting-feast is one of the most purely oriental that can well be witnessed. When at hand, the shade of an Illipe (*Bassia longifolia*), of a Margosa (*Melia Azadirachta*), or Tamarind (*Tamarindus Indica*), is chosen; a fire lighted, and the party of natives—men, women, children—squat around it, sucking the pulp out of the fibres of the fruits roasted, tearing them asunder with nails and teeth in the most approved and natural style,—all appearing wrapped in the highest possible state of alimentive enjoyment. This jelly, or pulp, resembles mashed carrots, but is a little darker. The period during which the fruits are obtained being short, and a greater number ripening than the

inhabitants can consume, *Punatoo*, or preserved pulp, is made. Europeans seldom eat it; but when the Dutch had possession of Ceylon, they used to consider it such a great dainty, that quantities of punatoo, preserved in sugar, were exported as presents to residents at Java and Holland. Punatoo is made in the following manner:—*Pandals* (stages) are constructed within four or five feet of the ground, and on these mats of Palmyra leaf are spread; the ripe fruits are then taken, torn up, put into ola baskets containing fresh water, and are then squeezed until the pulp, with the water, forms a jelly; layers of this jelly are spread on the mats to dry. This process is repeated for fifteen or eighteen days, one layer being deposited above the other, until they amount to about fifteen, or attain to about half an inch in thickness; the mats are exposed to the sun to dry, being covered at night and protected from rain and dew. Ferguson remarks that he has seen this process carried on, in a dry season, at Ittavil, in Patchelapalla (Ceylon), until the wells in the neighbourhood were nearly exhausted. Punatoo is sold by the *mat*, at three shillings to six shillings each (about a thousand fruits being sufficient for a mat), or in square cubits; it is the chief food of the poorer inhabitants of the peninsula of Jaffna for several months of the year.

In the 'Thala Vilasam' its taste is compared to honey, milk, and sugar; but Ferguson, who has eaten this famous compound, does not deem it particularly agreeable. It is preserved in ola baskets or bags, by being hung up in the smoke, and is generally consumed, plain or mixed, with gruel made from the pounded farina of the Kelingos, or young Palmyra plants, and with Cocoa-nut kernel; it also enters largely into the composition of soups, puffs, cakes, etc., and various other preparations.

It is not exactly the wholesomeness or the nourishing qualities of the edible products of the Palmyra which renders the tree so important to the inhabitants of India, but simply the fact that thousands, perhaps millions, of the people can procure them from their own groves, or purchase them at a low rate from their neighbours, while rice and other articles of food are frequently so expensive that they are beyond their means. The Palmyra is, in this respect, what the potato is to the poorer Irish or Scotch. The Palmyra yields perhaps one-fourth part of the food of about 250,000 inhabitants of the northern province of Ceylon; while it, no doubt, forms the chief support of six or seven millions of the inhabitants of India and other parts of Asia,—thus proving itself one of the most important plants on earth, rivalling the

Date-tree, and ranking only below the Cocoa-nut Palm in usefulness.*

Genus VIII. BENTINCKIA, *Berry*.

Bentinckia Codda-panna, Berry,—the “Codda-panna” of the Telinga language,—is the only species representing this genus. It is found in the mountains of Travancore in the

* It seems natural that a tree so largely diffused over the regions where the Tamil language is spoken, and which, with its various products, enters so largely into the daily use of the people of Southern India, should occupy a prominent place in their proverbial sayings and illustrations. Accordingly, in a volume of Tamil proverbs, published by the Rev. P. Percival, of Jaffna, I find the following, borrowed more or less from this familiar Palm and its characteristics. Fibre used as toothpick—a hit at a spendthrift: “He whose father possesses a thousand Palmyra-trees has not a fibre to pick his teeth.” Sharpness of the petiole: “What he saw was a snake, but what bit him was the stalk of a Palmyra leaf.” Leaves young and old, illustrative of heirship and succession: “It is said that the young leaves of the Palmyra-tree laughed because the dried leaves fell off.” Tenacity with which fruit clings to the tree: “Will the Palmyra fruit fall because a crow alights on the tree?” Size and weight of the fruit: “Can Palmyra fruit be suspended from the neck of a little bird?” Tenderness of the germ—taking unnecessary trouble: “Why use a mallet and wedge for splitting the newly germinated root of the Palmyra, that may be split by the hand?” Height of absurdity: “As the scorpion stung the Cocoa-nut tree, and the Palmyra swelled in consequence!” Felled timber—removal of obstacles: “As an ass perambulated the place where Palmyra

East Indies ; has a reed-like trunk, about twenty feet high ; pinnatisect leaves, with linear segments ; scarlet male, and lilac or violet female flowers ; and small, egg-shaped berries, of a purple colour. Nothing is known of its uses, nor is it as yet introduced into our European conservatories ; but it is cultivated in the Botanic Garden at Calcutta.

timber had been felled." Falling from a Palmyra-tree—injuring a fallen man: "A snake bit him who had fallen from a Palmyra-tree." "Yorkshire, though in London:" the fox of the Palmyra-tree is said to have deceived the fox of the city. Avoid even the appearance of evil—toddy-drinking discreditable: "If you drink under a Palmyra-tree, it will be regarded as toddy." Palmyra-tree insufficient for shade: "Is the shadow of the Palmyra-tree a shade, or is the friendship of the malignant friendship?" Rustling of leaves—effects of long experience: "Will the fox of the Palmyra grove be frightened by the rustling of leaves?" "Tell that to the marines:" "As one ascended a Palmyra-tree, and descended without touching the blossom." Toddy—the habit of drinking cannot be concealed: "He who drinks milk will belch milk, and he who drinks toddy will belch toddy." Eating a Palmyra-tree—effects of perseverance: "By eating slowly, even a Palmyra-tree may be eaten." How the fruit falls: "The fruit of the tree will fall at its foot." Young trees—to save your property you must take care of it: "Preserve young Palmyras by cutting, and buffaloes by tying." Turning the tree to a bad use: "Is it to drink toddy you have reared the Palmyra-tree?" Witchcraft and basket-making easy arts: "Witchcraft is the easiest of all arts, and the common ola basket is the easiest of all plaits."

Genus IX. BRAHEA, *Martius*.

If a person should wish to reside in a district combining the beauties of the tropics with those of the temperate zones,—a climate neither too warm nor too cold, a flora and fauna in which the characteristic types of both are harmoniously blended—oaks, palms, and pines, humming-birds and deer,—he could not select a more suitable one than the vicinity of La Mojonera and Alto de las Cajas, in Mexico, the native country of *Brahea dulcis*, where all the conditions alluded to are to be found. *Brahea dulcis*, Mart. (*Corypha dulcis*, H. B. K.), the only representative of a very curious genus, is known among the Mexicans by the names of “Palma dulce” and “Soyale,” and has for some years been an inmate of our conservatories. When fully developed it is about thirty feet high; its trunk yields timber; its leaves (which are fan-shaped) measure several feet across, and serve for thatch; its flowers are green; its fruit, a succulent drupe, of a yellow colour, and about the size of a large cherry, is sweet and edible.

Genus X. CALAMOSAGUS, *Griffith.*

Forests of the mountains of the Malayan peninsula are the places where the four species of which this genus is composed are found. They are more interesting on account of their botanical character—having the habit of *Calamus*, the leaves of *Wallichia* (*Harina*), and the seed of *Sagus* and *Zalacca*—than on account of their economic properties; indeed, if the truth must be told, of the latter we know nothing whatsoever. *Calamosagus hariniaefolius*, Griff. (*C. wallichiaefolius*, Griff.), is termed “Rotang Simote,” and *C. ochriger*, Griff., “Rotang Donam,” by the Malays, and it is not unlikely that these, as well as the other two species (*C. scapiger*, Griff., and *C. lacinosus*, Griff.), contribute their share towards the stock of “canes” annually sold in the markets of the East. All *Calamosagi* are climbing plants, bearing pinnatisect leaves, the segments of which are wedge-shaped, eroded from the middle upwards, of a lively green above and a bluish colour below; their petioles are, like their trunks, armed with prickles, and they have near the base a leafy expansion (ligula) characteristic of this genus; their inflorescence is axillary, and bears hermaphrodite flowers; while their fruit, best compared in appear-

ance to a pine-cone, is scaly and dry. None of them have as yet found their way into our gardens.

Genus XI. CALAMUS, *Linnaeus*.

Although St. George, the legendary hero, may have exterminated the last of the dragons, yet he certainly did not take any efficient steps to prevent their blood from continuing to circulate,—if no longer in the veins of that fabulous race of animals which he slew, at all events in the body of three species of plants (*Pterocarpus Draco*, Linn., *Dracæna Draco*, Linn., and *Calamus Draco*, Linn.), belonging to Natural Orders (*Leguminosæ*, *Liliaceæ*, and *Palmæ*) widely separated from each other.

Dracæna Draco—to which belongs the famous Dragon-tree of Orotava in Teneriffe, considered to be one of the oldest vegetable inhabitants of our globe—and *Pterocarpus Draco* are without the range of the subject proposed in this work; but *Calamus Draco* is a true Palm, entitled to a special notice. The genus (*Calamus*) to which it belongs is indigenous in Asia, and abounds in the islands of the Indian Archipelago, as well as in the Malayan peninsula.

A few species are found within the Madras territories, but in India they chiefly abound in the forests of the districts of Chittagong, Silhet, and Assam, whence they extend along the foot of the Himalayas as far north-west as the Deyra Doon, where one species (*Calamus Royleanus*, Griff.) flourishes in wild luxuriance.

All species of *Calamus* are spreading shrubs, or small trees, erect or often climbing to a considerable height; their trunks at intervals, where leaves are rent off, are covered with their sheaths; their foliage is, like their spathes, variously armed with spines or prickles; their leaves are pinnatisect, generally with linear segments, and their petiole runs out in some into a long whip-like cord, furnished with recurved hooks, in others a similarly armed cord extends from the sheath, in both cases these attach the *Calami* to their supports; their spadices are axillary, and bear male and female flowers on distinct spadices of the same plant (monœcio-dioecious); their fruit has much the appearance of a reversed pine-cone, being covered with scales, and is generally one, but occasionally two-seeded.*

* Martius enumerates fifty-two species of *Calamus*; but the total number composing this genus as at present known, cannot be stated even approximately, as Griffith, who added thirty-five to those previously described, did

Calamus Draco, Willd., the Dragon's-blood Palm, is a native of Sumatra and the Malay Islands, where it overruns trees to a great extent. The stem is believed to yield the white and brown "Manilla Dragons' Canes" of commerce. The natural secretion of the fruit constitutes the best *D'jurung*, or Dragons'-blood; a second and rather inferior kind is produced by the fruit from which the natural secretion has been removed by heat and bruising; the third, and most inferior, seems to be the refuse of this last process: it is perhaps doubtful whether it is ever procured from the plant by incisions. Dragons'-blood has been an article of commerce from the earliest times, and still continues in demand. "Large quantities," says Low, "are annually sent from Borneo to Singapore and Batavia, and thence to China, where this drug is much prized." In Europe it was for-

not succeed in identifying the latter with the older species, to which a great many, no doubt, belong. In our gardens we cultivate at present, according to Wendland's 'Index,' twelve species, viz. *Calamus ciliaris*, Bl.; *C. crinitus*, Wendl. (*Dæmonorhops*, Bl.); *C. heteroideus*, var. *refractus*, Bl., and var. *spissus*, Bl.; *C. Jacensis*, Bl. (*C. equestris*, Hort.); *C. latispinus*, Hort.; *C. niger*, Willd. (*Dæmonorhops melanocheates*, Bl.; *D. asperrimus*, *niger*, *viminalis*, Hort.; *C. asperrimus*, Hort.; *C. montanus*, Hort.); *C. oblongus*, Reinw. (*Dæmonorhops oblongus*, Bl.); *C. ornatus*, Bl.; *C. rudentum*, Lour. (*C. oblongus* and *rhomboideus*, Hort.); *C. Rotang*, Linn.; *C. Salacca*, Hort. (*Dæmonorhops Salacca*, Hort.); and *C. verus*, Lour.

merly reputed an astringent; but as it has been found to be inert, or nearly so, it is no longer prescribed by medical practitioners. It is a constituent of some tooth-powders and tinctures, and is also, and chiefly, used for colouring spirit and turpentine varnishes.

Calamus Scipionum, Lour., the *Heotau* of Cochin-China, is believed by Griffith to be the plant which produces the well-known "Malacca Canes;" yet—another instance of *lucus a non lucendo*—they do not occur about Malacca itself, but are imported from Siak, on the opposite coast of Sumatra. Some of them are simply mottled or clouded; others of a brown colour, in consequence, it is said, of their having been smoked. The most slender specimens, with the longest internodes, are those most highly valued.

Calamus Rotang, Linn., *C. rudentum*, Lour., *C. Royleanus*, Griff., and doubtless various other long trailing species, yield the rattans or canes of commerce, which, though apparently insignificant, form a considerable article of export. Royle* informs us that in some years between four and five millions of them have been shipped from the territories under the government of the East India Company alone. The same

* 'The Fibrous Plants of India fitted for Cordage, Clothing, and Paper,' etc. By J. Forbes Royle. London, 1855.

author adds :—"Canes are abundant in all the moist tropical parts of the East, both on the continent and islands. In Java the cane is cut into fine slips, which are plaited into excellent mats or made into strong, and at the same time neat, baskets. In Japan all sorts of basket-work are made of split cane, and even cabinets with drawers. Cane is also plaited and twisted into cordage, and slender fibres are made to answer the purposes of twine. It is stated that in China, as also in Java and Sumatra, and indeed throughout the Eastern islands, vessels are furnished with cables formed of cane, twisted or plaited. This sort of cable is very extensively manufactured at Malacca. The species employed for this purpose is probably the *Calamus rudentum* of Loureiro, which this author describes as being twisted into ropes in the eastern regions, and employed, among other things, for dragging great weights, and for binding untamed elephants."

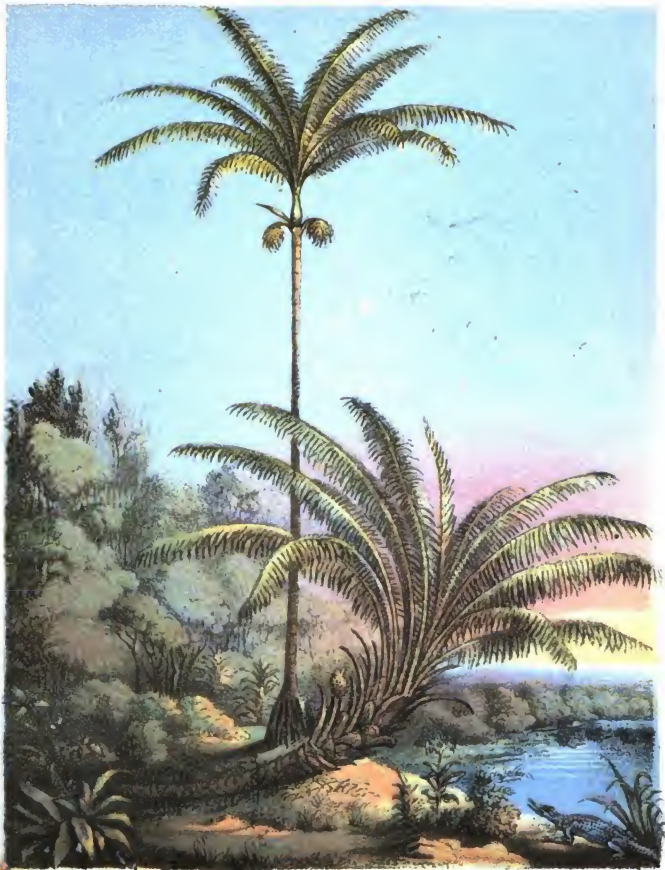
Rattans are extensively used in Europe for caning chairs, for making brooms, and, when dyed black, as a substitute for whalebone, for umbrella-ribs, and for stiffening bonnets, etc.; they are also occasionally used in India for making bridges, as described in the following passage extracted from Dr. J. D. Hooker's Himalayan Journals :—"Soon after

crossing the Rungmo, where it falls into the Rungeet, at a most wild and beautiful spot, I saw," says the enterprising traveller, "for the first time, one of the most characteristic of Himalayan objects of art,—a *cane bridge*. . . . A fig-tree projecting over the stream, growing out of a mass of rocks, its roots interlaced and grasping at every available support, formed one pier for the canes ; that on the opposite bank was constructed of strong piles, propped with large stones ; and between them swung the bridge, about eighty yards long, ever rocking over the torrent (forty feet below). The lightness and extreme simplicity of its structure were very remarkable. Two parallel canes, on the same horizontal plane, were stretched across the stream ; from them others hung in loops, and along the loops were laid one or two bamboo stems for flooring ; cross pieces below this flooring hung from the two upper canes, which they thus served to keep apart. The traveller grasps one of the canes in either hand, and walks along the loose bamboos laid on the swinging loops : the motion is great, and the rattling of the loose dry bamboos is neither a musical sound, nor one calculated to inspire confidence, the whole structure seeming as if about to break down. With shoes it is not easy to walk, and even with bare feet it is often difficult, there being fre-

quently but one bamboo, which, if the fastening is loose, tilts up, leaving the pedestrian suspended over the torrent by the slender canes. When properly and strongly made, with good fastenings, and a floor of bamboos laid *transversely*, these bridges are easy to cross. The canes are procured from a species of *Calamus*; they are as thick as the finger, and twenty or thirty yards long, knotted together, and the other pieces are fastened to them by strips of the same plant. A Lepcha, carrying 140 lbs. on his back, crosses without hesitation, slowly but steadily, and with perfect confidence."

Genus XII. CARYOTA, *Linnaeus*.

Humboldt has justly remarked, "The form of the leaf of *Caryota* is as singular among Palms as that of the Ginkgo-tree (*Salisburia adiantifolia*, Smith) is among *Coniferae*." This singularity consists not only in the leaves being bipinnatisect, but also in their ultimate division having the shape of the fin and tail of a fish, features so peculiar, that by means of it the genus *Caryota* may at once be distin-



J C Frank del et lith

Vincent Brooks Imp

Elais melanococca, Gaertn & *Inartea exorrhiza*, Mart

guished from all other Palms.* The Caryotas are elegant trees, frequent in woody mountains of the East Indies. Their trunks are ringed, and often lofty; their leaves are bipinnatisect, large, reticulated, and their segments wedge-shaped, obliquely eroded, and green on both sides; their spadices are nodding; their spikes pendulous, often hanging down in bundles, like the tail of a horse: their flowers are monœcious, their stamens infinite in number, and their roundish, somewhat red berries often one-seeded and containing sour juice. The Caryotas flower only once during their course of existence. The first spadix appears at the top of the tree; as soon as that has done flowering, others (latent buds) issuing from the axils, or former axils, of the leaves, make their appearance; this process, being of a downward tendency, is repeated until the last spadix, which may be looked upon as the death-knell of the plant, shows itself at the foot of the trunk, proclaiming that the hour of departure from life is at hand.

* I am aware that Zippel has described a genus (*Drymophloeus*) which has the habit and foliage of *Caryota*; but that genus has not yet been generally adopted, and appears to be, judging from the imperfect description known to me, more entitled to the rank of a section of *Caryota*, than to that of a separate genus.

Caryota urens, Linn., the oldest and best known species, is a native of Malabar, Bengal, Assam, and various other parts of India, where it often grows with teak and wild mango-trees. It is a lofty Palm; the trunk is more than a foot in diameter, and more than forty feet high. The leaves are very large, measuring eighteen or twenty feet in length and from ten to twelve across; from their fibre ("Kittul fibre" of commerce) ropes of great strength, brushes, brooms, baskets, caps, and similar articles, are manufactured; the woolly material found on the petioles is sometimes used for caulking ships. The tree is known in India under the various names of Evimannah, Jeroogoo, Ramguoah, Bonkhejur, and Bura-flawar, and, says Roxburgh, "it is highly valuable to the natives of the countries where it grows. It yields, during the hot season, an immense quantity of toddy, or Palm-wine. I have been informed that the best trees will yield at the rate of a hundred pints in the twenty-four hours. The pith, or farinaceous part of the trunk of old trees, is said to be equal to the best sago; the natives make it into bread, and boil it into thick gruel; these form a great part of the diet of those people, and during the late famine they suffered little while those trees lasted. I have reason to believe this substance to be highly nutritious. I

have eaten the gruel, and think it fully as palatable as that of the sago we get from the Malay countries."

"In Ceylon the *Caryota urens* is termed Kittul, and there has given rise to a distinct caste among the natives, that of the Jaggeraros, taking its name from the sugar which is made of the produce of the *Caryota urens* being called jaggery, and from the whole of the above caste, both male and female, being employed in the culture of the tree itself, or in the manufacture of the sugar procured from it. No sugar is made in Ceylon from the sugar-cane; all that used by the natives is made either from the *Cocos nucifera*, the *Borassus flabelliformis*, or the *Caryota urens*, and is sold for one-fourth or one-sixth of the price of the cheapest made from the sugar-cane."*

Besides *Caryota urens*, several other species of this genus (*C. sobolifera*, Wall., *C. mitis*, Lour., *C. propinqua*, Bl., *C. maxima*, Bl., *C. furfuracea*, Bl., *C. Rumphiana*, Mart., *C. ? horrida*, Jacq., and *C. obtusa*, Griff., (*C. obtusidentata*, Griff.,) are enumerated in systematic works: but little is known about their useful properties, and moreover not a few of them seem to be founded on very indifferent cha-

* Sir A. Johnston's letter to the Royal Asiatic Society of Great Britain, p. 545.

acters, making it difficult to recognize them, and rendering it necessary that they should be subjected to a stringent critical examination.*

Genus XIII. CERATOLOBUS, *Blume*.

The genus *Ceratolobus* is represented by one species only (*C. glaucescens*, Blume), a spiny climbing Palm, with pinnatisect leaves (the segments of which are cuneate-rhomboid), lateral panicles, and one-seeded, scaly berries. It is a native of the forests of Java, and is to be found in some of the gardens in Holland.

Genus XIV. CHAMÆDOREA, *Willdenow*.

Mexico, Central America, New Granada, and Venezuela, but principally the former, are the native countries of the various species of *Chamædorea*. "In the Eastern Cordilleras of Mexico," says C. B. Heller (*Bonplandia*, vol. ii. p. 157), "there is not a forest in which there is not, to an elevation

* In our gardens we cultivate:—*C. Cummingii*, Lodd.; *C. furfuracea*, Bl.; *C. horrida* (?); *C. maxima*, Bl.; *C. propinqua*, Bl. (*Ptychosperma appendiculata* ?); *C. sobolifera*, Wall.; and *C. urens*, Linn.—*Wendl. Index*, p. 9, *et seq.*

of at least three thousand feet, as part of the underwood, a considerable number of these slender Palms. Occasionally they are not thicker than a man's finger, yet still they attain a height of twenty feet, and when having pushed their crown of leaves through the boughs of the surrounding trees, they appear to great advantage. . . . Their flowers, when still enclosed in the spathes, are highly esteemed as a culinary vegetable, known as 'Tepejilote.'" Liebmann, who, like Heller, visited that part of Mexico in which these Palms chiefly flourish, has given the name of *Chamædorea Tepejilote* to a species which he considers as producing more especially the food in question; but, from the language of Heller, one is inclined to infer that the young flowers of all Mexican Chamædoreas are edible, and such is most likely to be the case. According to Purdie, bridges are made of these Palms in New Granada, similar to those made of canes in the East Indies.

The Chamædoreas are reed-like Palms, having polished, annulated trunks. Their leaves are terminal, on both sides green, generally pinnatisect, but in some species quite entire (reduced to what has been termed in the Introduction of this work, the normal state of the foliage of Palms). Their flowers issue from the old wood in slightly branched

racemes; they are diœcious, and often beautifully fragrant. Their fruit, a roundish berry, is occasionally not larger than a pea, but it appears in great numbers, and is sometimes of a bright red or scarlet colour, and highly ornamental; as, for instance, in *Chamædorea Ernesti-Augusti*, Wendl. The number of species known at present is, according to a recent enumeration, forty-two, out of which about twenty-six* are cultivated in our gardens.

* These are:—*Chamædorea Arenbergiana*, Hrm. Wendl. (*C. gracilis*, *latifrons*, and *oblongata*, Hort.); *C. atrovirens*, Mart.; *C. Bartlingiana*, Hrm. Wendl.; *C. brevifrons*, Hrm. Wendl.; *C. Casperiana*, Kl.; *C. desmoncoides*, Hrm. Wendl. (*C. elatior*, *regia*?, *repens*, *robusta*, and *scandens*, Hort.); *C. elegans*, Mart. (*C. Lindeniana* and *Martiana*, Hort.); *C. Ernesti-Augusti*, Hrm. Wendl. (*C. latifrons*, *C. simplicifrons*, *Geonoma latifrons*, and *Hypspathe elegans*, Hort.); *C. fibrosa*, Hrm. Wendl.; *C. flavo-virens*, Hrm. Wendl.; *C. geonomæformis*, Hrm. Wendl. (*C. fenestrata* and *humilis*, Hort.); *C. glaucifolia*, Hrm. Wendl.; *C. gracilis*, Willd. (*Borassus pinnatifrons*, Jacq.; *C. Lindeniana*, Hort.); *C. graminifolia*, Hrm. Wendl.; *C. Karwinskiana*, Hrm. Wendl. (*C. elatior*, Hort.); *C. Klotzschiana*, Hrm. Wendl.; *C. lepidota*, Hrm. Wendl. (*C. velutina*, Hort.); *C. Lindeniana*, Hrm. Wendl. (*C. concolor* and *scandens*, Hort.); *C. lunata*, Lich. (*C. oblongata* and *Schiedeana*, Hort.); *C. Martiana*, Hrm. Wendl. (*C. flexuosa* and *Lindeniana*, Hort.); *C. oblongata*, Mart. (*C. aurantiaca*, *Lindeniana*, and *scandens*, Hort.); *Morenia oblongata*, Hrm. Wendl.); *C. pygmæa*, Hrm. Wendl.; *C. radicalis*, Mart.; *C. resinifera*, Hrm. Wendl. (*C. elatior*, Hort.); *C. Sartorii*, Lieb. (*C. Mexicana*, Hort.); *C. Schiedeana*, Mart. (*C. gracilis* and *speciosa*, Hort.); *Kunthia Xalapensis*, Otto et Dietr.).

Genus XV. CHAMÆROPS, *Linnaeus*.

It is a curious fact, that in the Southern Hemisphere Palms with pinnatisect leaves (*Areca*, *Jubaa*, and *Phoenix*), in the Northern, Palms with fan-shaped ones (*Sabal* and *Chamærops*), mark the geographical limit of this Order. In Europe and Asia it is *Chamærops*, a small genus composed of about a dozen species,* which forms the limit. Most of the species have a low trunk, often creeping, and only a few—for instance, *Chamærops Martiana*, Wall.—attain the height of forty feet. Their petioles are generally furnished with prickles; their leaves are rigid and fan-shaped; their inflorescence, arranged in panicles, is axillary, and bears yellow polygamo-dioecious flowers; their berries are generally one-seeded, and may be compared to olives in appearance.

What renders this genus peculiarly interesting is that all its species grow in a comparatively low temperature; indeed *Chamærops Martiana* ascends, according to Madden

* According to Hrm. Wendland there are ten species cultivated in European gardens, viz. :—*C. arborescens*, Pers. (*C. tomentosa*, Hort. Germ.); *C. callosa*, Fulch. : *C. Cochinchinensis*, Lour. (*Rhaphis ? Cochinchinensis*, Bl.); *C. excelsa*, Thunb. (*C. Chinensis*, Hort.); *C. gracilis*, Lodd.; *C. Griffithiana*, Lodd.; *C. Guianensis*, Lodd.; *C. humilis*, Linn. (*C. conduplicata*, Hort.); *C. Hystrix*, Fras.; and *C. Martiana*, Wall. (*Londonia excelsa*, Hort.).

and J. D. Hooker, the Western Himalaya to an elevation of eight thousand feet, where it is annually covered with snow, rather shaking, as Lindley has already intimated, the hypothesis of those palæontologists who contend that Great Britain must at a former geological epoch have enjoyed a tropical climate, because remains of Palms have been discovered in its coal-fields.

The most northern species is *C. humilis*, Linn., the so-called Dwarf Fan Palm, worthy of particular notice as being the only Palm indigenous to Europe, the Date-tree (*Phoenix dactylifera*, Linn.) being merely an introduced plant. It is found as far up as Nice in Italy, in 43° 44' north latitude; but thence southward it has a great range, being met with in all the countries bordering the Mediterranean Sea, including Western Asia, Southern Europe, and Northern Africa, where it covers the wild and uncultivated lands, as the furze (*Ulex Europæus*, Linn.) does those of England, and where the leaves are used for making brooms, seats of chairs, hats, thatch for cottages, etc. In Algiers it was until lately regarded as a scourge; and indeed, in one sense, it still continues to be so; for being, on account of its deep and tough roots, difficult to extirpate, it constitutes a great obstacle to cultivation. Some of the Arabian tribes

use the fibres furnished by the trunk, mixed with camels' hair, for their tent covers; others make baskets of the leaves, and all prepare cordage from the whole plant properly twisted. These usages have called attention to this Palm as likely to afford materials for paper, and experiments made have been crowned with complete success. Millions of hundredweights of such material can be collected in Africa; the price of a hundredweight of green leaves would not exceed two francs. The Dwarf Fan Palm already furnishes a fibre resembling horsehair, which is firm and elastic, and is used in France in great quantities, in the manufacture of carpets, under the name of vegetable or African hair. Better sails are made from it than from the Spanish broom (*Genista scoparia*, Lam.), for which it may henceforward be substituted, to the annual saving of large contributions from Spain of raw materials. This however is not all. It has lately been discovered that the fibres, divested of the glutinous matter which binds them together, are extremely divisible, as fine as flax, and can be used, notwithstanding their inferior length (from twenty-five to forty centimetres), in the preparation of flax cotton. There are already, since 1854, four kinds of manufactures—paper, carpets, sailcloth, and thread—furnished by this plant.

Of the Asiatic species we shall mention, as most deserving of notice, *C. excelsa* and *C. Ritchiana*. The former is the only indigenous Palm in the northern and central provinces of China, where, as well as in Japan, it is sometimes cultivated. It attains a height of from eight to twelve feet. The brown fibre surrounding its trunk is very strong, and is, says Fortune, employed by the Chinese for many domestic purposes. Bed bottoms, used by all classes of the population, are wrought out of it; ropes and cables for the junks are made from it. Agricultural labourers and coolies of Northern China manufacture from the leaves hats and their "So-e," or garment of leaves, a dress worn in wet weather, affording great protection against the rain and wind. This latter statement refers however only to Northern China; in the southern districts of the Celestial Empire the "So-e" is made from the leaves of the bamboo and those of other broad-leaved grasses.

Chamærops Ritchiana, Griffith (*C. Griffithiana*, Lodd.?), is a small Palm, with a creeping trunk, and a much branched panicle. It grows—says the late Dr. Stocks, in a letter addressed to me a few weeks before his much-lamented death—in masses on the barren hills and passes below five thousand feet, leading up to the table-land of Afghanistan and Beloo-

chistan. It is well known to the natives of Scinde under the name of "Phees." The dried trunks and foliage form a common fuel, highly valued in a country where the scarcity of wood is so great. The scurf, with the addition of saltpetre, is a ready tinder for the matchlock. The leaves, called "phurra," are brought in large quantities for sale, across the Hala Mountains, from Beloochistan into Scinde, where they are made into baskets, fans, brushes, sieves, sandals, pouches, platters, and principally into ropes for the water-wheels used for the purposes of irrigation throughout Scinde. The leaf-bud or "cabbage," and the young inflorescence, as well as the flesh of the fruit, are commonly eaten. The hard seeds are used for bullets, and also as beads for rosaries.

The only species of *Chamærops* found in America is *C. Hystrix* of Fraser, which grows near the town of Savannah in Georgia: it has a creeping trunk, is furnished with prickles which resemble porcupine quills and are often fifteen inches long, and produces a brown, edible berry, possessed of a sweet flavour. Another American plant, formerly associated with this genus (*Chamærops serrulata*, Michx.), is now, more correctly, considered a species of *Sabal*.

Genus XVI. COCOS, *Linnaeus*.

About half a mile from Belligam, a fishing hamlet on the southern coast of Ceylon, between the towns of Point de Galle and Matura, is, completely overshadowed by groves of trees, a large rock of granite, which displays the representation of a former prince of the interior, about sixteen or eighteen feet in height, called "Rottah Rajah," to the attention of the traveller. According to tradition, the discovery of the Cocoa-nut tree is attributed to a vision, which communicated to this highly favoured rajah a knowledge of that production. A Cingalese rajah, of devout conduct and character, became suddenly afflicted with a cutaneous disease, which covered him with a white scaly substance from head to foot, to so great a degree as almost to deprive him of human appearance. So very rapidly did the loathsome distemper extend its malignant influence over the rajah's person, that sacrifices were resorted to by his people, in the hope of thereby appeasing the anger of the supposed author of the rajah's sufferings, the Maha Yaka, or great demon. The Kottah rajah (the *image* itself is now so styled) objected to assist in person at any such diabolical sacrifices, and however prejudiced his people were in the belief of their eventual

efficacy, he himself preferred humbly to submit to the decrees of that superior power from whom alone the Maha Yaka could have derived dominion, if he really possessed any, over the destinies of mankind. At this period the Cocoa-nut tree was not known in the interior of Ceylon; and to this day its scarcity is remarked by every traveller who visits the interior of the late Kandian territory. The resigned but suffering rajah having, with all due humility, paid his accustomed devotions, and offered sweet-smelling flowers,* according to the Buddhist religion, and repeated the Buddha-Sarana, fell into a sound sleep, which lasted for several days. During his trance, he beheld a large expanse of water, which he tasted, and found it both salt and nauseous, although of a fine green colour near and blue† in the distance; having on its margin immense groves of trees of a rare kind, such as he had never before seen. For, instead of branches in various directions, as other trees had in his country, a tuft of large leaves crowned the lofty summit

* Generally of *Bignonia Indica*, *Tabernæmontana*, *Jasminum odoratum*, *Zeylanicum* and *luteum*, *Polyanthes tuberosa*, *Nyctanthes Arbor-tristis*, *Michelia Champaca*, *Nerium odoratissimum*, *Acacia Farnesiana*, and *Lacsonia inermis*.

† A liberty is here taken with the tradition, blue and green being synonymous in Cingalese, "Mil-pata."

of each individual tree, which, to an immense height, was totally divested of branches or foliage. The Rottah rajah having awakened from his trance, felt his mind deeply impressed with the unusual nature of his dreams; but in the natural excitement which the hope of his recovery encouraged, he renewed his oblations and prayers, believing that a display of omnipotent mercy would be the result. A cobra di capello, the Naya of the Cingalese (*Coluber Naja*, Linn.), and sacred snake of the Buddhists, shortly afterwards approached; and having expanded its spectacle-marked hood, raised its head a cubit above the ground, and observed the rajah steadily for some moments; after which the animal, extending his blue forked tongue, and thrice bowing its head, lapped water from the leaf in which it had been reserved for the rajah's particular use. Having thrice repeated the draught, the animal, still keeping its eyes fixed on the rajah, gradually retired to the jungle. This was conviction itself of Buddhoo's favour. Again the prince felt his eyelids grow weary; but in his then state of disease, he had determined to occupy no place of shelter save that which the shady Bogaha (*Ficus religiosa*), the tree under which he reposed, afforded him. No sooner had sleep a second time exerted its magic influence, than his former vision recurred, with the additional appearance

of an aged man, whose face bore the appearance of the moon in all its splendour. It was Maha Sudona, the father of the god Buddhoo, who stood before the astounded rajah, and thus accosted him :—“ From ignorance of the sacredness of the ground over which the god’s favourite tree casts its honoured shade, thou once didst omit the usual respect due to it from all created beings. Its deeply pointed leaf distinguishes it above all other trees as sacred to Buddhoo ; and under another tree of the same heavenly character, thou now liest, a mass of sores and ulcers, which the impurity of the red water within the large and small rivers of thy body has, at the great deity’s command, brought upon thee externally. But since the snake, the kind snake, the shelterer of the god Buddhoo when on earth, has thrice partaken of thy drink, thou wilt derive health and long life by obeying the commands which I now bear thee. In that direction (pointing towards the south) lies thy remedy. One hundred hours’ journey will bring thee to those trees which thou hast seen in thy dream, and which thou shalt see in reality, and taste their fruits to thy benefit. But as on the top only it is produced, by fire it must be obtained. The inside—partly of transparent liquid, partly of innocent food—must be thy *sole* diet until thrice the

Great Moon (*Maha Handah*) has given and refused her light. Disease will, at the expiration of that time, leave thee; thou wilt be clean again; but forget not, with the restoration of thy health, sacrifices of sweet flowers and fruits, with much thanksgiving, to that great Brahma of all Brahmas,* to whom all other gods, and even demons, pay homage; through whose mercy and forgiveness of thy neglect and transgressions thy bodily vigour will have been restored, and the days of thy enjoyment in the splendour of the mighty and flaming chief ruler of the moon prolonged." A sound as of ten thousand tomtoms struck at once, seemed to the delighted rajah a manifestation of the messenger's authority. It reverberated on his ear for hours together, after he had awakened from his second trance; and, impressed with a belief that the invisible powers had thus intimated a disposition to take him under their especial protection, and that consequently it was his bounden duty to obey commands so mysteriously conveyed, the rajah, placing the palms of his hands across his forehead, and bending to the ground, prayed for strength to act in obedience to the Ossah Pollah Dewyo, the ruler and creator of all gods and demons, and of the flat world itself. Having

* "*Brahmata-Brahma*," a name of Buddho.



Guelma speciosa, Mart

Illustration by [unreadable]

summoned his immediate followers from the various resting-places which they had constructed with the branches and leaves of the neighbouring trees, by way of temporary shelter, the rajah repeated to them the prophetic words of the divine messenger; and having gone through the ceremony of making a propitiatory offering under the Bogaha-tree, of fruits, betel-leaves (*Piper Betel*), and flowers of sweet perfume, he, attended by his retinue, proceeded in a direct course, through rivers and forests, and over immense mountains, to the southward, as directed by the Maha Sudona. The one hundred hours' journey having been miraculously performed without any perceptible fatigue either to himself or attendants, the anxiously anticipated view of that boundless expanse of blue water, which in his dreams had appeared to him so beautiful yet nauseous to the taste, and on its margin immense groves of trees, with tufts of leaves, as his visions had foretold, gratified his astonished but delighted sight. Beneath the foliage, sheltered from the vertical sun, hung large clusters of fruit, much larger than he had ever seen in his own country of the interior, of green, yellow, and red* colours, and others apparently black. There were no human beings on the coast; but

* The Cingalese language has no signification for brown, reddish, orange-

a vast number of wild beasts—such as leopards, bears, sloths, and elephants. To climb the Cocoa-nut tree (the promised source of health) was then unknown, and considered beyond the power of mortal man; but as fire had been pointed out as the means of obtaining its fruit, the rajah's followers made one. Scarcely had an hour elapsed after the fire had been kindled that was to fell the pride of the coast and the most valuable boon of nature to the Indian world, ere, with a tremendous crash, the tree became prostrate upon the earth, whence, from its capacious and verdant crest, crept out creatures innumerable,—large blue scorpions, brown and yellow centipedes, snakes of various hues—from the polonga to the less dreadful rat-snake; blue, black, green, and yellow beetles, tarantulas, and other spiders, of all sorts and sizes and colours; whilst, running from leaf to leaf, the detested rat seemed to imitate the motions and equal in agility the beautiful three-striped squirrel, or lena, of this paradise (as the glad rajah and his suite at that time considered it) of the universe. The novel fruit was at first with some difficulty opened; but the rajah's superstitions were more powerful than even the effects coloured, scarlet, or pink, which are all expressed by the monosyllable "rat," red.

of hunger itself. With awe he approached the beach, over which wave followed wave in quick succession; whilst the surf beat with violence against the roots of those stately trees, which seemed to thrive best where no other tree of any utility whatever could survive even a temporary sprinkling from the briny spray. Mute with astonishment at the vast expanse of ocean, which he then for the first time approached, the rajah bent to taste the liquid aliment. It was as his vision prognosticated. Again his wonder was increased, but his faith had kept pace with it, in the full belief that "ere the great moon had thrice given and refused her light" he would be cleansed from his foul distemper, and his disrespectful demeanour under the sacred Bogaha, which had originally drawn down upon him the anger of the "All-seeing," be forgiven. Having once commenced, the rajah and his followers continued to live on the prescribed diet: the former, in obedience to the commands of Buddhoo, by the Maha Sudona; and the latter from necessity, there being none of their accustomed fruits, rice, or roots to be met with so near the ocean. They found the water within the nuts sweet and delicious, and pure as crystal itself (of which mineral their country produced abundant varieties); whilst the fleshy part of it was a cooling and satisfying food.

The prescribed time rolled on ; and day after day convinced the delighted followers of their suffering prince that truth came from above. The rajah gradually lost the white and scaly skin which had enveloped him like the armour of the great ant-eater of the interior ; whilst the glow of heat which pervaded his extremities convinced him of the near approach of his promised recovery. Thankful to his great preserver, he omitted not to perform the duties which in his visions had been dictated to him ; and on the first stone which appeared durable and beyond the reach of the sea, in token of his gratitude, he, with the assistance of his followers, carved on the granite rock (“ which you now see” is added by the narrator) a gigantic statue of himself ; remarking, that its great height would show the wonderful recovery he had experienced, being a very little man in stature ; “ for he had risen, by the blessing of the god of all gods, to an undeserved height of happiness and bodily vigour ; the memorial of which would thus be handed down to millions yet unborn.” Numerous families from the high country of the interior soon afterwards emigrated to the sea-coast ; for it had become an imperious duty on the part of the rajah, on whom a miraculous cure had been so unexpectedly wrought by the fruit of the Cocoa-nut tree, to give

publicity to the circumstances which originally introduced to him and his followers a knowledge of that splendid production; whilst the conviction of its transcendent utility pointed out its propagation as a never-failing source of individual advantage and of progressive national prosperity.

Such is the account Cingalese tradition gives of a tree which is at present to be found in every part of the tropics, where it flourishes in the greatest luxuriance in the vicinity of the sea, especially a few feet above high-water mark. But although that is its chief habitat, it cannot be termed an exclusively littoral plant, for it has been met with far inland; by C. B. Heller, at Merida, in Yucatan; by J. D. Hooker, at Patna, in Bengal; and by Humboldt, at Concepcion del Pao, leading the latter to remark:—"I was the more struck with the fact [of finding the Cocoa-nut tree at this great distance from the sea], because the veracity of those travellers who have asserted the existence of this Palm at Timbuctoo, in the centre of Africa, has been called in question. Bonpland and I saw it repeatedly, amid the cultivated spots on the Rio Magdalena, more than a hundred leagues from the coast." There is however no doubt that the Cocoa-nut Palm refuses to grow in many countries any distance inland, with as much pertinacity as it does in

our conservatories, where, after having attained the age of eight or ten years, it begins to sicken, and soon dies. I may affirm, for instance, from personal knowledge, that numerous trials have been made to cultivate it in the central parts of the Isthmus of Panama,—that narrow neck of land,—but that all of them have hitherto failed. The causes therefore which regulate this curious phenomenon are still involved in obscurity; and I should not be surprised to hear that theorists, eager to account for these apparent contradictions in the distribution, had been driven to the necessity of making several species of this Palm, which, as there exist several well-marked varieties, would not be a task attended by great technical difficulties.

The Cocoa-nut Palm is closely confined to the tropics, and wherever it ventures beyond their limits, it loses in elegance of aspect and power of productiveness. In the Sandwich Islands, just at the edge of the torrid zone, it has a mean look, and yields fruit in such comparatively small quantities, that the nuts were formerly, during the time of paganism, considered so great a luxury, that only the men—the privileged class in all barbarous countries—were allowed to partake of them, the women being strictly forbidden to touch them, and threatened with the

vengeance of the gods in case of disobedience. This custom was rigorously kept up for many centuries,—though no doubt often broken through clandestinely,—until a female chief had the boldness to set it at defiance, publicly braved the anger of the carved idols, and thus secured to herself and her sex an advantage which had long been withheld from them,—an act deserving the more to be recorded, as it was the prelude to the entire downfall of the superstitious system, preventing the free development of the Sandwich Islanders, to be followed by similar manifestations of an awakened reason and the ultimate establishment of Christianity in one of its purest forms.

The centres of the geographical range of this Palm are the islands and countries bordering the Indian and Pacific Oceans. On the western coast of Africa it has only of late years, Mr. Oldfield informs me, become more numerous by extended cultivation; in the Canaries it appears merely, according to Carl Bolle, in isolated specimens. Whether it was originally confined to the regions situated between the eastern shores of Africa and the western of America, or always spread throughout the tropics, is a question of too speculative a character to be treated of in a popular work. I will content myself with remarking that, whilst the Asiatics

and Polynesians have discovered a vast number of uses to which it may be applied,—showing that they must have been familiar with it from time almost immemorial,—the Americans have made no such progress, and only consume the nut as an occasional luxury, though the tree grows in their native land with as much vigour as it does in any parts of Asia or Polynesia; implying that their acquaintance with it must have commenced at a comparatively recent period.

The Cocoa-nut tree attains a height of from sixty to a hundred feet, and a diameter of one or two feet; its cylindrical trunk, crowned on the summit with numerous waving, feathery leaves, has a splendid effect, and forms an elegant object of intertropical scenery; it is seen on the arid, sandy shores, with its roots laved by the surges, as well as in the rich valleys, overshadowing the huts of the natives; but when it is found inland, it is inferior in size to what it is on the sea-shore and about the dwellings of natives. The Cingalese have a saying that Cocoa-nut trees do not thrive unless “you walk and talk amongst them,” indicating that the trees thrive best when carefully attended to.

In time of sickness the natives often make use of the young Cocoa-nut trees as offerings to the supposed offended

spirits. From the trunk the Tahitians extract a gummy substance, called *Pia Pia*; it possesses no fragrant property, but is used by the females to spread over their hair, in the same manner that they are accustomed to use the viscid gum of the Bread-fruit tree. The wood is devoted to various purposes: among the Polynesians it is used for shears, rafters, fences, etc., and converted into charcoal. When the tree has ceased to bear fruit, it is most valuable, and is imported into the European markets under the name of Porcupine Wood. Among the Cingalese it is used for rafters, laths, shingles, chairs, ladies' work-boxes, etc.; but during the period of its most abundant bearing (considered to be between ten and thirty-five years' growth), the heart is of so soft and spongy a nature, that it is merely used for fences, water-pipes, etc.

The leaves are from eighteen to twenty feet long; the Cingalese split them in halves, and plait the segments, so as to make baskets. Under the denomination of "cadjans," they form the usual covering of their huts, as well as the European bungalows. Many of the natives' huts are constructed there, as well as in Polynesia, almost entirely of materials derived from the Cocoa-nut tree. The Tahitians plait the leaves (*niau*) for screens, or as a covering for the

floors ; for similar purposes, and also as a thatch, it is used by the natives of the islands of Rotuma, Tongatabu, and other of the Polynesian Islands. The Tahitians call the screens *paua*, and they also manufacture neat baskets, one kind of which is termed *arairi*, and another *oini*: a shade called *taho niau* is made of the plaited leaves, and placed over the eyes to protect them from the unpleasant solar reflection from their sandy roads and beaches ; the yellow leaves (*rau para*) are preferred for this purpose, their colour being much admired. The leaves formerly played a part in many of the religious ceremonies of the Tahitians, and were also an emblem of authority ; they were sent by the chiefs to their dependants when any requisition was made. Through the leaf tied to the sacrifice the god was supposed to enter ; and by the same road the evil spirits, who, it was imagined, tormented those afflicted with diseases, were driven out. Bunches or strings of the segments were also suspended in the temple on certain occasions, and answered the same purpose as rosaries, reminding the worshipers of the order of the prayers.

The heart, or very young leaves, called the cabbage, is an excellent vegetable, either cooked or dressed in stews, hashes, or ragouts. The Cingalese use the dried, old leaves

as torches, both for themselves during the dark nights or to carry before the carriages and palanquins of Europeans; they also use the spathe for a similar purpose, as well as for fuel; and at Rotuma and other Polynesian islands it is also adopted for a like purpose. At Tongatabu, one of the Friendly Islands, combs are made of the midrib of the segments, the upper part being beautifully worked with the fibre of the husk, or bulu. "These combs, from their neat appearance, were," says Bennett, "in great requisition during the time I visited that island, and all the women were busily employed during our stay in making them, to exchange with the *papalangi* (foreign) officers and crew for trifling articles. The combs were stained by the bark of the Koka-tree of a dark reddish colour, intended as a rude imitation of tortoiseshell."

The washermen of Ceylon burn the foliage for the sake of its alkaline ashes; the midribs of the leaves, when tied together, form brooms for the decks of ships. The Cingalese use the unexpanded leaves in forming ornaments, on the occasion of any festival, decorating arches, etc., in various picturesque forms of crowns, flowers, etc.

There is one portion of the tree which attracts much the attention of the observer,—it is a kind of network at the

base of the petiole, which when very young is delicate, beautifully white, and transparent, but when having attained maturity becomes coarse and tough, and changes to a brown colour. It is stripped off in large pieces, and used in Ceylon as strainers, particularly for the toddy, which is usually full of impurities when first taken from the tree, as its sweetness attracts innumerable insects. In most countries where this tree is produced, this portion of it is used for a similar purpose. At Tahiti it is called *Aa*; and besides being used as sieves for straining arrowroot, cocoa-nut oil, etc., the natives, when engaged in such occupations as digging, fishing, etc., in order to save their bark cloth, join several portions of this network together, and having a hole in the centre, in a manner similar to their mat garment called *Tiabuta*, wear it as an article of apparel, merely for the time in which they may be engaged in those occupations. It is certainly a garment neither to be admired for its flexibility or firmness, but well adapted for fishermen, or those occupied in the water, as it is not easily injured by wet, whereas bark-cloth would be utterly destroyed in the water, its substance resembling paper both in strength and appearance.

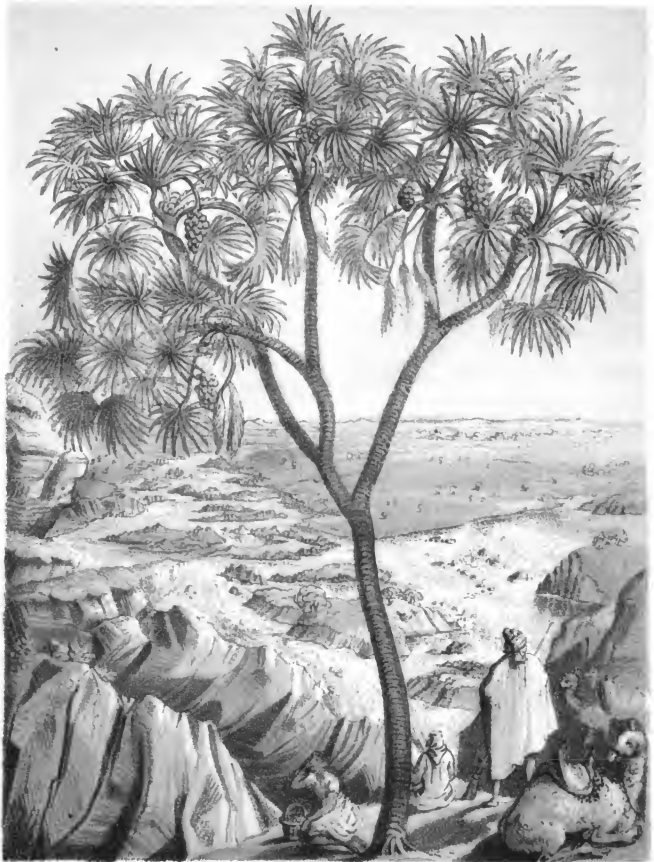
A tree produces several bunches of nuts; and from twelve

to twenty large nuts, besides several small unproductive ones, may be seen on each bunch. In good situations the fruit is gathered four or five times in the course of the year. The latter is most used as an article of food, both meat and drink, when green or young (*Oua* of the Tahitians, *Koroomba* of the Cingalese); in that state it yields an abundance of a delicious, cooling beverage, to which Madeira wine, brandy, etc., is sometimes added. The water, beautifully clear, has a sweetness, with a slight degree of astringency, which renders it very agreeable. This liquid has been erroneously considered as injurious (producing a predisposition to dropsical complaints), and among the Tahitians as one of the exciting causes of *fifé*, or elephantiasis; "but," says Bennett, "I have adopted this cooling beverage during my frequent and long visits to intertropical countries, and have always found it the most cooling and refreshing beverage during my excursions; but when an immoderate quantity is drunk, I have known a slight degree of strangury produced by it. The ladies however, who may fear taking it internally, are informed that to the water of the green Cocoa-nut is ascribed that inestimable property to them, of clearing the face of all wrinkles and imperfections whatever, and imparting to it the rosy tints of youthful days!"

In Ceylon house-plasterers attribute to the water of the green nut (*i. e.* the albumen in a liquid state*) an adhesive quality in their white and other washes, in which lime forms a chief ingredient, for the walls of houses, etc. etc.; the shells of the green nut, fixed on stakes, are used as illumination lamps. The albumen in the young nut is very delicate, easily removed from the shell with a spoon, and may very well be named a vegetable blancmange; in this state it is called *Niaa* by the Tahitians, who use it, as well as the natives of other of the Polynesian Islands, in several made dishes. After the fruit is suffered to remain a short time longer, and the albumen becomes firmer, the Tahitians change the name to *Omate*, and the fully ripe nut is called *Opa*; in this state it is sometimes, but seldom, eaten, being used principally for making oil, as it contains a small quantity of oily milk; it is in this state the nuts are seen

* The following analysis of the liquid albumen of the Cocoa-nut was made by W. von Löwenich:—

Water	900·88
Sugar	4·43
Gum	17·67
Extractive matters (fat)	28·29
Salts soluble in spirits of wine	5·44
Salts not soluble in spirits of wine	6·29
	<hr/>
	1000·00



J.C. Frank del et lith.

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Hyphaene Thebaica . Mart

and sold in Europe. In Ceylon, when the nut is fully ripe, it is denominated *Pol*, or *Curry Cocoa-nut*, the kernel of which is reduced to a small size by an instrument, the *hiromane*, being a circle of notched iron fastened to the raised end of a piece of wood: the kernel, thus reduced, is placed in a cloth, and water being poured on it, a white juice, which may with propriety be termed "Cocoa-nut milk," is extracted by pressure, used invariably, either with or without the grated kernel, in their various curries and mulligatawnies. A sort of tart, or cheesecake, is made from the kernel (albumen) of dry nuts rasped or pared down. In New Granada I have often seen the Negroes boiling it with rice.

The varieties of the Cocoa-nut are numerous at Tahiti, one of the Society Islands. Bennett says that he is acquainted with six, each having a distinct appellation by the natives. At Ceylon five varieties are indigenous; but they are seldom, if ever, found in the same plantation, except it be in the vicinity of a Buddhist temple of some importance. The first, or King Cocoa-nut, the Tembili of the Cingalese, must be well known to those who have resided in Ceylon; its bright orange-colour and somewhat oval shape cannot fail to attract notice, and it is usually presented to respectable

Europeans by the Modeliards, or by the priests, as a compliment to those whose curiosity may have induced a visit to the shrine of Buddhoo. The second is of a similar colour to the preceding, but of a more spherical shape. The third is of a pale yellow and rather heart-shaped ; it is the *Nawasi*, or edible husk, and has the peculiar quality that after the epicarpium has been removed, the inner rind (mesocarpium) turns to a pale red, and is edible. The fourth is the common Cocoa-nut, which is in general use, and the one most known. The fifth is a species of Maldivia, or dwarf Cocoa-nut, about the size of a turkey's egg, which, being rare, is more esteemed as a curiosity than for any peculiar good quality it possesses.

The shells, when fully ripe, are cut transversely, scraped, polished, and mounted on silver, being edged also with the same metal, and are preserved as goblets, more for curiosity than utility ; they are also used for cups (elegantly carved), lamps, ladles, skimmers, spoons, etc., by the Polynesians, as well as other natives, entire, for containing their water, having two holes on the summit. Without breaking the shell, it is filled with salt water, and buried for some time in the sand, when the albumen becomes decayed, and is then well washed out. The largest nuts are chosen for this pur-

pose, and are often seen highly polished and of a fine black colour. The cups of the natives are usually made of sections of the nut in that stage of ripeness when they are denominated by the Tahitians *Omute*; they are then scraped so thin as to be nearly transparent, and are of a light brown colour. The shells will also make good lamp-black, and, reduced to charcoal and pulverized, an excellent dentifrice.

The flowers are enclosed in a thick, tough spathe: when the latter is just expanding they have a beautiful milk-white appearance. The Tahitians call them *Tiari*, a name applied generally to all flowers; and the spathe *Pa tiari*, *Pa* signifying a shell or anything hard, sometimes applied to the shell of the Cocoa-nut, and the spathe is thus considered to be the shell of the flowers. The first appearance of these flowers on a tree of moderate size (when they are well seen) has an elegant effect,—the cluster erect, drooping, and delicately white. The flowers contain a most powerful astringent, used in Ceylon medicinally in various debilitating diseases: the expressed juice of the flower, mixed with new milk, and taken in quantities not exceeding a wine-glassfull, but at regular periods, affording almost immediate temporary relief, and, if persevered in, effectual cure. It is from these flower spathes, before the flowers have expanded, that toddy, or

Palm-wine, is made : it is called by the Cingalese *Ra*, and the Hindoo Portuguese *Soura* ; it is unknown to the natives of Polynesia, although at some of the islands Europeans had commenced instructing the natives, who were delighted to have a beverage possessing the stimulus of their favourite rum.

To procure the toddy the spathe is tied with strips of the young leaves (which are much tougher and stronger than the old ones) to prevent its expansion ; it is cut a little transversely from the top, and beaten either with the handle of the toddy-knife, or a small piece of ebony or iron-wood ; this process having been continued morning and evening (at dawn of day and just as the sun declines below the horizon) for five or six successive days, the under part of the spathe is taken off, so as to permit of its being gradually bent, when the Chandos, or toddy-drawers, for the purpose of keeping it in that position, attach it to some neighbouring leafstalk. After a further period of five days, an earthen chatty or calabash is hung to the spathe, so as to receive the toddy that exudes, which is collected every morning and evening, and the spathe cut a little every day : the quantity collected varies much.

The scene represented in the accompanying Plate (copied

from 'Hooker's Journal of Botany') was sketched by J. M. Strachan, Esq., in the Madras peninsula. There are three toddy-men; two in the foreground, and the other ascending a Cocoa-nut tree. The shed behind is a temporary toddy bazaar, kept (as is generally the case) by a woman, who is helping the figure shown in the attitude of drinking to another draught of toddy. The figures in the foreground are equipped with the apparatus necessary to their vocation. The ropes passing round the body of the man on the left side of the plate, and carried on the left arm of the other, are used in climbing the Cocoa-nut trees, and made of cow or buffalo hide. The small ladder serves for scaling the trees to the height of about eight or nine feet from the ground. The Cocoa-nut leaf over the shoulder of the left figure is supposed to be his perquisite, from which he manufactures mats.

The toddy should be drunk at sunrise, when it tastes most delicious, having a slightly stimulating effect, and acting as a gentle aperient, a remedy admirably adapted for constipated habits, particularly in those of delicate constitutions; the Cingalese prefer it after fermentation, when it is rather intoxicating. Fermentation takes place in a few hours after the toddy has been collected, when it is used by the

bakers as yeast, the bread made with it being remarkably light. Toddy is seldom or never used by Europeans during the rainy season, being then regarded as highly unwholesome. Bennett found the toddy in Ceylon, and a refreshing bath, before or just at sunrise, cooling and bracing him up to go through the heat of the day in that sultry, debilitating climate.

Arrack, or *rack*, is in several parts of India distilled from rice, but in Ceylon (where it is named *Pol wakéré*) from toddy, after it has undergone fermentation and become quite sour. One hundred gallons of toddy, it is said, will produce, by distillation, twenty-five of arrack. Like all other spirits, when new it is regarded as injurious to the constitution, but when old wholesome. It is a favourite spirit among the drinkers of that far-famed English beverage named punch.

Toddy also makes excellent vinegar, etc. The toddy-drawers of Ceylon are a separate caste, called Chandos, as are those of Bengal: almost all the families of this class reside in the neighbourhood of the sea-coast, where the trees grow in the greatest luxuriance and abundance, the whole line of coast between Point de Galle and Colombo being thickly planted with them; and the topes or groves are let

at a stipulated sum of six rix-dollars by the month; and it is also not uncommon for one or two families or more to have a share in a single tree, affording them sufficient for their favourite and universal food, the curry.

Besides vinegar, arrack, etc., the toddy yields abundance of jaggery or sugar. The toddy being collected in a calabash, as before mentioned, in which a few pieces of the stem of the Allghas (*Alpinia Allughas*, Rosc.) had been placed, a supply of sweet toddy is procured mornings and evenings, but particular care is required that the vessels be regularly changed, and that none are employed unless they have been well cleaned and dried. Eight gallons of sweet toddy, boiled over a slow fire, yield two gallons of a very luscious liquid, called Penni, or honey, or jaggery, or sugar-water, which quantity being again boiled, yields a kind of coarse brown sugar, called jaggery, which is formed into round cakes, and dried in the smoke of the huts; and in order to preserve it free from humidity, each cake is separately tied up in pieces of dried banana leaves, and kept in a smoky place, unless required for family use or the market.

Jaggery is exported from Ceylon to various parts of India. In the interior a jaggery is drawn from the Kittul-tree (*Caryota urens*, Linn.), and is considered to possess more

saccharine properties than that produced from the *Cocos nucifera*. The jaggery makers are called in Ceylon *Hakaroos*, and are one of the subdivisions of the second in rank of the Cingalese castes.

The rind or husk of the Cocoa-nut is very fibrous, and when ripe is the *Roya* or *Coir* of commerce, now so extensively used in Europe and North America for matting, brushes, hats, etc. It is prepared by being soaked for some months in water, washed, beaten to pieces, and then laid in the sun to dry. This being effected, it is again well beaten, until the fibres are so separated as to allow of their being worked up like hemp, similar to which it is made up in ropes of any size, from the smallest cord to the largest cable, but will not receive tar; it is rough to handle, and has not so neat an appearance about the rigging of shipping as that made from hemp, but surpasses the latter in lightness and elasticity, and even, it is said, durability; more so if wetted frequently by salt-water. From its elasticity it is valuable for cables, enabling a ship to ride easier than with a hemp or chain cable. Bennett remarks that he was once on board a ship, in a severe gale, when chain and hemp cables gave way; and the vessel at last, most unexpectedly, rode out the gale with a small coir cable. Among

the Polynesian Islands, where this tree grows, the coir is used in the manufacture of "sinnet," some of which is beautifully braided, and devoted to a variety of purposes. At Tonga, one of the Friendly Islands, the natives dye the "sinnet," called *Kafa*, of various colours, using it in tying the rafters of the huts, etc. The rope for their canoes is all manufactured from this substance. The husk from which the fibrous substance has not been separated is used in Ceylon in lieu of scrubbing-brushes for the floor; and also brooms, mats, and bags are manufactured from it.

Another valuable production of the Cocoa-nut is the oil, which is an article of exportation from Ceylon and other parts of India, Polynesia, etc. It is used in various articles of domestic economy; besides being an excellent burning oil (for which it is much admired, giving out neither smoke nor smell when burning, and having a clear bright flame), it has since had an additional value and more extended use in Europe, by the discovery of its capability of being manufactured into candles, rivalling wax or spermaceti, at the same time without being much higher in price than those of tallow. Soap has also been manufactured from it; and it is lavished by the Asiatics, Polynesians, and other inter-tropical natives over their persons; and at Tongatabu and

others of the Polynesian Islands is used scented with sandalwood, giving a delightful fragrance to the flowing tresses and elegant persons of the dark beauties of those fascinating islands. In cold weather this oil (like most of the vegetable oils) becomes very hard, and requires to be melted before it can be used for burning.

The method of making the oil is very simple. The kernel having been removed from the shell, is boiled in water for a short period; it is then pounded in a mortar, taken out, and pressed. The *milk*, as it is called, is then boiled over a slow fire, when the oil floats on the top, and being skimmed off and afterwards boiled by itself, two quarts of oil may be procured from fourteen or fifteen Cocoa-nuts. When fresh, the oil is used in cookery, and has an excellent flavour; the Cingalese anoint their bodies with it after bathing, and invariably use it for the sake of giving a glossy and smooth appearance to the hair, for which purpose it is in great requisition by both sexes.

The remains of the Cocoa-nut, from which the oil has been extracted, is termed by the Cingalese *Poonak*; the best *Poonak* is obtained when the oil is extracted by pressure: it is an excellent food for pigs, poultry, etc. This substance is termed by the Tahitians *Ota*, and by the natives of Ton-

gatabu *Efeniu*, and they use it also for fattening their pigs, poultry, etc., as also at the other Polynesian Islands.

At Tahiti they procure the *Morii*, or oil, from the nuts, by first grating the kernel, then depositing it in the hollow trunk of a tree, or some kind of hollow vessel, which is exposed to the sun during the day. After a few days have elapsed, the grated nut is heaped up in the trough or vessel, leaving a space between the heaps; the oil exuding, drains into the hollow spaces, whence it is collected into bamboo canes, containing each a gallon or more; in this way it is sold for export; but the indolence of the natives prevents its being so important an article of traffic as it might be in the South Seas.

Sometimes the Tahitians, after the oil ceases to collect in the vessel, put the kernel into a bag, and submit it to the action of pressure by a rude lever press; but the oil thus obtained is considered inferior to that procured by the heat of the sun.

The Malabar method of extracting the oil is by dividing the kernels into two equal parts, which are ranged on shelves made of laths of the Betel-nut Palm, or split bamboo, spaces being left between each lath of half an inch in width; under them a charcoal fire is then made, and kept up for

two or three days, in order to dry them. After this process they are exposed to the sun on mats, and when thoroughly dried (then called Koppera) are placed in an oil-press, or Siccoor. The Malabars have a caste of oil-pressers, called the Waany caste.

There are medicinal properties attributed to different parts of the Cocoa-nut tree in Ceylon; the root (the *Tumu Haari* of the Tahitians) is used by the native physicians, small pieces of it being boiled with dried ginger and jaggery, and the decoction given at stated regular periods, and is considered highly efficacious in remittent and intermittent fevers. When this decoction is used as a gargle, it is mixed with the fresh oil of the nut, and generally affords considerable relief to the patient; and has good effect, it is said, in cases where pustules have formed in the mouth or tonsils. The expressed juice of the leaves, mixed with the fresh oil of the nut, is considered a sovereign remedy in hæmorrhoids. The expressed juice of the nut applied externally, mixed with new milk, is regarded as a remedy for ophthalmic complaints.

The celebrated naturalist Charles Darwin describes the habits of a crab which lives on the Cocoa-nuts:—"The animal is very common on all parts of the dry land of the Keeling Islands, and grows to a monstrous size; it is closely

allied to or identical with the *Birgos latro* ; the front pair of legs terminate in very strong and heavy pincers, and the last pair are fitted with others weaker and much narrower. It would at first be thought quite impossible for a crab to open a strong cocoa-nut covered with the husk ; but Mr. Liesk assures me that he has repeatedly seen this effected. The crab begins by tearing the husk, fibre by fibre, and always from that end under which the three eye-holes are situated ; when this is completed, the crab commences hammering with its heavy claws on one of the eye-holes till an opening is made ; then, turning round its body, by the aid of its posterior and narrow pair of pincers, it extracts the white albuminous substance. This is certainly a curious case of instinct, and likewise of adaptation in structure between two objects apparently so remote from each other in the scheme of nature as a crab and a cocoa-nut tree. The *Birgos* is diurnal in its habits ; but every night it is said to pay a visit to the sea, no doubt for the purpose of moistening its branchiæ. The young are likewise hatched and live for some time on the coast. These crabs inhabit deep burrows, which they hollow out beneath the roots of trees ; and where they accumulate surprising quantities of the picked fibres of the cocoa-nut husk, on which they rest as on a bed. The

Malays sometimes take advantage of this, and collect the fibrous mass to use as junk. These crabs are very good to eat; moreover under the tail of the larger ones there is a great mass of fat, which, when melted, sometimes yields as much as a quart-bottle full of limpid oil. It has been stated by some authors that the *Birgos* crawls up the cocoa-nut trees for the purpose of obtaining the nuts. I very much doubt the possibility of this; but with the Screw-pine (*Pandanus*) the task would be very much easier. I was told by Mr. Liesk that on these islands the *Birgos* lives only on the nuts which have fallen to the ground.

The genus *Cocos*, of which the Palm just described is the most popular representative, is found in Asia and America, and composed of about twelve species (seven of which are cultivated in our gardens*): they are unarmed trees, with smooth, annulated trunks and pinnatisect leaves, having linear segments; their spadices appear in the axils of the lower leaves, bearing yellow male and green female flowers; their drupes are elliptical, or more or less ovate, have a fibrous husk, and a solitary seed ("nut"), with three holes

* *C. Australis*, Mart. (*Diplothemium campestre*, Hort.); *C. butyracea*, Mart.; *C. flexuosa*, Mart.; *C. nucifera*, Linn.; *C. oleracea*, Mart.; *C. plumosa*, Hort. Kew., and *C. schizophylla*, Mart.—Wendl. Index, p. 17.

on the base, which, though not peculiar to *Cocos*, but common to most other genera of the *Cocoinæ* tribe (*Desmoncus*, *Bactris*, *Guilielma*, *Acrocomia*, *Astrocaryum*, *Elæis*, *Syagrus*, *Diplothemium*, *Mazimiliana*, *Jubæa*, *Orbignya*, etc.), deserve special notice, as they are said to have given rise to the name "Cocos," the Portuguese fancying they could observe some resemblance between that end of the Cocoa-nut showing the three holes and the head of a monkey (Cocos, or Coquin) ; hence they are said to have termed the tree Coqueiro.*

No other species of the genus is of such vast importance to man as *Cocos nucifera*. *Cocos capitata*, Mart. (Cabeçudo of the Brazilians), abounds, according to G. Gardner, in swampy places about Arrayas, where it forms the principal food of the large blue mackaw so common in that district. *Cocos coronata*, Mart. (*Urucuri-iba* of the natives), another Brazilian species, yields a pith which the Indians make into bread, and a nut from which oil is extracted. *Cocos schizophylla*, Mart., of Brazil, vernacularly

* In Mexico the Cocoa-nut tree is termed, according to Heller, 'Marou;' in the East Indies it is known by the following names, copied from Roxburgh's 'Flora Indica:—Tenga (Rheed. Mal. i. t. 1, 2, 3, 4), Calapha (Rumph. Amb. i. t. 1 and 2), Neriula (As. Res. iv. 312); Sanscrit, 'Narikel,' 'Narikelée;' Hindustani, 'Naryel,' or 'Nariel;' Bengali, 'Narikel;' Telingoo, 'Nari Kudum,' or 'Kobri-Chullooo;' Tamil, 'Tenga.'

termed *Aricuri* or *Aracuri*, produces a fruit, the juice of which, when in an unripe state, is employed in slight ophthalmic attacks. *Cocos oleracea*, Mart. (*Iraiba* of the natives), of the same country, has edible leaf-buds. *Cocos butyracea*, Linn., a native of New Granada and Venezuela, produces oil (which has been compared to butter) and also wine. "The vine of the country (speaking of the Rio Sinu)," says Humboldt, "is the Palma dulce (*Cocos butyracea*, Linn.), which in the valley of the Magdalena is termed 'Palma de vino' (the Wine Palm), and here, on account of its majestic height, 'Palma real' (the royal Palm). After having felled the trunk, which diminishes but little towards the top, the natives make, just below the point whence the leaves and spathes issue, an excavation in the ligneous part eighteen inches long, eight broad, and six deep. They work in the hollow of the tree, as though they were making a canoe; and three days afterwards this cavity is found filled with a yellowish-white juice, very limpid, with a sweet and vinous flavour. The fermentation appears to commence as soon as the trunk is felled, but the vessels preserve their vitality: for we saw that the sap flowed even when the summit of the Palm-tree (that part whence the leaves shoot out) is a foot higher than the lower end, near the roots. The sap continues to mount



J.C. Frank del. et lith.

Vincent Brooks imp.

Iriarteia ventricosa, Mart.

as in the arborescent *Euphorbia* recently cut. During eighteen to twenty days the palm-wine is daily collected; the last is less sweet, but more alcoholic and more highly esteemed. One tree yields as much as eighteen bottles of sap, each bottle containing forty-two cubic inches. The natives affirm that the flowing is most abundant when the petioles of the leaves, which remain fixed to the trunk, are burned."

I may add that the same process of extracting the wine as here described is practised in the Isthmus of Panama, where I have often tasted the beverage, which I consider quite equal to champagne in flavour.

Genus XVII. COPERNICIA, *Martius*.

Martius, on writing the name of the great Copernicus in the Album of Systematic Botany, could hardly have selected for that purpose a more beautiful genus than the present. It is confined to the tropics of the New World, and composed of six species, three of which are little known, and therefore regarded as doubtful. They are all unarmed, middle-sized trees, their trunk being erect, and covered with

the remnants of the leafstalks, which gives it a peculiar aspect; their leaves are palmate, their flowers appearing in the axils of the petioles, and being hermaphrodite or polygamous, small and of a green colour; their berries are elliptical, one-seeded, and somewhat yellow. Perhaps the best known species is the Carnaüba of the Brazilians (*Copernicia cerifera*, Mart., *Corypha cerifera*, Arruda da Camara), which occurs chiefly in the northern districts of Brazil, either isolated (as represented in our plate, copied from Martius's splendid work on Palms) or aggregated in immense forests. It attains the height of from twenty to forty feet. The trunks of the younger plants are generally covered with leaves, but as they grow older the lower ones drop off, leaving only a tuft at the top, which is so arranged as to form a perfect ball. The leaves, covered by a glaucous bloom, are not unlike those of the Dwarf Fan-Palm of Southern Europe (*Chamærops humilis*, Linn.). The trunk,—from the inside of which the Brazilians prepare for home consumption a kind of farinha,—is used for almost every purpose to which wood can be applied; it is so durable, particularly the lower parts of the full-grown plants, that it lasts for many years, even when exposed to the weather; hence all the framework of houses and the enclosures for cattle are made of it; occasionally

it is met with in London timber-yards. The leaves serve for a variety of purposes, such as thatch, pack-saddles, hats, etc., and in time of scarcity the young ones are chopped up and given as fodder to horses and cattle. They also produce a kind of wax, obtained by shaking the young leaves after they have been detached from the tree; when each leaf yields about fifty grains of a whitish, scaly powder, which is melted in pots over a fire. This vegetable fat is sometimes used by the Brazilians to adulterate bees'-wax; samples of it have occasionally been sent to Portugal to see whether a demand for it could be created, but without any result. The wax is now however imported into Great Britain for manufacturing candles, but those made from it by Price's Candle Company at Vauxhall, near London, retain the lemon-coloured tint peculiar to the raw wax, no process of bleaching that material having, according to Mr. Wilson, as yet been discovered. The fruit of the Carnaüba, though bitter, is, either raw or boiled, eaten by the Indians.

The foliage of *Copernicia hospita*, Mart., a Cuban Palm, is used for thatch, as is also that of another species, *Copernicia tectorum*, Mart. (*Corypha tectorum*, Humb., Bonpl., et Kth.), which is found in the plains of Venezuela and New Granada, and in the former Republic is, according to Hum-

boldt and Bonpland, commonly termed "Palma de covija," "Palma redonda," and "Palma de sombrero;" in the latter, according to Purdie, "Palma serra" (cera?). "The wood of *Copernicia tectorum*," says Humboldt, "is excellent for building purposes, and so hard that it is difficult to drive a nail into it. The leaves are employed to cover the roofs of the huts scattered through the llanos (plains) of Venezuela, and these roofs last more than twenty years. The leaves are fixed by bending the extremities of the foot-stalks, which have been beaten beforehand between two stones, so that they may bend without breaking." Purdie, who, as well as Schlim, met with this tree in Santamarta, New Granada, confirms the above statement, in a memorandum contained in the Hookerian Herbarium, and adds that the fruit is an article of food among the inhabitants of that province. Purdie's remark about the fruit may be extended to the Pumos (*Copernicia ? Pumos*, Mart., *Corypha Pumos*, Humb., Bonpl., et Kth.), a Mexican plant, the berries of which are said to have an agreeable flavour. Little is known about *Copernicia ? maritima*, Mart. (*Corypha maritima*, Humb., Bonpl., et Kth.), and *Copernicia Miraguama*, Mart. (*Corypha Miraguama*, Humb., Bonpl., et Kth.), both natives of Cuba. To obtain perfect specimens, and a full

history of them, will be one of the objects of future travellers in that region.*

Genus XVIII. CORYPHA, *Linnaeus*.

Under the native government of Ceylon each person was allowed, according to the social station he occupied, to have a certain number of gigantic Palm-leaves, folded up in the form of fans, borne before him. These leaves were the produce of the Tallipot-tree, belonging to *Corypha*, a genus composed of about five species, all inhabitants of tropical Asia. They have ringed or channelled trunks, generally remarkably straight, but not much higher than thirty feet; petioles armed with prickles; fan-shaped, much-divided leaves, each division being bilobed; a terminal panicle (hence they can flower but once); hermaphrodite, white or greenish blossoms, emitting a powerful though not always agreeable odour, and a roundish, one-seeded berry. The

* In our gardens we cultivate:—*Copernicia? Barbadosis*, Hort. (*Thrinax Barbadosis*, Hort.), *C. ? maritima*, Mart. (*Corypha maritima*, H. B. K., *Thrinax multiflora*, Hort.), *C. ? robusta*, Wendl. (*Cocos Jatta*, *Corypha Guianacoa*, *Licuala brevipes*, *Sabal maritima*, *Thrinax robusta*, Hort.), and *C. tectorum*, Mart. (*Corypha tectorum*, H. B. K.).—*Wendl. Index*, p. 19.

Tallipot-tree (*Corypha umbraculifera*, Linn.) grows in stony parts of the mountains of Ceylon, Malabar, and the Malay coast. Its leaves are of gigantic size, the petiole being seven feet long, the blade (which describes nearly a complete oval) six feet long and thirteen feet broad, and the segments of the leaf from ninety-five to a hundred in number! They are extensively used by the lower classes of Cingalese as umbrellas, and that they are extremely well adapted for that purpose requires no assurance, one outspread leaf affording sufficient shelter for seven or eight persons. Some of the sacred records of the Cingalese are written on pieces of the blade of these leaves with either a brass or iron style. That such records "have resisted for ages the ravages of time" has been asserted by various authors, denied by others; I, for my part, believe that their power of resistance is not very great, and those who have seen much of the effect of time upon well-preserved specimens in herbaria will probably be inclined to side with me. The leaves of the Tara, Tallier, or Tareet of the Bengalese (*Corypha Taliera*, Roxb.), a tree closely resembling in habit the Palmyra (*Borassus flabelliformis*, Linn.), are also used for writing upon, as well as for tying the rafters of the native houses, being strong and durable. The leaves of the Gebang Palm (*Corypha Gebanga*, Blume),

are likewise useful. Thousands of boys and girls, it is stated, are employed in Java in converting them into baskets and bags; thatch and broad-brimmed hats are made of them, fishing-nets and shirts are woven from their fibre, and ropes manufactured from their stalk. The pithy substance of the trunk, it is further stated, yields a sort of sago; the root is both emollient and slightly astringent; sliced, it is administered in slight diarrhœa; Waitz even says that it is a most efficacious remedy for the periodical diarrhœas which, in the sultry regions of the East Indies, attack Europeans out of health.

Formerly, a number of other Palms were associated with *Corypha*; these are now distributed under the genera *Copernicia*, *Hyphæne*, *Livistonia*, *Sabal*, and *Thrinax*, as deviating too much from the original type of this genus.*

Genus XIX. DESMONCUS, *Martius*.

The Palms associated under the name of *Desmoncus* hold

* In European gardens are cultivated:—*Corypha Cumingii*, Lodd., *C. Gebanga*, Blum. (*C. macrophylla*, Hort. Germ.), and *Corypha umbraculifera*, Linn.—*Wendl. Index Palm.* p. 19. They are of slow growth. I know not of any plant in England with a trunk.—*John Smith, MSS.*

about the same position in the forests of America that the Rattans and their allies do in those of Asia; most of them climb over shrubs and among trees, often forming elegant festoons. The trunk is slender, and furnished with large, either straight or hooked prickles, their leaves being scattered over their whole surface, not terminal, as in most Palms; the latter are pinnatisect, and end in a long whip, clad with recurved spines, by which these plants are enabled to hold on; their flowers, which appear in the axil of the petioles, are simply branched, monœcious, and of a yellow colour; their drupes are ovate or nearly round, one-seeded, and red; their seeds are black. About eighteen species are described, a few of which are cultivated in Europe.*

The fruit of *Desmoncus prunifer*, Pœpp., a Peruvian plant, is succulent, has an acid-sweet flavour, and is edible, as is also the kernel. The outer part of the trunk of the Brazilian Jacitára, which Wallace believes to be the *Desmoncus macracanthus* of Martius, is much used in the Amazon and Rio Negro districts for making the "tipitis," or elastic platted cylinders employed in the manufacture of farinha,

* These are:—*Desmoncus? aculeatus*, Hort., *D. dubius*, Lodd., *D. latifrons*, Mart., *D. macracanthus*, Mart. (*Bactris Paraensis*, Hort.), *D. mitis*, Mart., *D. orthacanthus?* Mart., and *D. polyacanthus*, Mart.—*Wendl. l. c.* p. 20.

the produce of the mandiocca plant. "These cylinders," says Wallace, "are sometimes made of certain water-plants and several other Palms, but those constructed of 'Jacitára' are said to outlast two or three of the others. . . . When the cylinders are used they are suspended from a strong pole, after being filled with the grated pulp. A long lever is passed through the loop at the lower end of the 'tipiti,' by means of which it is stretched, the power being applied by the woman sitting on the further extremity of the pole. The cylinder thus becomes powerfully contracted, and the poisonous juice runs out of every part of the surface, and is caught in a pan below, in order to be carefully thrown away; for it would cause speedy death to any domestic animal which should happen to drink it."

"The Jacitára grows in the Catinga forests of the Upper Rio Negro, and on the margins of small streams, climbing over trees, and throwing out its armed leaves on every side to catch the unwary traveller. How often will they seize the insect net of the entomologist, just as he is making a dart at some rare butterfly, or fasten on his jacket or shirt-sleeve, or pull the cap from his head! Woe then to the impatient wanderer! A pull or a tug will inevitably cause a portion of the fractured garment to stay behind, for the

Jacitára never loses its hold, and it is only by deliberately extracting its fangs that the intruder can expect to depart unhurt."

"In some places small *igaripés*, or forest streams, are almost filled up with the various climbing grasses and creepers, among which the Jacitára holds a prominent place. It is up these streams that the Indians often delight to fix their abode. In such cases they never cut down a branch, but pass and re-pass daily in their little canoes, which wind like snakes among the tangled masses of thorny vegetation. They are thus almost safe against the incursions of the white traders, who often attack them in their most distant retreats, carry fire and sword into their peaceful houses, and take captive their wives and children. But few white men can penetrate for miles along those little winding streams, where not a broken twig or cut branch shows that a human being has ever passed before. Thus does the spiny Jacitára help to secure the independence of the wild Indian in the depths of those forests which he loves."

Genus XX. DIPLOTHEMIUM, *Martius*.

This genus is composed of four species, one of which

(*Diplothemium maritimum*, Mart.) is an inmate of our gardens. Two of them inhabit the coast, and two the dry campos of Brazil. They are either entirely stemless, or possess a short ringed trunk, which, like every other part of the plant, is unarmed. Their leaves are pinnatisect, with linear segments, the underside of which is either of a silvery white or a glaucous hue. The flowers are monœcious, rather large, and appear in the axils of the petioles. The fruit, an ovate or obovate drupe, is yellow, and has a fibrous acid-sweet flesh, which is eaten by the natives.

Genus XXI. ELÆIS, *Jacquin*.

One chapter of the history of Botany still remains to be written,—that showing the direct and indirect influence the occurrence of a plant exercises on the moral and physical condition of a country. A subject more redundant with interest, a task more grateful to the phytologist, could hardly be selected. A few leaves from the history of the Oil Palm of Africa will serve to illustrate this idea. The state of debasement of the Negro races of Africa has long been a subject of great concern to philanthropists, and numerous schemes have been tried to raise them to the rank of intelligent

beings, but all have hitherto proved an utter failure,—a failure chiefly to be ascribed to the fact that the natural resources of that country were either entirely unknown, or, if known, so little developed that legitimate commerce on a large scale could not be established. The traffic in slaves was found more profitable than that of other indigenous productions, and as long as that was the case, the establishment of society on a more rational and firmer basis than that hitherto existing was out of the question. At last a ray of hope seems to glimmer, at least for Western Africa. A production scattered over that country with a bountiful hand has been found, the exportation of which yields returns more ample than those of the abominable traffic in human beings ; and hence it may be fairly expected that the selfish love of gain will tend to bring about that reform in the social state of those degraded people, which unselfish philanthropy has failed to accomplish. The African Palm oil, the production here alluded to, has indeed long been sought after by Europeans, but it did not assume that importance, either directly or indirectly, which it now claims, until the introduction of new processes for manufacturing *Stearic* candles from it, first applied by Price's Patent Candle Company, at Vauxhall, near London. By the introduction of

those and similar processes, Palm oil has become an article of so much demand, and the trade in it has assumed such dimensions, that it employs no less than 20,000 tons of shipping from Liverpool alone! The value of this trade, as well as the possibility of civilizing Africa by means of increased traffic in legitimate articles in general, is fully revealed in the evidence given before a Parliamentary Committee in 1848, by the late Mr. William Hutton, Mr. William Jackson, and Dr. Kehoe, as has already been pointed out by Mr. G. F. Wilson in his instructive pamphlet 'On the Stearic Candle Manufacture.' *

"Mr. Hutton stated that the palm-oil trade is carried on in British vessels; that it is a barter trade, the palm-oil being almost entirely paid for in the manufactures of Manchester, Birmingham, and Glasgow; that the trade might be very much increased gradually, but not suddenly; that it employs a very large proportion of the population of the districts where it is grown, in gathering, preparing, and bringing the oil down to the British factories; that it is brought down to the coast in small quantities, and sold

* 'On the Stearic Candle Manufacture.' By G. F. Wilson, Esq. To which are appended, Papers on the Slave Trade and the Soap Tax. Third Edition. London, 1852.

even in single gallons ; that the natives keep no store, but bring it as it is manufactured ; that the natives prepare it by boiling it with water, the oil floating upon the surface of the water, and, when the latter is cold, being skimmed off into calabashes or large gourds (I presume of the kind Sindbad's old man of the sea used as wine-cups), in which it is brought to the European factories.

“That he considers it an indisputable fact, that the legitimate trade and produce of Africa are in every respect the most desirable means that can be applied to the suppression of the slave-trade.

“Mr. Jackson stated that palm-oil is a produce that may be indefinitely multiplied ; that it is impossible for any one to form an idea of what Africa can do ; that he thought we are only in our infancy with regard to the trade with the West coast ; that what we import now is a mere *bagatelle* to what we shall be able to do in the course of a few years ; that from his experience of the trade, and seeing the way that increase has taken place according to the demand for it on the coast, he considers that there is no end to the quantity of palm-oil that can be produced, and that he is corroborated in this view by every trader he has come into contact with, who has been out to the coast of Africa, from



Frank del et lith

Vincent Brooks Imp

Lodoicea Secchellarum, La Pal

whom he has always heard the opinion that the demand will always be met by a supply, although there may be occasionally a little delay, in consequence of the demand coming suddenly when their season is not on; that the trade is carried on invariably by barter, by which are paid British manufactured goods for the palm-oil.

“In answer to the question, ‘I presume principally in articles of clothing,—articles of civilization, so to call them?’ he stated that they did not so commence in 1826; they used to send out fancy articles, such as beads and looking-glasses, and other nicknacks, which please the fancy of the Black; that gradually, by anticipating his wants, they led him on to further industry, and induced him to produce more palm-oil than he did before, and gradually led him into habits of civilization, and a demand for civilized articles,—a tendency which might probably be increased with the increase of opportunity.

“In answer to the question, ‘You began with them, like children, with beads, and you have got almost up to pantaloons with them by this time?’ he said, ‘Oh yes; I recollect the last year I was in the trade we sent out to King Eaman, of Old Calabar, a house to cost nearly £1000, which was paid for in palm-oil.’ Mr. Jackson

further says 'that the palm-oil trade is a peculiar one; that the black man, if he has wants, will gratify them, whatever it costs; if he has no desire for what you have, he will not buy it at any price.'

"Dr. Kehoe stated that he had resided a year on the west coast of Africa; that he had greatly turned his attention to the means of promoting civilization there, and had made inquiries from all persons who trade upon the coast, both from the native and other merchants resident there. He had not the least doubt that civilization would, in the course of time, be enormously promoted by legitimate trade; or that any amount for which we had a demand, whether of palm or other vegetable oils of a similar kind, could be produced. That a largely increased quantity could be given by the natives for their own immediate benefit; and that he had no doubt that it would be a most important means of gradually civilizing the inhabitants, and checking the slave-trade, since it would be found that slaves could be profitably employed as domestic servants, and that it would gradually become the interest of their masters to keep them at home, and thus that the natives would be benefited in every possible way. That there is an increasing taste among the natives for articles generally used in civilized life. That

a naked savage, who has been taken out of a slaver, after passing a few years at Sierra Leone, becomes a consumer of almost every European article; the women dress in silks and satins, and the men in cloth, and acquire comfortable houses, and furnish them. That, from his knowledge of the character of the natives, he thinks we have every reason to hope that they will go on progressing in civilized tastes, and that every additional tun of palm-oil that is imported into this country is a blessing to Africa, as tending to assist this progress.

“The latest published work bearing upon the palm-oil and slave trades, that I am acquainted with, is ‘Dahomey and the Dahomans,’ a journal of missions to the King of Dahomey, in the years 1849 and 1850, by Captain Forbes, R.N. He says, ‘The inhabitants of a vast extent of coast have been led to give up the slave-trade; and why? Because they have been taught the immense increase of the value of the palm-oil trade over that in slaves. . . . The taste for British goods runs high, and if these could not be purchased with slaves, palm-oil would be manufactured to obtain them.’ Speaking of South-western Africa, where the sale of relations still exists, he says, ‘Strength ever predominated, and the father either sold his son in his

boyhood, or ran the risk of changing the positions, when the son, now the strongest, bound the father, and sold him to foreign slavery.' He further says, 'One-third, at least, of the extent of the slave coast has been already conquered by civilization and legal traffic, and it requires perseverance alone to reduce the remainder. All the high-roads to Central Africa, the Delta of the Niger,—in which I include the Benin, the Cameroons, the Calabars, etc.,—have submitted to the laws of civilization, and the inhabitants scout with disgust the idea of selling their fellow-men. . . . The Africans are by nature great traders; all the higher articles of trade are to be found on board some of the largest trading ships in the world in the Bonny, and its neighbouring rivers, in order to be exchanged for palm-oil.'"

There are, in various countries, raw materials which cannot be—or rather are not—gathered without the entire destruction of the plants producing them. The disappearance of the Gutta-percha trees in the Indian Archipelago is a deplorable instance of this kind; but a still more deplorable one is the rapid destruction of all the magnificent Quina-forests of South America,—a process by which, in a few years, they will be numbered amongst those things that have been, making it even problematical whether the seeds

necessary for propagating them by artificial means will then be obtainable. The demand for Quinine and Cinchonine will no doubt go on, as it has done, increasing; and how great will be the dilemma when the supply begins to fail! when the poor fever-stricken patient will be longing in vain for the remedy, at present so effectually employed in curing the malady with which he is afflicted; and the physician search, perhaps without result, for a suitable substitute to alleviate the sufferings which he is called upon to heal! Professor Miquel, at Amsterdam, foreseeing this dilemma, presented a few years ago a memorial to the Dutch Ministry, setting forth the fatal consequences which the extermination of those forests would ultimately produce, and urging the adoption of some practical remedy. His memorial was received with much favour. A competent person, Mr. Hasskarl, was at once despatched to South America, in order to collect information and seeds necessary for establishing plantations; and at present thousands of young plants flourish in the mountainous districts of Java, insuring to Holland, for ages to come, the use of that invaluable medicine, Quinine. It would be well if nations who, like the Dutch, have colonial possessions, were to imitate this example; and if those naturalists of this country,

who, like Professor Miquel in Holland, have the ear of the Government, would use that advantage to urge the establishment of Quina plantations, on a large scale, in the higher districts of some of the West India Islands, or in British India, they would, by doing so, not only receive from their contemporaries the highest approbation for sagacity, but also be justly entitled to the blessings of posterity for the inestimable benefits conferred. It is a matter of congratulation that the collecting of palm-oil does not, like the gutta-percha and quina-bark, involve the total destruction of the tree yielding it, as the fruit is the only part gathered,—a fact rendering the trade in that oil of a very solid nature, and the deductions derived from it still more certain.

The genus *Elæis*, to which the Oil Palm belongs, is distinguished by its decumbent trunk, serrated petioles, pinatisect leaves with linear segments, monœcious flowers, and ovate-angular, one-seeded fruits (drupes), with oily husks, of a bright vermilion or a more or less yellow colour. There are only two species, both cultivated in our gardens, one being a native of Africa (*Elæis Guineensis*, Linn.), the other a native of America (*E. melanococca*, Gærtn.). The fruit of both yields oil, but that of the American species

has not yet played such a prominent part in commerce as that of its congener. Besides the oil, the Africans prepare from *Elæis Guineensis* palm-soup, a dish which, the late Dr. Theodore Vogel informs us in Hooker's 'Niger Flora,' "when made of boiled palm-nuts *only*, is very well flavoured. The natives pick the nuts off those young trunks which have not yet lost any of their leaves, and consider them as superior to the fruit of older plants; they also cut down the trunks to collect palm-wine."

The American species (*Elæis melanococca*, Gærtn., *E. Pernambucana*, Lodd.?, *Alfonsia oleifera*, H.B.K.), the *Caiaue* of the Brazilians, and the *Corozo colorado* of the Venezuelians and New Granadians, I have repeatedly met with in the Isthmus of Panama, where it is very common. It is always found in swampy, shady places, never on dry ground, or in sunny, exposed positions. The trunk, which is short and thick, creeps along the ground, and has generally so very few roots that it is a task of no difficulty to overturn a whole plant by a single kick of the foot. The leaves are mostly twenty-four feet long—I have measured them accurately—and from them are manufactured ropes in some parts of New Granada, according to Mr. Jervis, a gentleman who has resided in that country. The fruit is red or vermilion-colour, hence the

vernacular name, *Corozo colorado*. In order to extract the oil, the fruit, after having been boiled in water, is crushed in a wooden mortar until the husk (*sarcocarpium*) is separated from the seed, and the oil floats on the surface of the liquid mass thus produced. The oil is generally used both in private houses and churches, but I do not think it has as yet been exported in any large quantity.

Genus XXII. EUGEISSONIA, *Griffith*.

In forests on the hills about Ching, Malacca, and in Penang, occurs very commonly a stemless Palm, which the Malays term vernacularly "Bertam," and which Griffith* has made the type of a new genus—*Eugeissonia*—distinguished by its inflorescence, its indefinite number of stamens, and the peculiar structure of the seed, from all other East Indian genera of the tribe (*Calameæ* or *Lepidocaryæ*), to which it belongs. *Eugeissonia tristis*, Griffith—that is the name of the typical species alluded to—has not yet been introduced into our gardens. It grows in thick tufts, sur-

* 'Palms of British East India,' by the late William Griffith, etc. Arranged by John M'Clelland, etc. Calcutta, 1850.

rounded by the remnants of its old foliage. The leaves are very numerous, the outer ones spreading, fifteen to twenty feet in length, and pinnatisect, with linear segments from two to two and a half feet long, and armed, like the petiole and spathes, with prickles. The flowers are terminal, and diœcious, and the fruit densely covered with brown scales, and in general outline resemble an inverted pear. There is only one seed.

According to Lewis, the leaves of this plant are used in Penang in making mats for the sides of houses, for thatch, and the same purposes as those of *Nipa fruticans*.

Genus XXIII. EUTERPE, *Martius*.

One of the first and oft-repeated cries a stranger hears on landing at the city of Pará, in Brazil, will be that of "Assai—i," proceeding from Indian and Negro girls, who are walking in the streets with small earthen pots on their heads. "If you call one of these dusky maidens," says Wallace, "she will set down her pot, filled with a thick creamy liquid, of a fine plum-colour and a peculiar nut-flavour. You may not perhaps think a great deal of this

beverage at first, but if you drink it repeatedly, you will inevitably become so fond of it as to consider 'Assai' one of the greatest luxuries the place produces. It is generally taken with farinha, the substitute for bread, prepared from the mandioca-plant, and with or without sugar, according to the taste of the consumer. We had frequently opportunities of seeing the preparation of this beverage. Two or three large bunches of fruit are shaken and stripped by the women into an earthen vessel; tepid water is then poured on them, which soon becomes tinged with purple. In about an hour the outer pulp of the fruit has become soft enough to rub off. The greater part of the water is now poured away, a little cold added, and a damsel, with no sleeves to turn up, plunges both hands into the vessel, and rubs and kneads with great perseverance, adding fresh water as it is required, until the whole of the purple covering of the fruit has been rubbed off and the greenish stones become bare. The liquid, poured through a wicker sieve into another vessel, is now ready for use. The smiling hostess will then fill a calabash, and give you another with farinha to mix to your taste; and nothing will delight her more than your emptying your rustic basin and asking her to fill it again. The inhabitants of Pará are excessively attached to this beverage,

and many of them never pass a day without partaking of it. They are particularly favoured in being able to get it at all seasons, for though in most places the trees only bear for a few months once in the year, yet in the neighbourhood of Pará there is so much variety of soil and aspect, that within a day or two's journey there is always some ripe Assai to supply the market. Boys climb up the trees to get it, with a cord round the ankles, and with its own leaves make a neatly-interlaced basket to carry their harvest home. From the great island of Marajó, its Igaripés, (a small stream, literally 'path of the canoe,') and marshes, from the rivers Guamá and Mojú, from the thousand islands in the river, and from the vast Palm swamps in the depths of the forest, baskets filled with the fruit are brought every morning to the city, where half the population look to the Assai to supply a daily meal, and hundreds are said to make it, with farinha, almost their main subsistence."

The Palm producing the Assai is *Euterpe edulis*, Mart., (not, as Wallace has stated, *Euterpe oleracea*, Mart.,) a tree with a slender trunk, often swollen at the base, and berries in shape, size, and colour resembling the fruit of the sloe.

The terminal leaf-bud of *Euterpe oleracea*, Mart., a native of Brazil, and *Euterpe montana*, Grah., a native of Venezuela,

and probably that of several others, if not all species of this genus, is both used and misused;—used as a fresh vegetable or a pickle; misused, as in order to obtain it a whole tree has to be sacrificed, Palms, be it remembered, not having the power of forming regular side-branches.

The genus *Euterpe* is confined to the forests of tropical South America, where it generally forms separate groves. The trunks are sometimes one hundred feet high, and, like all other parts of the plant, unarmed. The leaves are terminal, few in number, pinnatisect, and have linear segments. The flowers are monœcious, and the berries round, one-seeded, and of a dark purple colour. Three species are cultivated in our conservatories—*Euterpe edulis*, Mart., *E. montana*, Grah., and *E. oleracea*, Mart.

Genus XXIV. GEONOMA, *Willdenow.*

Geonoma is an extensive genus, scattered over the forests of tropical America, between the 20th of south and the 10th degree of north latitude. Sometimes the trunk is entirely wanting; but in cases where present it has a reed-like aspect, is ringed, smooth, polished, and crowned at the

extremity with either quite entire, or more or less split and pinnatisect leaves. The spadixes appear in the axil of the petioles, and are arranged in spikes, or sometimes in panicles. The flowers are monœcious, and more or less intensely yellow or purple, the male ones bearing six stamens. The berries are ovate or nearly globose, and one-seeded, but of an insipid taste and an obscure colour.

Their trunks are occasionally used for walking-canes, their foliage for thatch, but they do not seem to be employed in any other way. On account of their small size, the different species are great favourites in our gardens.*

Genus XXV. GUILIELMA, *Martius*.

A lofty, rather slender trunk, armed with black spines and crowned with pinnatisect leaves, having linear segments and spiny petioles, simply branched spadices, growing from

* Hermann Wendland has given the following list of the cultivated species:—*Geonoma acutiflora*, Mart. (*G. baculifera*, Kth.); *G. diversa*, Kth.; *G. fragilis*, Hort. Paris.; *G. fragrans*, Hort. Germ.; *G. interrupta*? Mart.; *G. maxima*, Kth.; *G. pinnatifrons*, Willd.; *G. Portiana*, Hort.; *G. pulchella*, Hort.; *G. Schottiana*, Mart.; *G. simplicifrons*, Willd. (*G. Willdenowii*, Kl.); *G. Spixiana*, Mart.; *G. undulata*, Kl., and two other undetermined species.

beneath the foliage, and bearing monœcious green or yellowish flowers, and large, ovate, fleshy or mealy drupes, of a yellowish-red colour, are the most striking features of *Guilielma*, a genus composed of three species (*G. Macaña*, Mart., *G. speciosa*, Mart., and *G. spectabilis*, Mart.), indigenous to New Granada, Venezuela, the Guianas, and Brazil, and cultivated in our gardens.

The best known and most widely-diffused species is *Guilielma speciosa*, Mart., the Piritu or Pirijao of Venezuela, the Pupúnha of the Amazon district, and the Paripou of Guiana, first brought into notice by Aublet, Humboldt and Bonpland, and lately described in popular language by Wallace. It has a slender, cylindrical trunk, thickly set with long, needle-shaped spines, disposed in rings or bands. It reaches sixty feet in height, and grows quite erect, though in exposed situations it becomes curved and waving. The leaves are very numerous, terminal, pinnatisect, and drooping, forming a nearly spherical crown to the trunk; and their segments growing out from the midrib in various directions, and being themselves curled or waved, give the whole mass of foliage a singularly plummy appearance. The leaves of the young plants are entire, like those of the Bussu (*Manicaria saccifera*, Gærtn.), but as the age of the

tree increases, they break up into regular narrow segments. The spadices grow from beneath the leaves, and are small, simply branched, and drooping. The spathes are ventricose, woody, and persistent, curving over the spadix. The fruit is about the size of an apricot, of a triangular oval shape, and fine reddish-yellow colour. In most instances the seed is abortive, the whole fruit being a farinaceous mass. Occasionally however fruits are found containing the perfect stony seed, and they are then double the usual size. The tree is not found wild in the Amazon district, but is invariably planted. In the Indians' villages, about the houses, many hundreds of these trees may often be seen, adding to the beauty of the landscape, and supplying an abundance of wholesome food; in fact it here takes the place of the Cocoa-nut tree in the East Indies, and is almost as much esteemed as that is. Climbing this Palm being, on account of the prickly trunk, impossible, the Indians construct rough stages up the sides of the trees, or form rude ladders, by securing cross pieces between two of them, by which they mount so high as to be able to pull down the bunches of fruit with hooked poles. The fruits are eaten either boiled or roasted, when they somewhat resemble Spanish chestnuts, but they have a peculiar oily

flavour; they are also ground up into a kind of flour, and made into cakes, which are roasted like cassava bread; or the meal is fermented in water, and forms a subacid, creamy liquid. Parrots, macaws, and many other birds devour them, and tame monkeys eat them greedily, though the wild ones cannot climb the spiny stems to obtain them. The wood of this tree, when old and black, is exceedingly hard, turning the edge of any ordinary axe. When Mr. Wallace descended the River Uaupés in April, 1852, he had a number of parrots, whose objections to any restraint upon their liberty caused him much trouble. Their first cage was made of wicker, and in a couple of hours the birds had all set themselves at liberty. Then tough green wood was tried, but the same time only was required to gnaw that through; thick bars of deal were bitten through in a single night. He then tried the hard wood of the *Pashiúba* (*Iriarteia exhorrhiza*, Mart.); this checked them for a short time, but in less than a week, by continual gnawing, they had chipped these away, and again escaped. He now began to despair; no iron for bars was to be procured, and his resources were exhausted, when one of his Indians recommended him to try Pupúnha, assuring him that if their beaks were of iron they could not bite that. A tree was



J. Chr. Frank del et lith

Maunua vinifera, Mart

Vincent Peckol's Imp

accordingly felled, and bars made from it, and he had the satisfaction of seeing that their most persevering efforts now made little impression.

The sharp, needle-like spines of this tree are used by some Indian tribes to puncture the skin, in order to produce the tattooed marks with which they decorate various parts of their bodies. Soot, produced from burning pitch, rubbed into the wounds, is said to make the indelible bluish stain which these markings present.

Humboldt, speaking of this noble Palm, says:—"The Indians and the missionaries of the settlement of San Francisco, in Venezuela, are unwearied in their praises of this noble Palm-tree, which might be called the Peach Palm. We found it cultivated in abundance at San Fernando, San Baltasar, Santa Barbara, and wherever we advanced towards the south or the east along the banks of the Atabapo and Upper Orinoco. In those wild regions we are involuntarily reminded of the assertion of Linnæus, that the country of Palm-trees was the first abode of our race, and that man is essentially palmivorous. On examining the provision accumulated in the huts of the Indians, we perceive that their subsistence during several months of the year depends as much on the farinaceous fruit of the *Pirijao* as on the Cas-

sava and Plantain. The tree bears fruit but once a year, but to the amount of three clusters, consequently from one hundred and fifty to two hundred fruits.”

Genus XXVI. HYOPHORBE, *Gärtner*.

The islands of Bourbon and Mauritius produce the only representative (*Hyophorbe Indica*, Gærtn., *H. lutescens*, Hort., *Areca lutescens*, Bory, *A. alba*, Hort.) of this genus, which is cultivated in our gardens. It is a middle-sized, unarmed tree, with a cylindrical, annulated trunk, about thirty feet high, and from four to six inches in diameter. The leaves are terminal, pinnatisect; the flowers are diœcious, and white; the berries one-seeded, and resembling olives in shape and colour.

Genus XXVII. HYOSPATHE, *Martius*.

The virgin forests of Brazil, near the confluence of the rivers Amazon and Tocantins, are the localities in which *Hyospathe elegans*, Mart., the only representative of the

genus, has hitherto been met with. The natives term it *Tajassa-ubi*. It is a reed-like Palm, allied to the genus *Chamædorea*, and attains the height of about six feet; its trunk is straight and annulated, bearing terminal and lateral leaves, which are either entire, and nearly divided into two lobes at the point, or more or less pinnatisect: they make excellent thatch. The flowers are of a pale yellow, and monœcious, the male ones having six stamens; the berries are one-seeded, violet, and resemble olives in shape. In our gardens this plant is still a desideratum.

Genus XXVIII. HYPHÆNE, *Gærtner*.

This genus is diffused, with the exception of the Cape of Good Hope, over the whole of the continent of Africa, and parts of Arabia. The trunk is about thirty feet high, and ringed, and differs essentially from those of most Palms by being branched. The leaves are terminal, and fan-shaped, the flowers diœcious, and pale yellow or reddish. The fruit is of a yellowish-brown colour, and grows in large bunches; it has a thick, mealy rind, which has very much the look

and taste of gingerbread, on account of which *Hyphæne Thebaica*, Mart. (*Corypha Thebaica*, Linn., *Douma Thebaica*, Poir., *Hyphæne cucifera*, Pers., and, according to J. Smith, *Parinarium Senegalense*), the Doom Palm of Egypt, has obtained the popular name of "Gingerbread-tree." A beautiful representation of this unique tree is given in our Plate, where it is seen in one of its favourite localities on the banks of the Nile, in the neighbourhood of the cataracts. It is difficult to speak with any degree of certainty of the geographical limits of *H. Thebaica*, as its synonymy is very confused. In the Museum at Kew there are a considerable number of fruits of *Hyphæne*: some of them were brought from Port Natal by Captain Garden, some from the Gulf of Guinea by Mr. Daniel, and some were sent from Egypt by the late Dr. Bromfield, an examination of which has inclined me to the belief that the characters by which the various species are at present defined are most unsatisfactory, and unless better ones can be substituted, all the supposed species must be reduced to one. Fresh seeds of this genus, Mr. John Smith informs me, vegetate readily, but the young plants are of slow and precarious growth, there being no good specimen of them in England.

The wood of the Gingerbread-tree is used in Africa for

various domestic purposes; the rind of the fruit is eaten, the kernel turned into beads for rosaries. Dr. Lindley has stated (*Vegetable Kingdom*, ed. i. p. 137), that Egyptian *Bdellium*, a gum-resinous substance, formerly employed as a diuretic and diaphoretic, is obtained from this Palm; but he does not give his authority, and I have not been able to meet with a confirmation of his statement in any other botanical work.

My esteemed friend, Edward Vogel, the great African traveller, alludes, in one of his letters to Dr. Augustus Petermann—dated Kuka, July 13, 1854, and published in the '*Bonplandia*' (vol. iii. p. 13)—to a Palm which, I think, must be closely allied to *Hyphæne*. He says:—"A beautiful tree, about forty feet high, which forms on the banks of the Lake of Tuberi extensive forests, is the Deleb Palm (as it is termed in Nubia). The leaves are fan-shaped, very much resembling those of the Doom, only they are larger and of a more lively green, and they form a dense and fine crown. The trunk is smooth, and never divides. The fruits weigh about four or five pounds each; they are from eight to nine inches long, and from six to seven inches thick, oval-shaped, and dark yellow; they consist of a thick, fibrous rind, including three seeds.

The rind contains a rather bitter but by no means disagreeable juice, which in taste and smell reminds one of Pine-apple."*

Genus XXIX. IRIARTEA, *Ruiz et Pavon.*

I well remember when I saw for the first time one of the uses to which this genus is applied. It was on the 22nd of September, 1845. I had been all day ascending the Chagres, one of the rivers of the Isthmus of Panama, in a small canoe roofed over with palm-leaves, and was therefore heartily glad when at dusk our party halted near a sandy spit. My men at once set to work preparing their supper. A fire was kindled, and after a large pot, filled with rice and water, had been placed on it, they brought forward a number of cocoa-nuts and several very peculiar-looking cylinders, which at first sight I mistook for those barrels seen in musical boxes and hurdy-gurdies, being covered with small tubercular prickles, but which to my astonishment were used instead of graters for reducing the inside of the cocoa-nuts to a pulpy mass, to be boiled with the rice and water.

* We cultivate in our gardens *Hyphæne Petersiana*, Kl., and *H. Thebaica*, Mart.—*Wendl. Index Palm.* p. 24.

I afterwards found that these graters were the aerial roots of the Zanora Palm of the country (*Iriartea exorrhiza*, Mart.), and that they were in common use in the Isthmus; and I now learn from Wallace's work that the same is the case in the Amazon district, countries in which, from the excessively moist climate, tin graters soon get rusty, making these provided by nature very acceptable. Two of these graters I have sent to the Museum of Economic Botany at Kew, where they are exhibited amongst the other productions of Palms. The roots here alluded to are common to *Iriartea exorrhiza* and several allied species, including *I. ventricosa*, Mart., figured in our Plate. They spring from the trunk, each from a higher point than the last, and extend diagonally downwards until they approach the ground, when they often divide into many rootlets, each of which secures itself to the soil. As fresh ones appear, those below them decay and die off; and it is not uncommon to see a lofty tree supported entirely by three or four roots, so that a person may walk erect beneath them, or stand with a tree seventy feet high growing immediately over his head.

The genus *Iriartea* (*Ceroxylon*, H.B.K.) is peculiar to the forests of South America. Its trunks are erect, annulated, and unarmed. Its leaves are terminal, pinnatisect,

the segments of which are often trapeziform, plicated and divided in toothed or truncated lobes. The flowers are monœcious, and more or less intensely yellow, and their fruit, a one-seeded berry, is of a green or yellowish-brown, and sometimes of almost a black colour. About nine species have hitherto been discovered, several of which are cultivated in our gardens.*

Iriartea exorrhiza, Mart., the best-known species, is termed in Brazil "Pashiúba," or "Paxiúba," and attains the height of fifty to sixty feet. The trunk is slender, and its wood is very hard on the outside, but soft and pithy within. It splits easily and very straight, and is on that account much used in its native country for forming the floors of canoes, the ceilings of houses, shelves, seats, etc., and is also exported in great quantities to the United States for umbrella sticks. The trunks of this Palm are also used for making the Juriparis (or Devils), musical instruments, played upon by the Indians dwelling on the banks of the river Uaupés, in their Dabocuris (*festas*). Mr. Spruce, the

* *I. altissima*, Kl.; *I. Andicola*, Spr. (*Ceroxylon Andicola*, H. et B.); *I. ferruginea*, Hort. (*C. ferrugineum*, Hort.); *I. Klopstockia*, Hort. (*C. Klopstockia*, Mart., *Klopstockia cerifera*, Karst.); *I. niveum*, Hort. (*C. niveum*, Hort.); and *I. præmorsa*, Kl.

meritorious traveller, on sending specimens of these instruments to the Museum at Kew, accompanied them with the following note:—"The two larger instruments are portions of the trunk of the Paxiúba (*Iriartea exorrhiza*), with a square hole near the upper extremity. When about to be used, this end is nearly closed by a piece of clay, and a piece of Uaruma-leaf is tied on above the square hole, so as to form a monster flageolet. The smaller ones consist of a tube of Paxiúba, wrapped in a long strip of the tough bark of the Jébarú (a Cæsalpineous tree, with handsome red monopetalous flowers, apparently the *Parivoa grandiflora* of Aublet), which descends in widening folds to some distance below the tube, thus forming a sort of trumpet, which is simply blown into at the upper end."

Wallace, who was for a long time the travelling companion of Spruce, has thus alluded to the Juripari of the Indians:—"One evening," he says, "there was a caxiré-drinking; and a little before dark a sound as of trombones and bassoons was heard coming on the river towards the village, and presently appeared eight Indians, each playing on a great bassoon-looking instrument. They had four pairs, of different sizes, and produced a wild and pleasing sound: they blew them all together, tolerably in

concert, to a simple tune, and showed more taste for music than I had yet seen displayed among these people. The instruments are made of bark, spirally twisted, and with a mouthpiece of leaves. In the evening I went to the malocca, and found two old men playing on the largest of the instruments; they waved them about in a singular manner, vertically and sideways, accompanied by corresponding distortions of the body, and played a long while in a regular tune, accompanying each other very correctly. From the moment the music was first heard, not a female, old or young, was to be seen; for it is one of the strangest superstitions of the Uaupés Indians, that they consider it so dangerous for a woman ever to see one of these instruments, that having done so is punished with death, generally by poison; even should the view be perfectly accidental, or should there be only a suspicion that the proscribed articles have been seen, no mercy is shown; and it is said that fathers have been the executioners of their own daughters, and husbands of their wives, when such has been the case. I was of course anxious to purchase articles to which such curious customs belong, and spoke to the Tushaúa on the subject. He at length promised to sell them me on my return, stipulating that they were to be embarked at some

distance from the village, that there might be no danger of their being seen by the women."

Mr. Wallace tells us also something about another species of this genus (*Iriartea setigera*, Mart.); he says:—"One day I accompanied the Indian with whom I lived into the forest, to get trunks for a blow-pipe. We went, about a mile off, to a place where numerous small Palms were growing: they were the *Iriartea setigera* of Martius, from ten to fifteen feet high, and varying from the thickness of one's finger to two inches in diameter: they appear jointed outside from the scars of the fallen leaves, but within have a soft pith, which when cleared out leaves a smooth polished bore. My companion selected several of the straightest he could find, both of the smallest and largest diameter; these trunks were carefully dried in the house, the pith cleared out with a long rod made of the wood of another Palm, and the bore rubbed clean and polished with a little bunch of roots of a tree-fern pulled backwards and forwards through it. Two trunks are selected, of such a size that the smaller can be pushed inside the larger; this is done so that any curve in the one may counteract that in the other; a conical wooden mouthpiece is then fitted on to one end, and sometimes the whole is spirally bound with the smooth,

black, shining bark of a creeper. Arrows, made of the nerves of the sheathing base of the Patawá (*Enocarpus Batawa*), which remaining when the parenchyma decays, pointed, and anointed with poison, and with a little conical tuft of tree-cotton (the silky covering of the seeds of a *Bombacæ*), at the other end, fill up exactly, but not tightly, the bore of the tube; these arrows are carried in a wicker quiver, well covered with pitch at the lower part, so that it can be inverted in wet weather, to keep the arrows dry. The blowpipes, or *gravatánas*, are the principal weapon here; every Indian has one, and seldom goes into the forest or on the rivers without it."

Another species of *Iriartea* deserving notice is the Wax Palm of the Andes, *I. Andicola*, Spr. (*Ceroxylon Andicola*, Humb. et Bonpl.), one of the little-known, small group of mountain or alpine Palms—the *oppositum* of the numerous littoral Palms. "I found this tree," says Humboldt in a letter to me, "in the Cordillera at the Pass of Quindiu, between Ibague and Cartago, not lower on the declivity than 7930, not higher than 9700 English feet (you could say in your 'Popular History of the Palms' between 7900 and 9700 English feet), in company with *Podocarpus* trees, and *Quercus Granatensis*."

“The lofty, noble trunks of this tree,” says W. Purdie, “are covered with a coating of resin-like wax,* which gives them a white and marble-like appearance, imparting a lively feature in the scenery, so peculiar to the Paramo of Quindiu, where the Palm abounds to an extraordinary degree, without any apparent injury to the noble but subordinate forest beneath its grateful shade. To obtain the wax the tree must be felled; and I was informed by my guides that each tree gives an arroba, or twenty-five pounds. A man will cut down and scrape two trees in a day, giving fifty pounds at least. The wax is used, mixed with tallow, for making candles (alone it is said to burn too rapidly); it is also used alone, as wax candles, for offerings to the saints and the Virgin, tallow being prohibited by the laws or rubric of the Church of Rome; but the priest of Toche, a small settlement at the foot of the Quindiu, told me he could not permit its use on high functions or occasions in the Church, it being a resinous production, which the laws of his religion prohibit, thus rendering it impossible for them to take advantage of this extraordinary and easily-obtained natural production; consequently a large importation of bees'-wax is introduced for the use of the Church alone.

* According to Vauquelin this substance consists of one-third wax and two-thirds resin.

“After scraping, it is merely melted and run into calabashes, for the use of the villagers in the neighbourhood of the Toleme range. It is sold in the town of Ibague, at the foot of the Quindiu, at threepence, or half a real, per pound; it is in considerable demand, but is abundant, and easily obtained.”

“This, however,” says Bonpland, “is not the only advantage which can be derived from this tree; the height of its trunk renders it preferable to the other Palms, which are principally used to make canoes, aqueducts, etc.; its wood is very durable, and deserves also the preference in the construction of houses; its leaves are not less useful than those of *Cocos butyracea*, of which the Indians of the Orinoco make all their thatches; lastly, the filaments which hang from the base might be used in the same way as those of the *Arenga saccharifera* of the Moluccas, and those furnished by the *Chiqui-chiqui* Palm of the Spaniards (*Mauritia flexuosa*, Linn.), which grows in abundance in the Upper Orinoco, the Rio Negro, the Amazon, and in nearly all Pará.

“It is interesting to observe that the rings formed by the falling away of the leaves do not exude this inflammable matter; they are truly cicatrices, in which the organization is destroyed, and where the carbon, separated from the



J. Chr. Franck del et lith

Vincent Brooks sculp

Metroxylon Rumphii, Mart & *Sagus elata*, Remy

hydrogen by the oxygen of the atmosphere, is deposited uncovered."

Genus XXX. JUBÆA, *Humboldt, Bonpland, et Kunth.*

The southernmost Palm on the western side of America is the Coquito of Chile, the only representative of *Jubæa* (*Molinæa*), a genus having an arboreous, unarmed trunk, pinnatisect leaves, monœcious, dark yellow flowers, numerous stamens, and an obovate, one-seeded drupe. *Jubæa spectabilis*, H. B. K. (*Cocos Chilensis*, Mol.), is cultivated not only in its native country, but also in New Granada and other parts of South America; it has also long been an inmate of European conservatories. "I well remember this graceful Palm," says my learned friend Mr. Miers, in a letter addressed to me; "though not common in those parts of Chile that I have visited, it is often seen here and there, forming one of the greatest ornaments in a beautiful landscape country. Near where I resided at Concon, two of these Palms grew close together, rearing their straight and tall stems to a height of forty or fifty feet before they threw out their graceful head of widely-spreading leaves. I remember the *fruit* well, and the large spathes enclosing their

copious racemes, which look like gigantic bunches of very large grapes (it is well figured by Humboldt and Kunth, Nov. Gen. vol. i. pl. 96); it has a thick fibrous husk like the Cocoa; its nuts are like full-sized marbles, and indeed are used as a substitute for these toys by the boys of the country; they also find a market among the confectioners of large towns, where they are extensively used in the preparation of various sweetmeats. The *Jubæa spectabilis* appears to abound in the more central provinces of Chile, which lie between the latitudes of 33° and 35° south, but I do not know its southernmost limit. Within the provinces alluded to, they sometimes form naturally almost small forests, the proprietors of which derive a considerable revenue from this source. The profit arises from the preparation of a syrup extracted from the trunk, called *Miel de Palma* (palm honey), which I have often eaten, and which is conveyed as an article of commerce to different parts of Chile, where it is sold for domestic use, and much esteemed."

To obtain the 'miel,' a number of trees are cut down every year. "When the trunk is lying on the ground," says Darwin, "the crown of leaves is lopped off; the sap then immediately begins to flow from the upper end, and continues so doing for several months; it is however neces-

sary that a thin slice should be shaved off every morning, so as to expose a fresh surface. A good tree will give ninety gallons, and all this must have been contained in the vessels of the apparently dry trunk. It is said that the sap flows much more quickly on those days when the sun is powerful; and likewise, that it is absolutely necessary to take care, in cutting down the tree, that it should fall with its head upwards on the side of the hill; for if it falls down the slope, scarcely any sap will flow, although in that case one would have thought that the action would have been aided, instead of checked, by the force of gravity. The sap is concentrated by boiling, and is then called treacle, which it very much resembles in taste."

"I never heard of the existence of the Date Palm in Chile," continues Mr. Miers in his above-mentioned letter, "where I do not think it would grow, except in the desert tracts of the north; but I know that it is cultivated in many places along the sandy line of coast of Peru, to the southward of Lima, especially in what are called the 'Intermediate Ports,' between Callao and Arica. I have seen the Dates brought to Chile from that coast, but never in a fresh state. Molina says they are cultivated in Copiapo; this is not improbable, but if so, they must be a rarity, as

they never find their way to the southward. The common Cocoa-nut trees are not unfrequently seen in Chile along the sea-coast, but I suspect they are only planted for ornament, as there is hardly heat enough for them; I am inclined to think so, because I have never seen them produce fruit. They grow only in marine sands, or where they can be fed by salt water. I never heard of the existence of any other Palm in Chile, although Molina mentions one as growing in the island of Juan Fernandez, called *Chonta*, but that has proved to be a tree-fern, the *Thyrsopteris elegans* of Kunze."

Genus XXXI. KUNTHIA, *Humboldt et Bonpland*.

In the temperate parts of the mountains of New Granada, between Almaguez and Pasto, near San Pablo, grows a reed-like Palm, which is known to the inhabitants of that district by the name of Caña de la Vibora (Snake-cane), and is the only representative of the genus *Kunthia*. Its annulated trunk is from twenty to twenty-four feet long, about as thick as a finger; its leaves are terminal and pinnatisect; its flowers, appearing below the commencement of the fo-

liage, are white, monœcious, and arranged in simple branches; its berries are round, green, one-seeded, and about as large as the fruit of the sloe.

The wood of the trunk is used by the Indians for making blowing-tubes, through which they discharge their little poisoned arrows. The saccharine juice of it is considered by those people a remedy for the venom of snake-bites, and is either taken internally, or applied externally to the wound.

Genus XXXII. LATANIA, *Commerson.*

The genus *Latania* is composed of two species; the one (*L. Commersonii*, Linn., *L. rubra*, Jacq.) being a native of Bourbon and the beautiful island where Paul and Virginia roamed; the other (*L. Loddigesii*, Mart.) being a native of equinoctial Africa. The fruit of the former is eaten by the Negroes, but that does not argue much for their taste, and should not lead us to imitation, as it has a rather disagreeable flavour.

The *Latantias* are middle-sized trees, with terminal, palmate-flabelliform leaves, diœcious flowers, and yellow three-seeded drupes. *Latania Commersonii*, Mart. (*L. rubra*,

Jacq., *Cleophora lontarioides*, Gærtn.), is an inmate of most European conservatories, and in the Royal Botanic Gardens at Kew there is cultivated another but doubtful species, under the name of *L. glaucophylla*, Hort. Kew.

Genus XXXIII. LEOPOLDINIA, *Martius*.

The few species of which this genus is composed are all natives of the forests of the provinces of Rio Negro and Pará, of north-eastern Brazil. They are middle-sized trees, with straight unarmed trunks, crowned with fine pinnatisect leaves, and bearing small monœcious flowers of a reddish colour, and roundish, one-seeded berries, the outside of which is of a yellowish-green.

The trunk of *Leopoldinia pulchra*, Mart., the Jará or Jará-miri of the natives, is, says Wallace, very smooth and cylindrical; and being of convenient length, it is much used for fences in the city of Barra do Rio Negro. "The want of neatness out-of-doors," he continues, "which is quite a characteristic feature of the Portuguese and Indian settlers on the Amazon, is always apparent in these fences. It is never thought worth while to cut all the poles a uniform

length, but they are set up just as they are brought in from the forest; and the space between two handsome houses in the city is often filled up with a Jar railing of most unpicturesque irregularity. The bright green and glossy foliage also renders this tree suitable for another purpose. On certain saints'-days little altars and green avenues are made before the principal houses in Barra, the Jar Palm being always used to construct them; and its graceful leaves, rustling in the evening breeze, fitfully reflecting the light of the wax tapers which burn before the images of the saints, with the blazing torches of the rustic procession, produce a very pleasing effect."

Wallace has noticed two other species of *Leopoldinia* (*L. major*, Wallace, and *L. Piassaba*, Wallace). The latter has been considered by me (page 76 of this Work) as a synonym of *Attalea funifera*; and although since those sheets, containing my description, have gone through the press, Mr. Spruce has endorsed the correctness of Mr. Wallace, in considering the Piassaba of the Rio Negro a *Leopoldinia*, yet no specimens of it have hitherto reached Europe, and I am still compelled, in the absence of positive information, to leave *Leopoldinia Piassaba* with *Attalea funifera*. The former species, *Leopoldinia major*, Wallace,

the Jará-assu of the natives, occurs plentifully on the lakes and inlets of the upper Rio Negro. "The Indians," says its discoverer, "collect the fruit in large quantities, and by burning and washing extract a floury substance, which they use as a substitute for salt when they cannot procure that article; they assert positively that the smaller species of Jará (*L. pulchra*, Mart.) will not yield the same product; but perhaps this may be only because the fruit of that is less abundant, and they do not take the trouble to collect it. Coarse Portuguese salt is used in the Rio Negro, and among the Indians in the upper part of the river it serves as a circulating medium, about a pound of it being reckoned equivalent to a day's work. The supply however is very uncertain, and there are many distant tribes of natives which it scarcely ever reaches; and it is among them that this substitute alluded to is manufactured.

"It is doubtful however whether the fruit contains any true salt, for the extract is described as being more bitter than saline in its taste; yet with this substance alone to season their fish and cassava, the Indians enjoy almost perfect health. Perhaps, therefore, mineral salt may not be such a necessary of life as we are accustomed to consider it."

Genus XXXIV. LEPIDOCARYUM, *Martius*.

Lepidocaryum comprises two species of Palms (*L. gracile*, Mart., and *L. tenue*, Mart.), which grow in the gloomiest parts of the Brazilian forests. They are only a few feet in height. Their leaves are flabelliform, irregularly split, and furnished at the margin with minute prickles. Their flowers are polygamo-dicæous, and of a reddish colour; and their fruit, a one-seeded berry, is covered with scales, like that of *Mauritia*, *Calamus*, and other genera of the tribe (*Calamineæ*) to which these plants belong. Nothing is recorded of their uses; nor have they as yet been introduced into our gardens.

Genus XXXV. LICUALA, *Rumphius*.

It was thought for a long time that those well-known walking-sticks, the "Penang Lawyers," were the produce of the Betel-nut tree; but they have now been ascertained to be the young trunks of *Licuala acutifida*, Mart.,—the "Plass tikooss" of the Malays,—a miniature Palm inhabiting Penang, and attaining generally only three or five feet, and in exceptional cases from fifteen to twenty feet in

height. The "Penang Lawyers" are prepared by scraping the young trunk with glass, so that the epidermis is altogether removed, care being taken not to scrape away much more than that, as the inside is like the substance of rattan. It is on this account that the smaller, thinner sticks are so much more sought for than the larger, thicker ones, and are so rare. The sticks are ultimately straightened by fire, and then polished.

The genus *Licuala* is confined to the tropical parts of Asia, and composed of about a dozen species, eight of which are in our gardens.* Their trunk, in some species, is marked with rings, and sometimes rough with the persistent, indurated bases of the faded leaves; their leaves are terminal and fan-shaped, with the petioles armed with horny, conical, or often hooked prickles; their flowers are lateral, hermaphrodite, and their drupes are red or yellow.

One of the finest species of this genus is *Licuala peltata*, Roxb., the "Chattah-pat" of the Assamese, which inhabits all the woody mountains to the eastward of Bengal, as well as the base of the Himalaya, below Darjeling, Rungpore,

* These are, *Licuala elegans*, Bl.; *L. gracilis*, Bl.; *L. horrida*, Bl. (*Rhaphis Javanica*, Hort.); *L. nana*, Bl.; *L. peltata*, Roxb.; *L. pumila*, Reinw.; *L. Rumphii*, Bl.; and *L. spinosa*, Wurm. — *Wendl. l. c.* p. 27.

and Assam. It is chiefly remarkable on account of its large, peltate, orbicular leaves, which are used, according to Jenkins, for the same purpose as those of the "Toko-pat" of Assam, but are much coarser than the latter, and only employed by the lower order of inhabitants. Nevertheless the demand for them is very great, as scarcely a single ploughman, cow-keeper, or coolie is without his *jhapee* or *chattah* (umbrella-hat), made of "Chattah-pat."

Genus XXXVI. LIVISTONIA, *R. Brown.*

The number of Palms to be found in our conservatories has only of late years become considerable. Formerly it was very limited, chiefly owing to the great difficulty experienced in transmitting the seed to Europe without its losing the germinating power. This difficulty was however at last overcome. When Allan Cunningham, the King's botanist, was in New Holland, he sent a case with living plants to the Royal Gardens at Kew, which on being disturbed was found to have, instead of the crocks usually placed at the bottom of such cases for drainage, seeds of a Palm, nearly all in process of germination. Cunningham's attendants, too

indolent to look for the crocks, had substituted the seeds of the *Livistonia Australis*, which happened to be more handy. These young plants were carefully nursed, and one of them has now become one of the gems of the collection of Palms at Kew ; another adorns the chief conservatory at the Royal Gardens at Hanover ; and again another the Crystal Palace at Sydenham. The discovery that the seeds of Palms could be introduced most effectually by being in their native country at once placed in mould was not overlooked by Mr. John Smith, the intelligent Curator of Kew Gardens. He made it widely known, and to its diffusion more than to any other circumstance must be mainly ascribed the great increase of the collections of Palms in our horticultural establishments. I availed myself of it during my voyage round the world, and was thus enabled to introduce several rare species into our gardens.

The *Livistonias* are natives of Eastern Asia and Australia. Their trunks are generally arboreous, and always unarmed. Their leaves are palmate, their petioles clad at the base with copious fibres, and generally at the edge furnished with spines. Their flowers are hermaphrodite, minute, white, and arranged in axillary panicles ; their fruit, a drupe, is often inequilateral, and always of a shining, glossy blue

colour, which, says Griffith, is one of the characters distinguishing this genus from its ally, *Licuala*.

The Livistonias are more remarkable for their noble aspect and their elegant foliage than for any peculiar useful quality they possess. *Livistonia Jenkinsiana*, Griff., (the "Toko-pat" of Assam,) as its discoverer informs us, "is an indispensable accompaniment of every native gentleman's house; but in some parts it is rare, and the trees are then of great value. I cannot call to my recollection having ever seen a 'Toko-pat' undoubtedly wild. The leaves are in universal use throughout Assam for covering the tops of doolees (palanquins) and the roofs of boats; also for making the peculiar hats, or rather umbrella-hats (*jhapees*) of the Assamese." The wood and leaves of the *Livistonia rotundifolia*, Mart., a native of Java and Celebes, are employed for various economic purposes, but I have not been able to meet with any records of the useful properties of any of the other species of this genus. In our gardens they are great favourites, and five out of the entire number known* are already under cultivation.

* These are:—*Livistonia Australis* (*Corypha Australis*, R. Brown); *L. Chinensis*, Mart. (*Latania Chinensis*, Jcq., *L. Borbonica*, Lam., *Livistonia*

Genus XXXVII. LODOICEA, *Labillardière*.

Of all the Palms, perhaps that which for a long time has been the least known, and yet the most celebrated, is the Double Cocoa-nut, the *Coco de mer*, *Coco de Salomon*, and the *Coco des Maldives* of the French, the *Cocos Maldivicus* of Rumphius, the *Nux Medica* of Clusius, and the *Lodoicea Sechellarum* of Labillardière. Until the discovery of the only spot in the world where the nuts grew, in the year 1743, they were solely known from having been found floating on the surface of the sea in the Indian Ocean and near the Maldivé Islands, whence their French name was derived; and even in the time of Rumphius the nuts were spoken of as the “*mirum miraculum naturæ, quod princeps est omnium marinarum rerum, quæ raræ habentur.*” The nuts were only found floating, destitute of their husk, and mostly with the internal part decayed; they were called “*Calappa Laut*” by the Dutch, and under that appellation Rumphius has given an historical account of them; but fa-

Mauritiana, Wall., *Saribus Chinensis*, Bl.) ; *L. Jenkinsiana*, Griff. ; *L. oliveformis*, Mart. (*Saribus oliveformis*, Hassk., *Chamærops Biroo*, Hort.) ; and *L. rotundifolia*, Mart. (*Corypha rotundifolia*, Lam., *Saribus rotundifolius*, Blume, *Livistonia spectabilis*, Griff. ?)—*Wendl. l. c. p. 26.*

bulous as it is, he tells us that many other tales were related to him respecting it, too absurd to be repeated.

The Double Cocoa-nut is not, he assures us, a terrestrial production, which may have fallen by accident into the sea and there become petrified, as Garcia ab Orta relates; but a fruit probably growing itself in the sea, whose tree has been hitherto concealed from the eye of man. The Malay and Chinese sailors used to affirm that it was borne upon a tree deep under water, which was similar to a Cocoa-nut tree, and was visible in placid bays, upon the coast of Sumatra, etc., but that if they sought to dive after the tree it instantly disappeared. The Negro priests declared it grew near the island of Java, where its leaves and branches rose above the water, and in which a monstrous bird, or griffin, had its habitation, whence it used to sally forth nightly, and tear to pieces elephants, tigers, and rhinoceroses with its beak, the flesh of which it carried to its nest; furthermore they avouched that ships were attracted by the waves which surrounded this tree, and there retained, the mariners falling a prey to this savage bird, so that the inhabitants of the Indian Archipelago always carefully avoided that spot.

With such, and many even more strange ideas respecting

its place of growth and history, it is not wonderful that this nut should have been highly prized: in the Maldivian Islands, it was death to any man to possess it; all nuts that were found became the immediate property of the King, who sold them at a very high price, or offered them as the most precious of regal gifts. Their value was estimated at from 60 to 120 crowns; but those which measured as much in breadth as in length were the most esteemed; and those which attained a foot in diameter were sold for 150 crowns; nay, some kings have been so greedy of obtaining these fruits as to have given a loaded ship for a single one.

The Chinese as well as the natives of the Archipelago are justly thought by Rumphius to have set perhaps too high a value upon their medicinal properties, in considering them an antidote to all poisons. The principal virtue resided in the albumen which lines the nut, and which is so hard as to be preserved for a length of time after the embryo is destroyed. This substance was triturated with water in vessels of porphyry, and, mingled with black and white or red coral, ebony, and stags' horns, was drunk. The Double Cocoa-nut was also thought serviceable in all inflammations of the body; as a preservative against colic, apoplexy, epilepsy, paralysis, *et id genus omne*.



J.C. Presl del.

Vincent Brooks Imp.

Oreodoxa cleracea, Mart

The great men formed of the shell, which possessed fewer medicinal properties, precious vessels, cutting off a transverse slice, which constituted the lid; and in these they put their tobacco, betel, lime, and whatever else they masticated, believing that then these articles could never be contaminated by anything noxious. Water kept in it was considered to preserve those who drank of it from every complaint. The discovery of the Seychelles Islands, and the knowledge thence derived, that these nuts grew upon trees, as other Cocoa-nuts, soon reduced their value; and now probably, by the East Indians as by the Europeans, they are only sought as a matter of curiosity, or for domestic purposes.

The Seychelles, or Mahé Islands, as they are sometimes called, lie to the north-east of Madagascar, in about 5° S. latitude, and 55° E. longitude. It is in this group only that the Palm is found, and among them, on no others than the Isles of Praslin and Curieuse, and Round Island. These are within half a mile of each other, and are mountainous and rocky.*

* Mr. R. W. Plant, well known as an ardent explorer of Port Natal, has the following remark about the native country of the Double Cocoa-nut, in a letter, dated Port Natal, April 16, 1855, and addressed to Mr. John Smith, at Kew:—"In the Seychelles I more nearly realized my preconceived ideas of tropical vegetation than at any other place;—the beach fringed with

The crown of the trunk, *i.e.* the heart of the leaves, is eaten like that of the American Cabbage Palm (*Oreodoxa oleracea*), and often preserved in vinegar; but it is less delicate, and slightly bitter. The trunk itself, after being split and cleared of its soft and fibrous parts within, serves to make water-troughs, as well as palisades for surrounding houses and gardens. The foliage is employed to thatch the roofs of houses and sheds, and even for walls. With a hundred leaves a commodious dwelling may be constructed, including even the partitions of the apartments, the doors and windows. In the Isle of Praslin most of the cabins and warehouses are thus made. The down, attached to the young

common Cocoa-nuts; the ravines and watercourses overhung with Bananas, Bamboos, and three or four indigenous Palms; the open ground full of Pine-apples—miles of them run wild; the tops of the mountains covered with forests of Ebony and Rosewood, interspersed with Tree-Ferns of some twenty to thirty feet high; and then these glorious *Lodoiceæ*, with their leaves of fifteen to twenty feet span, and trunks reaching to the sky; to say nothing of groves of Cinnamon and Cloves and Bread-fruit, all new to me in this their natural wildness and beauty: you may believe that I enjoyed it; so much so that I nearly forgot the errand that brought me there. We have many beautiful scenes in this country (Natal), and there is much excitement in travelling over it, but it is altogether of a different character; a savage sternness or monotonous sameness marks the two principal divisions of it, and the really beautiful spots look small by comparison with the vast extent s;read around of another character.”

leaves, serves for filling mattresses and pillows ; the ribs of the leaves and fibres of the petiole constitute baskets and brooms, the young foliage affords an excellent material for hats ; for this purpose, the unexpanded leaves only are taken, dried in the sun, and cut into longitudinal strips, two or three lines in breadth, which are then plaited ; and scarcely any other covering for the head is worn by the natives of the Seychelles. Of the nut are made vessels of different forms and uses. When preserved whole, and perforated in one or two places, the shell serves to carry water, and two of them are suspended from opposite ends of a stick. Some of these nuts hold six or eight pints. If divided in two between the lobes, each portion serves, according to its size and shape, for plates and dishes, or drinking-cups, these being valuable from their great strength and durability ; so that this kind of utensil in the Seychelles Islands bears the name of *Faisselle de l'Isle Praslin*. And such is the estimation in which these nuts are held by the Negroes and poor people of other islands, that the sailors always try to make them part of the cargo of their vessels. Amongst other articles, shaving-dishes, black, beautifully polished, carved, and set in silver, are made from them.

The *Lodoicea* attains a height of eighty or ninety feet,

and is surmounted by a beautiful crown of winged and palmated leaves. The diameter of the trunk varies from twelve to fifteen inches, and the whole is so flexible that the tops of those trees which stand in each other's vicinity strike against and chafe each other in a strong breeze, making an extraordinary noise. The leaves open like a fan; they are of large size, often attaining a length of twenty feet, with a breadth of ten or twelve, and in some few cases thirty feet in length, including the petiole, which is of sufficient strength to support the weight of a man. The flowers are diœcious, the male ones having from twenty-four to thirty-six stamens. The fruit is a drupe, of an olive-green colour, and generally double, sometimes triple, and even quadruple, and frequently attains a length of eighteen inches, with a circumference of three feet, and sometimes weighs from forty to fifty pounds. It is in fact the largest fruit which any tree produces! The immature fruit, called by the colonists "coco tendre," is easily cut with a knife, and then affords a sweet and melting aliment, of an agreeable taste. When the fruit is ripe, it drops on the ground, and is no longer fit for food; in a few months, if not buried in the earth or exposed to the rays of the sun, the fallen nut begins to germinate, and a new plant is formed.

A remarkable circumstance connected with this tree is the length of time necessary to mature its fruit, and the long duration of its bloom. It bears only one spadix in each year, and yet has often above ten in bloom at once ; it has flowers and fruits of all ages at one time. The tree grows on all kinds of soil, from the sandy shore to the arid mountain-top, but the finest are found in deep gorges, on damp platforms, covered with vegetable soil ; in such situations, the great height and slender diameter of the trunk, and the length of its enormous leaves, produce a fine effect ; though, near the sea-shore, its leaves, torn by the storms and hanging in long strips, give it a desolate appearance. It is to be regretted that the tree is not cultivated, and that a practice has prevailed of cutting it down in order to get at the fruit and tender leaves. In fact, it is feared that the species will be, ere long, entirely lost.

After many unsuccessful attempts to introduce this Palm into our conservatories, one has at last met with complete success, and the plant is now to be seen in the Royal Gardens at Kew. Germinating nuts were disposed of in 1854 at public sales in London for £10 apiece, but all of them have since died.

Genus XXXVIII. MALORTIEA, *Hrm. Wendl.*

This genus, which was named in honour of M. de Malortie, the Director of the Royal Gardens at Hanover, was brought into notice in 1853 by Hermann Wendland, who received it from Guatemala, where it grows in the forests, and performs, like *Chamædorea* and *Geonoma*, the office of underwood. It is composed of two species, *M. gracilis*, *Hrm. Wendl.* (*Chamædorea*, *Chamærops*, and *Geonoma fenestrata* of gardens), and *M. latisecta*, *Hrm. Wendl.*, only the former of which is as yet to be met with in our conservatories. The Malortieas are related to the genera *Oreodoxa*, *Enocarpus*, *Manicaria*, *Reinhardtia*, *Areca*, etc., from all of which they differ in various important technical characters. They are small, reed-like Palms, covered with short, deciduous scales; the leaves are terminal, pinnatisect, but their segments are rather irregular, and very often more or less grown together; the flowers are monœcious, and appear in simply-branched racemes below the leaves; the berries are one-seeded, somewhat egg-shaped, and of a more or less dark green colour. Nothing whatever is known of their useful properties.

Genus XXXIX. MANICARIA, *Gartner.*

Manicaria saccifera, Gærtn., the unique and handsome Palm representing this genus, has a trunk from ten to fifteen feet high, curved or crooked, and deeply ringed. The leaves are very large, entire, rigid and furrowed, and have a serrated margin; they are often thirty feet long and four or five wide, and split irregularly with age. The petioles are slender, with a broadly-expanded, fibrous-edged sheath at the base; these sheaths are persistent, and often cover the stem down to the ground. The spadices are numerous, growing from among the leaves, and are simply branched and drooping. The fruit is of an olive colour, somewhat three-lobed, and with a rugose or papillose exterior covering. The spathe is fusiform and entire, of a fibrous, cloth-like texture, and of a brown colour. As the spadix expands it breaks open irregularly; but in some cases a dead, unopened flower-bunch is found enclosed in an entire, half-rotten spathe, as if the vital powers of the plant had not been sufficient to tear asunder the tough, fibrous sheath. The "Bussú," as the Brazilians term this Palm, produces the largest entire leaves of any known Palm, and for this reason, as well as on account of their firm and rigid texture, they form the very

best and most durable thatch. The leaves are split down the midrib, and the halves laid obliquely on the rafters, so that the furrows formed by the veins lie in a nearly vertical direction, and serve as so many little gutters to carry off the water more rapidly. A well-made thatch of "Bussú" will last ten or twelve years, and an Indian will often take a week's voyage in order to get a canoe-load of the leaves to cover his hut. The spathe too is much valued, furnishing an excellent and durable cloth. Taken off entire it forms bags—hence the specific name of this Palm—in which the Indian keeps the red paint for his toilet or the silk-cotton for his arrows, or he even stretches out the larger ones to make himself a cap—cunningly woven by nature without seam or join. When cut open longitudinally and pressed flat, it is used to preserve his delicate feather ornaments and gala-dresses, which are kept in a chest of plaited Palm-leaves between layers of the smooth "Bussú" cloth. This species inhabits the tidal swamps of the Lower Amazon, and is also met with on the western coast of America. A Palm called "Bussú" is also found on the Rio Negro and Upper Amazon, but it is of a smaller size, and is probably a distinct species.

Genus XL. MARTINEZIA, *Ruiz et Pavon.*

Martinezia is closely allied in its technical characters to *Guilielma* and *Acrocomia*, but differs considerably from those genera in habit. The trunk is seldom more than eighteen feet high, clad with spines, and bears at its extremity a few leaves, with spiny petioles and midribs, and cuneiform segments, eroded at the edge, resembling those of *Caryota* and *Wallichia* of Tropical Asia. The flowers are monœcious, and the fruit, a round, one-seeded drupe, is about half an inch in diameter, and of a reddish-yellow colour. All *Martinezias* inhabit tropical parts of South America. *M. caryotæfolia*, Humboldt et Kunth, occurs in the mountains of Quindiu, on the banks of the Orinoco, the Cassiquiare, and the Atabapo; it is cultivated in the gardens of Ibague and Cartago, near Popayan, and has also been for some years an inmate of our conservatories, where several of its congeners, *M. Aiphanes*, Mart., (*M. aculeata*, Kl.), and the doubtful *M. ? globosa*, Hort. (*Acrocomia globosa*, Hort.), and *M. ? truncata ?* Brongn., are likewise to be met with.

Genus XLI. MAURITIA, *Linnaeus*.

Sir Walter Raleigh states, in his description of Guiana, that on his second voyage, in 1595, when in the mouth of the Orinoco, "he saw the fire of the Tivitites and Quarawetes" (as he terms the Guaranés Indians), "high up in the trees," and published a drawing of the fire in the Latin edition of his work. Father José Gumilla, who twice visited the Guaranés as a missionary, says indeed that that tribe has its dwellings in the *Palmares* (or Palm-groves) of the morasses; but while he speaks more definitely of pendent habitations supported by high pillars, makes no mention of platforms attached to still growing trees. Hillhouse and Sir R. Schomburgk are of opinion that Bembo, through the relations of others, and Raleigh by his own observation, were deceived into this belief in consequence of the high tops of the Palm-trees being lighted up in such a manner by the fires below them, that those sailing by thought the habitations of the Guaranés were attached to the trees themselves. "We do not deny," says Schomburgk, "that in order to escape the attacks of the mosquitos the Indian sometimes suspends his hammock from the tops of trees,

but on such occasions no fires are made under the hammock."

Raleigh was the first who brought to England the fruit of the Palm-trees in question, which he very justly, and on account of their scales, compared to fir-cones; and Linnæus was the first who described the trees systematically under the name of *Mauritia flexuosa*; but the materials at his disposal were so imperfect that he erroneously considered them to be devoid of leaves. Since the time of Linnæus several congeners of this *Mauritia* have been discovered, and more ample materials have been collected, so that the genus is at present well known. It belongs to the *Lepidocaryæ*, the same tribe as the Rattans do, and has a tall trunk, which is either smooth or armed with spines. The leaves are fan-shaped, and terminal. The flowers are axillary, and monœcious; the fruit is an oval-shaped or globular drupe, covered with rather small, imbricated scales. At present we know about half-a-dozen species, all of which are confined to the hottest parts of the South American continent and the adjacent islands; only one of them, *Mauritia flexuosa*, Linn., has been introduced into our gardens.

The latter is one of the most noble of all the American

Palms. It grows to a height of eighty to a hundred feet, and is found in the island of Trinidad, on the banks of the Amazon, Rio Negro, and Orinoco, under the names of *Miriti*, *Moriche*, *Murichi*, and *Ita*. "It forms," says Humboldt, "in moist places, fine groups of a fresh and shining verdure, reminding one of our Alders. . . . The trees preserve the moisture of the ground by their shade, and hence the Indians believe that the *Mauritia flexuosa* draws water around its roots by some mysterious attraction. In conformity with an analogous theory, they advise that snakes should not be killed, because the destruction of those animals is followed by the drying-up of the lagoons. Thus the rude children of Nature confound cause and effect!"

"*Mauritia flexuosa*," according to Wallace, "is a social Palm, covering large tracts of tide-flooded lands on the Lower Amazon. In those places there is no underwood to break the view among interminable ranges of huge columnar trunks, rising unbroken by branch or leaf to the height of eighty or one hundred feet, a vast natural temple which does not yield in grandeur and sublimity to those of classical antiquity. Of the age of these trees we have no knowledge, but it is remarkable how uniform they appear in size, there often being not a single young tree over a considerable

extent of ground, particularly in places now flooded daily by the tide. One would therefore imagine that the present trees sprang up when the ground was more elevated than at present, and that it has since gradually sunk (or the waters risen) till the conditions have become unfavourable to the growth of young plants, though not hurtful to those which had already attained a certain age. Whether such is the true explanation of the phenomenon can only be decided by continued observation on the spot."

"In the tidal districts of Pará (Brazil)," continues the same traveller, "the massive trunks of these trees are often used to form a raised pathway across the expanse of soft mud, generally left at low water between 'terra firma' and the water's edge. A smooth and slippery cylinder is certainly not the best thing that could be devised for this purpose, but as it is the most easily procured and the least expensive, it is proportionally common; and on paying a visit to many a Brazilian country-house, should you arrive at ebb-tide, you will have no other means of getting ashore than that afforded by these trunks."

The medullary portion of the trunk contains a sago-like flour, which bears the name of *Ipuruma*. "I have eaten it," says Humboldt, "at the town of St. Thomas, in

Guiana, and it was very agreeable to the taste, resembling rather cassava bread than the sago of India. The Indians assured me that the trunks of the *Mauritia*, the *tree of life*, so much vaunted by Father Gumilla, do not yield meal in any abundance, unless the male tree is cut down just before the flowers appear. Thus, too, the *Maguey* (*Agave Americana*), cultivated in Mexico, furnishes a saccharine liquor, the wine (*pulque*) of the Mexicans, only at the period when the plant shoots forth its long panicle. By interrupting the blossoming, nature is obliged to carry elsewhere the saccharine or amylaceous matter, which would accumulate in the flowers of the *Maguey* and in the fruit of the *Mauritia*."

An entire leaf of this tree is a load for a man. The unopened leaves form a thick, pointed column. "This is cut down," says Wallace, "and by a little shaking the tender segments fall apart; each one is then skilfully stripped of its outer covering, a thin, ribbon-like pellicle, of a pale yellow colour, which shrivels up almost into a thread; these are then tied in bundles and dried, and are afterwards twisted, by rolling on the breast or thigh, into string, or with the fingers into thicker cords. The article most commonly made from it is the 'réde,' or netted hammock, the



11. *Thrinax* *delavayi*

12. *Thrinax* *delavayi*

Orontocarya oleracea, *Hart* & *Thrinax multiflora*, *Corr*

almost universal bed of the native tribes of the Amazon. This is formed by doubling the string over two rods or poles, about six or seven feet apart, till there are forty or fifty parallel threads, which are then secured at intervals of about a foot by cross strings, twisted and tied on to every longitudinal one; a strong cord is then passed through the loop formed by all the strings brought together at each end, by which the hammock is hung up a few feet from the ground, and in this open net the naked Indian sleeps beside his fire as comfortably as we do in our beds of down. Other tribes twist the strings together in a complicated manner, so that the hammock is more elastic; and the Brazilians have introduced a variety of improvements, by using a kind of knitting-needles, producing a closer web; or by a large wooden frame with rollers, in which they weave in a rude manner with a woof and weft, as in a regular loom; they also dye the string of many brilliant colours, which they work in symmetrical patterns, making the 'rédes' or 'maqueiras,' as they are called, among the gayest articles of furniture to be seen in a Brazilian house on the Amazon." Spruce says, in a note accompanying a specimen of these hammocks made at Tomo, on the Guainia of the Upper Rio Negro, and sent to the Museum of Economic Botany

at Kew, that the body of the specimen was made from the leaves of *Astrocaryum vulgare*, termed *Tucum* in Brazil, *Cumari* in Venezuela; and the borders from those of the *Mauritia flexuosa*, the *Muriti* of Brazil, and the *Morichi* of Venezuela. It is not unlikely that in every district different materials are used.

The sap of the tree, when fermented, constitutes the sweet inebriating Palm-wine of the Guaranés. The narrow-scaled fruit, which resembles reddish pine-cones, yields, like the Banana, and almost all tropical fruits, different articles of food, according to the periods at which it is gathered, whether its saccharine properties are fully matured, or whether it is still in a farinaceous condition. On the Amazon a favourite Indian beverage is produced from it. A quantity of it is soaked in water until it begins to ferment, and the scales and pulpy matter soften, and can be easily rubbed off. When strained through a sieve, the liquor is ready for use, and has a slight acid taste and a flavour peculiar to the fruit, and at first rather disagreeable to the European palate.

“When the Tamanacs,” says Humboldt, in his Travels, “are asked how the human race survived this great deluge, the ‘age of water’ of the Mexicans, they say, ‘a man and

a woman saved themselves on a high mountain, called Tamanca, situated on the banks of the Asiveru; and casting behind them, over their heads, the fruits of the *Mauritia* Palm, they saw the seeds contained in those fruits produce men and women, who re-peopled the earth.' Thus we find, in all its simplicity, among nations now in a savage state, a tradition which the Greeks embellished with all the charms of imagination!"

Similar to the last species is *Mauritia vinifera*, Mart., also a native of Brazil. "In a marshy place near the head of the valley of Brejo Grande, we passed," says Gardner, in his Travels, "a large group of a beautiful Palm, which I had met with in only a few instances below Crato, but which I afterwards saw in the greatest abundance in the swamps of Piahy and Goyaz; it is called *Buriti* by the inhabitants, and is the *Mauritia vinifera* of Martius. This Palm is not only the most beautiful, but one of the loftiest in the country [it is stated to be from 100 to 150 feet high, *B. S.*]; the leaves are fan-shaped, and form a large round ball at the top of the stem, after the manner of the *Carnaüba* (*Copernicia cerifera*, Mart.). It produces a great number of nuts, about the size of a small egg, covered with rhomboidal scales, arranged in a spiral manner; between these scales

and the albuminous substance of the nut, there exists an oily pulp of a reddish colour, which the inhabitants of Crato boil with sugar, and make into a sweetmeat; in Piauhy they prepare from this pulp an emulsion, which when sweetened with sugar forms a very palatable beverage, but if much used is said to tinge the skin of a yellowish colour. The juice of the trunk also forms a very agreeable drink, but to obtain it the tree must be cut down, when several holes about six inches square, three deep, and about six feet apart, have to be cut in the trunk with a small axe, which in a short time become filled with a reddish-coloured liquid, having much the flavour of sweet wine. During my travels in Piauhy, we used occasionally to cut down these Palms in order to obtain the juice."

According to a note by Spruce, an inferior wine is also made from the fruit of the *Mauritia vinifera*, Mart. The trunks, which rarely reach thirty feet in height, are employed for the same purposes as those of most other species; on the Rio Negro they are much used in the construction of houses; strips cut from their circumference being fastened crosswise to the upright poles, and the intervals then filled with mud.

Genus XLII. MAXIMILIANA, *Martius*.

“Nature has lavished every beauty of form on the Jagua Palm, which, intermingled with the Cucurito or Vadgihai (eighty-five to one hundred and six feet high), adorns the cataracts of Atures and Maypures, and is occasionally found on the lonely banks of the Cassiquiare. Its smooth, slender trunks, rising to between sixty-four and seventy-five feet, appear above the dense mass of foliage of other kinds of trees, from amidst which they spring like raised colonnades, their airy summits contrasting beautifully with the thickly-leaved species of *Ceiba*, and with the forests of *Laurineæ*, *Calophyllum*, and different species of *Amyris*, which surround them. Its leaves,—few in number, scarcely so many as seven or eight,—rise almost vertically into the air; their extremities are curled like plumes, the ultimate divisions having only a thin, grass-like parenchyma, flutter lightly and airily round the slowly-balancing midrib of the leaves.”

Thus wrote Humboldt, in March, 1801, when sailing from the palmy shores of the mouth of the Rio Sinu, west of Darien, to Cartagena de Indias. Strange to add, nothing was ever heard of the Palma Jagua, and botanists were not able even to guess the genus to which it belonged,

until fifty-three years afterwards, again in the month of March, Richard Spruce, during his stay at San Carlos del Rio Negro, in Venezuela, communicated in his sketch of the vegetation of the Cassiquiare (Hook. Journ. of Bot. and Kew Misc. vol. vii. p. 1 *et seq.*) another piece of information, which established the systematic position of this Palm, and added besides several important data concerning its habit, to those already recorded by Humboldt. He says, "I gathered all I could on the banks of the Orinoco, including the Palma Jagua, the beauties of which are so justly eulogized by Humboldt in his 'Aspects of Nature;' and I brought away specimens, and notes on the living plant. There are two splendid trees of it in the mouth of the Cassiquiare. I had one of them cut down, and a leaf and a spadix embarked in the *piragoa*, where I could examine them at my ease and also continue my voyage. The leaf measured thirty-four feet in length, and possessed 426 segments. The spadix bore about a thousand fruits, and was a load for two men. Several spadices are matured simultaneously. These statements will alone suffice to give an idea of the magnificent aspect of the Palma Jagua, which is one of the chief ornaments of the Upper Cassiquiare and Orinoco, and is an undescribed species of *Maximiliana*."

The genus *Maximiliana* has received through this rediscovery an important addition, and now boasts of three species, all of which are natives of the forests of the north-eastern parts of South America; they have an arboreous, smooth trunk, terminal pinnatisect leaves of gigantic dimensions, and with linear, aggregated segments of a lively green colour; their spathes are large and woody; their flowers furnished with bracts, monœcious; and their fruit ovate, one-seeded, and of a brownish colour. They are all very noble trees; for the two older species (*M. regia*, Mart., and *M. insignis*, Mart.), though they may not surpass in beauty the one rediscovered by Spruce, are by no means much inferior to it. We have them both in our gardens, where, although they have only been introduced during the last ten years, they already begin to display enough charms to make even those who have not seen them in their native country bear testimony to their excellence.

Maximiliana regia, Mart., which in Pará and other parts of New Brazil is called "Inaja," is described by Martius as growing to the height of from fifteen to twenty feet; but from other authorities we learn that it sometimes attains to the height of one hundred feet, and has leaves exceeding fifty feet in length. The terminal leaf-bud furnishes a most

delicious cabbage; the spathe forms a ready-made basket, used by the Indians for carrying earth, clay, farinha, etc., and by the hunters to cook meat, as, with water in it, it stands the fire well. The fruit is eaten by the Indians, and proves particularly attractive to monkeys and fruit-eating birds; it is also burned by the *seringueiros* (India-rubber makers) for smoking and drying the successive layers of the milk of the Seringue, which they apply to their clay moulds.

Genus XLIII. METROXYLON, *König*.

Sago, that palmaceous starch so largely imported into our northern countries as a delicacy, and so extensively consumed in southern regions as a common article of food (*sago*, in the language of the Papua Indians, signifying bread), is the produce of two species of *Metroxylon*, *M. Rumphii*, Mart., and *M. leve*, Mart., which, in common with their congeners, present the following characteristics:—Their trunk is large, and often tall, surmounted by a crown of pinnatisect leaves, the sheath and petiole of which are often armed with straight spines; their flowers are hermaphrodite, somewhat red, and arranged in spikes; they are besides ter-

minal, and hence the trees flower only once during their term of existence. Their fruit is dry and scaly, resembling pine-cone, and having a beautiful polish. All the species inhabit the islands of the Indian Archipelago, where they form extensive forests almost exclusively composed of their own kind.

The best sago is obtained from *Metroxylon Rumphii*, Mart. (*Sagus Rumphii*, Willd.), and particularly from *M. leve*, Mart. (*Sagus leveis*, Rumph.), which both grow in marshy spots. In order to procure it the trunk is split into logs a few feet in length, their soft interior extracted, pounded, and thrown into water; the water is then drained off from the pulpy mass, when the starch comes away with it, and upon being allowed to settle is afterwards prepared and purified by successive washings. It is calculated that a tree fifteen years of age will yield from six to eight hundred pounds of this nutritious matter. The sago-meal, as it is called, is the form in which this starch is procured, although it is not commonly imported to Europe in this state. The usual form in which it is to be met with is the common article called Pearl Sago.

“Singapore,” says Bennett, “is the principal, if not the only place in the East Indies, where the refining or manu-

facturing of the Pearl Sago is carried on; the process is said to be the invention of the Chinese. According to Crawford, it was first practised in Malacca, and was only introduced into Singapore in 1284. I availed myself of the establishment of many of the manufactories of this article in and about the settlement to visit one, in which I found a number of Chinese, all of whom were busily occupied in different stages of the operation. The Sago, or Sagu, is imported in large quantities into Singapore from Sumatra in native boats, which bring it at all seasons of the year; and a few days since eighteen proas of different sizes arrived in the creek laden with this article alone in its raw state. The tree from which the raw material is produced is named *Rumbiya* by the Malays, and has been too often described to render an account necessary here.*

“The raw Sago is imported in cone-shaped packages, each probably weighing about twenty pounds;† the mass is of rather soft consistence, and of a dirty white colour, occa-

* There is a very coarse granulated sago, in large grains and of a dirty greyish colour, which is imported by the native boats from Borneo, and is used at this settlement during a scarcity of rice by the poorer class of people.

† In the list of imports published in the ‘Singapore Chronicle’ the raw sago is usually designated as “sago tamping” (tamping signifying a package,

sioned by being mingled with several impurities, and the whole is enveloped in the leaves of the *Pandanus* tree. It first undergoes several different washings in large wooden tubs, being also strained, after washing, through cloth strainers. When the raw material has undergone sufficient ablutions, the masses which remain at the bottom of the vessels are collected, broken into pieces, and placed upon platforms in the sun to dry, being broken into still smaller pieces as the drying proceeds.

“As soon as the pieces are sufficiently, although still not always thoroughly, dry, they are pounded and sifted upon long benches through sieves made of the midrib of the leaves of the Cocoa-nut Palm, and placed at certain distances in a longitudinal direction, so as to cause the pulverized, or rather broken, masses of sago to pass through it of only the required size. Having been passed through the sieve, a certain quantity at a time is taken, placed in a large cloth, tied to cross sticks, in the form of a bag, hang-

from the raw sago being always imported wrapped in the leaves of the *Pandanus*-tree). It is imported into Singapore by fleets of ten boats, or even more, having to the amount of twenty thousand tappings or packages on board: the packages vary in weight, some weighing more and some less to the picul.

ing by a cord from the roof of the building ; a Chinese is then employed in shaking the bag backwards and forwards by aid of one of the longest crossed sticks to which it is attached, occasionally shaking up the sago-powder ; this is continued constantly for about the space of ten minutes, when it is turned out granulated. It is then placed in small wooden hand-tubs, looking beautifully and delicately white, but still so soft as to break instantly with the slightest pressure under the fingers, and is carried to several Chinese, whose occupation is to make it undergo the drying process in large iron pans over a fire. They are constantly stirring it about when in the iron pan with a wooden instrument ; it is then resifted at another bench and rebaked, after which it is considered prepared. It is then of a fine pure white colour, and, being spread thinly over a long and large bin, in course of time it becomes both harder and of a darker colour.

“ At this establishment there appeared to be about fifteen or sixteen Chinese employed, and they said six or seven piculs could be manufactured in one day. The pearl or refined sago is imported in large quantities to Europe, our Indian Empire, the Cape, etc., in wooden boxes, each containing rather more than a picul, ten boxes containing

nearly fifteen piculs. It is sold at two and a half and three dollars the picul, which includes the expense of boxes. A piggery is attached to this sago establishment, the inhabitants of which must fare very well upon the refuse of the sago-washings.

“ The time for collecting the sago is just before the tree begins to show its large, spreading, terminal flower-spike, which it generally does at seven or eight years old. While young, the trunk is admirably protected by its long and stout spines from the wild hogs, which would otherwise destroy it. As it grows and the trunk hardens, the spines drop off, and the central farina is enclosed in the outer wood. When the flower and fruit are allowed to perfect themselves, which is in two years from the first appearance of inflorescence, the pith of the centre is found dried up, the leaves have fallen, and the plant perishes. The Sago Palm is seldom propagated from seed, which is generally unproductive, but it may be raised in any quantity by offsets, which are freely produced.”

In comparison with *Metroxylon Rumphii* and *M. leve*, the other species of this genus, including *M. ? elatum*, Mart. (*Sagus elata*, Reinw.), figured in our Plate, may be said to be of little value, except *M. filare*, Mart., which produces a

useful fibre. *M. lare*, Mart., is already an inmate of our gardens. All the other species are still desiderata.

Genus XLIV. MORENIA, *Ruiz et Pavon*.

The genus *Morenia* is confined to the mountains of Peru, allied to *Hyophorbe* and *Kunthia*, and composed of two species (*Morenia fragrans*, Ruiz et Pav., and *M. Pæppigiana*, Mart.), both of which have a thin, unarmed, reed-like trunk, terminal pinnatisect leaves, diœcious, white or yellow flowers (in one species fragrant), and a one-seeded berry. Nothing is known of their useful properties, nor have they as yet been introduced into our conservatories; the *Morenia corallcarpa*, Hort., being probably a species of some other genus.

Genus XLV. NIPA, *Thunberg*.

Thousands and thousands of acres of the salt marshes of the islands and coasts of the Indian Ocean may be seen covered with *Nipa fruticans*, Thunb., a low, stemless plant,

which partakes so much of the habit of a Palm that it is generally considered as such by all those who do not trouble themselves much about the technical characters which it ought to possess, to be admitted a true member of the order of Palms. The position thus assigned to it may be quite near enough for all popular purposes; but science, not content with such a superficial decision, has been obliged to look more closely into the relationship of this plant, without however being able to find out more than that it is a staunch ally of the Palms, and shows indisputable and strong connections with the *Pandaneæ*, or Screw-pines. It is therefore a plant of the greatest interest to the botanist, and also, it may be added, to the geologist, as has been justly remarked by Bowerbank, Lyell, and J. D. Hooker, arising from the fact that nuts of a similar plant abound in the tertiary formations at the mouth of the Thames, where they once floated about in as great a profusion as those of the *Nipa fruticans* do at the present day in the rivers of the Indian Ocean, until they became buried in the silt and mud which now forms the island of Sheppey.

Nipa fruticans, Thunb. (*N. littoralis*, Blanco, *Cocos Nypa*, Lour., see Plate IV.), is a stemless plant, with pinnatisect, unarmed leaves, often more than twenty feet long. The

flowers are monœcious, axillary, and enclosed in a spathe like those of tree-palms; the fruit is a one-seeded drupe, aggregated in heads as large as that of a man. The seeds have often been sent to Europe, and have even germinated, but they soon died, so that the plant is still a desideratum in our gardens.

Nipa fruticans, termed Nipa and Sasa in the Philippine Islands, possesses various useful properties. The leaves are used for thatch; when burnt, they yield a supply of salt; "pounded, they are applied with advantage to the bites inflicted by centipedes, and a decoction of them produces an excellent effect on wounds."* From the spathe toddy is extracted, convertible into syrup, sugar, vinegar, yeast, and a strong spirit. "This spirit," says M. Blanco, "preserves, I am told, the sight, if the eyes are washed with it in the mornings: it also imparts an agreeable odour to tobacco and snuff. The inside of the fruit is edible, like that of the Cocoa-nut."

Genus XLVI. GENOCARPUS, *Martius*.

It has been observed, first by Robert Brown and after

* M. Blanco, Fl. de Filipinas, p. 662.



J.C. Frank del et lith.

Vincenz. Broeze Inv.

Phoenix dactylifera, Linn.

wards by other botanists of eminence, that all Palms belonging to that tribe of Palms called *Coccoinea*,—characterized by the originally trilocular *putamen* having its cells when fertile perforated opposite the seat of the embryo, and when abortive indicated by *foramina cæca*,—bear a fruit affording oil. The genus *Ænocarpus*, one of that tribe, so far from forming an exception, tends but to confirm the soundness of the observation. Speaking of the oleiferous Palms of the Amazon district, Spruce remarks: “After the Caiaué (*Elæis melanococca*, Gærtn.), as to the quality of oil, come the various species of *Ænocarpus* (*Æ. Bacaba*, *Æ. Batava*, *Æ. disticha*, etc.). The oil of these is apparently of finer quality than that of the Caiaué: it is colourless and sweet-tasted, and not only excellent for lamps but for cooking. The shopkeepers of Pará buy these oils of the Indians, and mix them in equal proportions with olive-oil, retailing the whole as olive-oil, from which indeed even the best judges can scarcely distinguish it. I can bear testimony that for frying fish, oil of these different *Ænocarpi* is equal either to olive-oil or butter.

“The various species of *Ænocarpus* abound on the Amazon and Orinoco, and on their tributaries. I have seen the Patawa (*Ænocarpus Batava*, Mart.) in the greatest plenty

throughout the Cassiquiare, Alto-Orinoco, and Cunucunuma; near the Barra it is frequent, but less so than the *Bacaba*. The forests opposite San Carlos, extending from the Rio Negro to the Xié, are literally sown with Patawa. The fruit is in season nearly all the year round. We are just now (March 19, 1854) beginning to make use of it, and we shall have it (in unlimited quantity if there were always Indians to climb the trees) all through November. I am passionately fond of Patawa-yukissé, and it is the only thing I shall regret when I leave San Carlos. When I have passed a long time without drinking it and recommence, I always find it slightly aperient, but this effect passes off in two or three days. *Yukissé*, it should be added, is the general name which the Indians of the Rio Negro district give to all sorts of vegetable juices, and also to the gravy of animal substances. It is obtained by triturating the fruit of the Assai (*Euterpe oleracea*) and other Palms in water, and adding a small quantity of sugar and farinha. The Portuguese-speaking Brazilians term these drinks *vinho*, though they are totally different from the Palm-wine prepared in other parts of Tropical America and Asia. All the Palm-drinks are exceedingly nutritious, and several slightly purgative, owing, no doubt,

to the oil they contain. By allowing the "yukissé" to stand a short time in a *caya*, the oil rises to the top, and an idea is obtained of the quantity yielded by any particular palm-fruit."*

The genus *Ænocarpus* is composed of about half-a-dozen species,† all of which inhabit Tropical America, where they prefer dry elevated lands, none being known to extend more than 1600 feet above the level of the sea. They are tall, majestic trees, with large smooth trunks, generally distinctly ringed; the leaves are terminal, pinnatisect, with linear segments; the spadices spring from beneath the leaves, and are simply branched; the spathe is large, fusi-form, and woody, and falls off as soon as the spadix escapes from it; the flowers are monœcious, and the fruit is nearly globular, one-seeded, with an edible covering.

Besides the oil and "yukissé" which all the species afford, they are also used for various other purposes. Their leaves serve as thatch, and from the nerves of the decayed

* Spruce in Hook. Journ., vol. vi. p. 334.

† Herm. Wendland enumerates the following species as cultivated in our gardens:—*Æ. altissimus*, Klotzsch; *Æ. Bacaba*, Mart.; *Æ. Bolivianus*, Hort.; *Æ. Caracasanus*, Lodd. (*Diplotherium caudescens*, Hort. Kew.); *Æ. Chiragua*, Hort.; *Æ. Cubarro*, Hort.; and *Æ. utilis*, Klotzsch.

petioles the Indians make arrows for their blow-pipes (*gravatanas*), as has already been mentioned when describing the latter (p. 221).

Genus XLVII. ONCOSPHERMA, *Blume*.

In humid places and in thick forests of the Indian Archipelago grow two Palms, with lofty, spiny trunks, terminal pinnatisect leaves, from ten to sixteen feet long, monœcious flowers, appearing below the commencement of the foliage, and small, round, one-seeded berries, which are the only species, as yet, representing the genus *Oncosperma*. The one, *O. horrida*, Seem. (*Areca horrida*, Griffith), the *Bhyass* of the Malays, is confined to Malacca, where it is commonly met with in densely wooded valleys and ravines at Ching, and rarely on wooded hills at Lagdang Soobubi; it is also found in forests at the base of Battoo Bakar: nothing is known of its uses. The other, *O. filamentosa*, Bl. (*Areca tigillaria*, Jack., *A. Nibung*, Mart.), the Nibung or Nibong of the Malays, is an inmate of European gardens. It is diffused over most of the islands of the Indian Archipelago, and is very generally to be met with on the borders of paddy (rice) swamps. Low, in his 'Borneo,' has given

an interesting account of its uses, which may find a place here. "Of all the excellent vegetables of Borneo," he says, "the heart or cabbage of the Nibong is the most esteemed. It consists of the whole unexpanded foliage, and is delicately white, with a very sweet nutty flavour. It excels the cabbage of the Cocoa-nut Palm, but is inferior to the Pinang (*Areca Catechu*, Linn.), which however, on account of the value of the tree, is very seldom used, the extraction of this edible part invariably causing the destruction of the entire tree. The Nibongs are very plentiful near the mouths of all the rivers, and are prized also for house-building, etc. Their trunks being quite round, and generally measuring half a foot in diameter, little trouble is necessary, beyond felling the trees and cutting them into lengths. The outside of the trunk is hard; the inner portion being, as in all monocotyledons, the most recently formed, is soft, and readily decays, which causes the Nibong to be more used by the poor than the rich inhabitants. Posts formed of this tree last only three or four years, and then require either support or renewal. Rafters and flooring are made of the hardest parts. The laths for floors are laid at distances of two feet asunder, and bound together by rattans,—a plan adopted in order that the dirt and rubbish of the house

may fall through the interstices of the floor, and be washed away by the next high tide."

Genus XLVIII. OREODOXA, *Willdenow.*

Just as a man, when about to be introduced to another whose good opinion is not a matter of indifference to him, would put on the most suitable dress and assume the most proper look he can command, so the American Palms may be said to have been anxious to appear to the best advantage, when they were about to form the acquaintance of those Europeans who had the boldness and energy to seek a Western world. They placed on the very threshold of their native country several representatives, which in elegance and majesty of form are equalled by few, surpassed by scarcely any of the whole order of Palms. Even ere the anxious voyager has set his foot on shore, he has already perceived their graceful foliage fluttering in the breeze, and waving, as it were, a hearty welcome to the newly-arriving stranger. Since the time when Columbus first discovered the West Indian Isles to the present day, these Palms have been seen and admired by all who possess an eye for the

beautiful; and I shall never forget the delight experienced when in September, 1845, the steamer which had brought me from Europe approached at sunrise the island of Barbadoes, and allowed me to behold, for the first time, these noble representatives of a truly tropical vegetation.

Oreodoxa regia and *oleracea*—for these are the Palms here alluded to—are the most typical and best-known representatives of a genus of *Cocoinea*, distinguished by its lofty unarmed trunk, terminal pinnatisect leaves, monœcious yellowish flowers, and oval drupes. *Oreodoxa regia*, Humb. and Kunth (*Ænocarpus regius*, Sprengl.), the Palma real de la Havana, is one of the most common Palms in Cuba, where it is, as Eduard Otto informs us, frequently used for making avenues, a purpose to which it is admirably adapted. It has also been introduced, according to Carl Bolle (*Bonplandia*, vol. ii. p. 277), into Teneriffe. The great peculiarity of this tree is, that there rises upon the rough part of the trunk a grass-green, smooth, thinner shaft, like a column placed upon a column, and from this the leaf-stalks spring.

Oreodoxa oleracea, Mart. (*Areca oleracea*, Linn., *Euterpe Caribæa*, Sprengl.), the Cabbage Palm of the West Indies, is one of the loftiest of all Palms, its trunk attaining the

height of a hundred and seventy feet. As the lower leaves drop, the broad part of the footstalks forms a hollow trough or cradle for Negro children, and when cut up makes excellent splints for fractures; on the inside of every footstalk are tender pellicles, which when dried make a writing-paper; the heart is made into pickles, or when boiled is served up at table; the trunks serve as gutterings; the pith makes a sort of sago, and the nuts yield oil by decoction. The wood is very hard, but so thin that it is only fit for walking-sticks or gun ramrods. When the leaves are old they strip off, and the part that envelopes this green trunk appears woody like deal. When the leaves are stripped off green, the inside skin of each, if torn off and dried, looks like vellum: this bears ink very well on one side, on the other it seems greasy. From one trunk may be procured twenty large sheets.

Oreodoxa? Sancona, Humb. et Kunth (*Enocarpus Sancona*, Sprengl.), a native of the valley of the Cauca, in New Granada, is also a very lofty tree, yielding excellent timber. *Oreodoxa? acuminata*, Willd., produces a "cabbage." *O.? frigida*, Humb. et Kth., the *Palmito* of the mountains of Quindió, is remarkable on account of the high elevation above the sea at which it grows, being one of

the little group of alpine Palms quite unknown before the time of Humboldt and Bonpland's travels in Equinoctial America.*

Genus XLIX. PHŒNIX, *Linnaeus*.

That when Jesus Christ made his triumphal entry into Jerusalem some of the population spread, as a mark of homage, their garments on the ground to allow the procession to pass over, is a statement common to all the four Gospels, and St. Luke does not mention anything else as closely connected with that circumstance; but St. Matthew and St. Mark add that others of the multitude "cut down branches from the trees, and strewed them in the way;" and St. John, still more circumstantial in this instance, particularizes the branches as those of *Palms*. From the mere mention of the latter particular, it is of course impossible to decide, scientifically, what species of Palm is meant, but it has always been popularly supposed that the

* We cultivate in our gardens:—*Oreodoxa acuminata*, Willd.; *O. oleacea*, Mart. (*Areca oleracea*, L., *Euterpe Caribæa*, Sprengl.); *O. regia*, Kth.; and *O. ? Sancona*, Humb. et Kth.—*Wendland's Index*, p. 31.

Date-tree—*Phœnix dactylifera* of Linnæus—was the one implied, as it is one of those growing in Palestine; and moreover tradition in those countries professing the Roman Catholic form of Christianity has sanctioned this supposition, by prescribing that on the anniversary of the important event alluded to—Palm Sunday—the leaves of the Date-tree should be those used in religious ceremonies. Hence we find that in places situated so far north that the cultivation of the tree for the sake of its fruit is impossible, such as the Isles d'Hyères, San Remo, Nice, Genoa, etc., and more especially at Bordighiera, a small town on the Sardinian coast, in the territory of Genoa, it is still planted on account of its leaves, which constitute an important article of commerce, and are sold in the spring for Palm Sunday to the Christians, and in the autumn for Passover to the Jews. Several vessels quit Bordighiera with this singular freight, and some go so far as Holland, where a great quantity of it is bought by the Jews.

In places where these leaves are not to be procured, those of other plants are substituted. At Panama, for instance, I have seen the Palma real (*Attalea Cohune*, Mart.) supply its place. Sometimes however plants more humble have to be used:—

" In Rome, upon Palm Sunday,
 They bear true Palms ;
 The Cardinals bow reverently,
 And sing old psalms.
 Elsewhere those psalms are sung
 'Mid Olive branches ;
 The Holly branch supplies their place
 Among the avalanches ;
 More northern climes must be content
 With the sad Willow."—*Göthe*.

Having done duty for a Palm, these plants, as is often the case, have received, here and there, the popular title of Palm : thus, for example, does *Salix Caprea*, Linn., go by that name in Northern Germany, and in the counties bordering the Forest of Arden and various other parts of England, a fact not generally known to literary men.*

* " Look here," says Rosalind, in Shakspeare's 'As You Like It,' " what I found on a Palm-tree !" " A Palm-tree in the Forest of Arden," remarks Steevens, " is as much out of place as a lioness in the subsequent scene." Collier tries to get rid of the difficulty by suggesting that Shakspeare may have written "plane-tree." " Both the remark and the suggestion," observes Miss Baker, in her 'Glossary of Northamptonshire Words,' " might have been spared if those gentlemen had been aware that in the counties bordering on the Forest of Arden, the name of an exotic tree is transferred to an indigenous one." The *Salix Caprea*, or Goat Willow, is popularly known as the "Palm" in Northamptonshire, no doubt from having been used for the decoration of churches on Palm Sunday ; its graceful yellow blossoms

The genus *Phœnix*, of which the Date-tree is at once the most important and popular representative, is indigenous to Africa and Asia, and only introduced into Europe. Its trunk, marked with the scars of fallen leaves, is, in some species, so short that it hardly appears above the ground, and attains in others from forty to eighty feet in height. Its leaves are pinnatisect, bearing linear segments, the lower ones of which gradually assume, in many instances, the appearance of spines; and they are moreover more or less conduplicate at the base, a peculiarity distinguishing *Phœnix* from all other genera of Palms. The flowers, growing on branched spadices, which appear in the axils of the leaves, are of a dark-yellow or yellowish-white colour, and diœcious. In order to make the trees bear plenty of fruit, it is necessary to have recourse to artificial fertilization.

appearing at a time when few other trees have put forth a leaf, having won for it that distinction. Clare so calls it:—

“Ye leaning Palms, that seem to look
Pleased o'er your image in the brook.”

That Shakspeare included the Willow in his forest scenery is certain, from another passage in the same play:—

“West of this place, down in the neighbour bottom,
The *rank of osiers* by the murmuring stream,
Left on your right hand, brings you to the place.”

This is always done in countries where the successful cultivation of these trees for that purpose is an object. The late Dr. Stocks, whilst at Muggur Peer, near Kurrache, tells us in 'Hooker's Journal of Botany' that he witnessed the fertilization of the Date:—"A man ascended the male tree, and cut off the yet unopened spathe. He split it open, and took out the male inflorescence, white and confert, like the head of a cauliflower, *yet* with the pollen quite ripe and falling in showers, if the inflorescence was shaken. On being asked (intentionally) what was the meaning of this strange and insane fit of cutting off the flowers which would yield him Dates:—

" 'No, Sahib,' said he, 'these could never become Dates: this is the male' (*mu*).

" 'What palaver is this? Male indeed! where is your female?'

" 'Yonder, Sahib—this is the male.'

"After more of this he explained that one was male, one the female (*madee*), and this flour (*ata*) is (shaking the inflorescence) the pollen. He then ascended the female tree by the stumps of the old petioles, and with his axe cleared away the old circle of leaves of 1847, and dressed up and made tidy, as it were, for the bridal. He had previously

cut the male into little bits, some of which he gently shook over the female, and opening out her inflorescence a little, inserted one or two bits of the male in it, and descended.”

The fruit of *Phœnix* is a round or more or less oblong, yellowish-brown drupe, which generally has one seed, but in some instances the latter proves abortive, as is the case in the American *Guilielma speciosa*.

Phœnix is composed of about a dozen species.* I say advisedly *about* a dozen, for it is impossible to speak more decidedly respecting this point, as the limits of the various species are at present very ill understood, and considerable confusion prevails among the synonyms. As yet we do not even know whether the East Indian *Phœnix sylvestris*, Roxb., is a wild state of *Phœnix dactylifera*, Linn., which has from time immemorial been cultivated in Asia, Africa, and Europe, or a distinct species; but all the evidence collected seems to incline in favour of the former opinion. Nor have we, as yet, assigned any very definite limits to *Phœnix acaulis*, Hamilton, which appears almost indistin-

* Herm. Wendland gives the following list of the species cultivated in European gardens:—*Phœnix dactylifera*, Linn.; *P. farinifera*, Roxb.; *P. ferruginea*, Hort.; *P. pygmæa*, Lodd.; *P. reclinata*, Jacq.; *P. spinosa*, Thonning (*Fulchironia Senegalensis*, Leseb.); and *P. sylvestris*, Roxb.



J.C. Frank del et lith

Thomson Brooks imp

Phytoloba macrocarpa, Ruiz & Pavon.

guishable from *P. Ouseleyana*, Griff., and *P. pedunculata*, Griff.: other species share the same fate. It is necessary to state in the outset these facts, as they must account in a great measure for the rather loose terms in which the history of the various species has to be written.

The most southerly species are *Phœnix spinosa*, Thoning, and *P. reclinata*, Jacq., both natives of the Cape of Good Hope. The most northern species is *P. dactylifera*,—the Date-Palm,—which is spread over the whole of Southern Europe, Northern Africa, and South-eastern Asia, and furnishes us with that well-known dessert-fruit. The Date-Palm, justly termed one of the most important plants of the Vegetable Kingdom, attains the age of upwards of one hundred years. It is a noble tree, from forty to eighty feet high, with an elegant glaucous foliage and edible fruits, which vary in shape, size, colour, and flavour to such a degree that in the oases of the Desert of Sahara alone the late Dr. James Richardson counted no less than forty-six varieties, all distinguished by different vernacular names.*

* My friend Dr. Ed. Vogel has also paid considerable attention to the varieties of the Date, and has communicated to me, in October, 1853, from Murzuk in Fezzan, a list of thirty-seven kinds, with full descriptions and figures, which I have since published (*Bonplandia*, vol. ii. p. 74. t. 1). From that communication it appears that the largest Date of Fezzan (which is also

“In Egypt,” says Dr. Bowring in his report on the state of agriculture and horticulture in that country, “the Date-tree is a source of considerable revenue to the Government, (1 piastre per tree being generally levied,) and ministers, both by its fruit, trunk, foot-stalks, leaves, and fibres, to the comforts of the natives, far more than any other product of the soil. As a source of landed revenue it is highly lucrative. One proprietor told me that he had planted five thousand trees, which, after eight years, had produced yearly fruit of the average value of from forty to eighty piastres (eight to sixteen shillings sterling) per tree. Revenue is collected on about two millions of Date-trees.” And he further goes on to say:—“The Date Palm is easily propagated by offshoots from the roots: of its leaves, brooms and brushes,—of the fibre (*lif*) by which the petioles are bound together, all sorts of cordage are made; the trunk is employed for house-building, and many other purposes; and the fruit is of universal consumption.”

the best) is $21\frac{1}{2}$ Parisian lines long, and 10 in diameter, the smallest $7\frac{1}{2}$ by 5; that the different Dates are of almost every colour, except pure white and black, and that there are not, as is the case with our apples and pears, early and late sorts, but that all arrive at maturity at about the same period (restricted to within a fortnight), which falls in Fezzan about the latter part of August.

The great resource of the inhabitants of Northern Africa and of the oases of Sahara is the Date Palm. "All Fezzan and half of Tripolitania," says Dr. Ed. Vogel (*Bonplandia*, vol. ii. p. 2), "satisfy most of their wants with the products of it. The huts of the poorer classes are entirely made of its leaves, and the more substantial habitations of the wealthy chiefly consist of the same material; every door, every post is made of its wood, and the ceilings of the rooms are formed by its trunks. The footstalks furnish the most common fuel, and they are often brought on men's backs from a distance of six to eight miles, a man's load consisting of two bundles, fetching about twopence. The fruit is the common food of both man and beast: camels, horses, dogs, all eat dates. Even the stones are soaked in water, and when they have thus become soft are given to the cattle, for in many districts the cattle have no grass nor any other herbage except a little safshah (*Melilotus*), which in Murzuk is cultivated with almost as much care as the corn, and fetches the high price of fourpence a bundle (*i. e.* about a good handful). The camels of Murzuk are therefore often sent about one hundred miles northwards for pasture. The number of Date-Palms cultivated is enormous. When Abdel-Gelil besieged Suckna, in 1829, he cut down no fewer

than 43,000 trees, to compel the town to surrender ; nevertheless there are still at least 70,000 left. Their produce is comparatively small, a hundred full-grown trees yielding about forty hundredweight of dates, worth at Murzuk about thirty shillings, but at Tripoli four times that sum. The dates, after having been gathered, are dried in the sun, and when quite hard buried in the sand. They may thus be preserved about two years, but generally after eighteen months they are attacked by worms, and in the beginning of the third year nothing remains of them save the stones. As an every-day food dates are considered very heating, in consequence of which they are not much used on journeys, as causing great thirst. The most relishing and wholesome way to eat them is, when made into a paste, mixed with barley. When the heart of the leaves has been cut out a sweet thickish fluid collects at that cavity, called *lagbi*, which is very refreshing and slightly purgative. A few hours afterwards this fluid begins to ferment, becomes acid and very intoxicating. From the ripe fruit a kind of treacle is prepared, used especially for coating leather bags or pipes to render them tight."

The Date Palm is one of the objects that strike the voyager when approaching the lovely Isle of Madeira ; and I

well remember the pleasure it gave me when, in August, 1845, I discerned its plummy head amongst the white walls of Funchal. "In the Cape de Verde it is rather too scarce," says J. Schmidt,* "to constitute an important contribution to the food of those islands. Originally it has probably not been wild in the Cape de Verde, but it appears to have been formerly cultivated to a greater extent than at present." As Schmidt has not given his reasons for believing why he doubts its being an endemic species, he has of course left the question whether it was originally wild, or introduced, where it stood. It has also been called in question whether the Date-tree was indigenous to the Canary Islands; henceforward that cannot be repeated, as Dr. Carl Bolle has, both from historical records and from his own observation, set that question finally at rest. In answer to my inquiries respecting it, he sent an elaborate treatise, which I published entire in the second volume of the 'Bonplandia,' and much regret that I cannot reproduce it at this place in full length, or render the abstract here given in anything like the highly poetical and graphic language for which the original is so justly admired.

* 'Beiträge zur Flora der Cap Verdischen Inseln,' etc. Von Dr. Johann Anton Schmidt. (Heidelberg, 1852.)

“That the Date-palm has always existed in the Canary Islands,” says Dr. Bolle, “might be proved from the first positive documents we possess of the history of the Fortunate, if the mode in which it occurs at present, and the logical deductions derived from that fact, did not render such a proof unnecessary. Well known is the expedition despatched by King Juba, who, as a vassal of the Emperor Augustus, reigned over Mauritania, and who by his love for science, particularly cosmography and geography, attained a degree of immortality which the simple possession of a crown would never have imparted to him. Juba had sent learned men to visit the isles, originally discovered by Phœnicians and Carthaginians, but lost again in sub-mythical obscurity, thus originating the first scientific expedition which the annals of mankind record. How new the scheme must have been, is evident from the highly obscure and confused report given by the explorers,—a report, of which Pliny has unfortunately only preserved a fragment. Two dogs of immense size, from Canaria, were brought to the king as trophies. The Mauritanian reporters seem to have found the islands uninhabited, but they say most positively and clearly, ‘Abundant palmetis caryotas ferentibus’—they abound in groves of Palms, bearing dates.”

The information Juba acquired does not seem to have led to a permanent occupation of the islands. They were doomed once more to oblivion, and remained to the Romans and Arabs more a myth than a reality. The feudal times arrived, and with them, foremost in Italy, a fervent desire to explore the sea. The writings of the ancients, rescued from the dust of conventual libraries, awoke in Florentines and Genoese doubts whether the ocean presented in reality insurmountable obstacles to a more extended navigation; and there appeared another great name directly connected with the Canaries. Boccaccio wrote the narrative of a voyage of a company of bold Florentines, who, in the service of Alfonso IV. of Portugal, rediscovered the Canaries a second time, and, navigating from isle to isle, explored them thoroughly. Here we find more clearness, and many more details; and again we hear something about the Palms.

Their leaves, we are informed, were substituted by the islanders for garments, as is the case at the present day in the Bissagos. In the remarkably minute description of the three youths, who were taken to Portugal, he says: "*Crines habent longos et flavos, usque ad umbilicum fere, et cum his teguntur; decorâ facie, nudi incedunt; habent tamen femoralia, cingunt autem lumbos cordâ, ex quâ fila pendent*

palmae seu juncorum in multitudine grandi, iis quidem tegunt pubem omnem," etc. This is the first mention of the *tamarco*, that principal part of the old Canarian dress, which, with the cloak of well-prepared goat-skins, was worn around the shoulders. The derivation of its name from the Semitic word 'Tamar' (the Palm-tree) cannot be gainsaid, and, curious to add, the Isleños still term the smaller fruits of the half-wild Date-trees 'Tamaras,' in contradistinction to the 'Datiles,' which, improved by culture, are larger and of superior quality.

The members of the Canarian flora captivate in most instances, by their originality and beauty of form and colour, more the eye than the palate; Madroños (*Arbutus Canariensis*), Vicacaros (*Canarina Campanula*), Mocanes (*Visnea Mocanera*), a few strawberries, blackberries, and pine-nuts, being the only kinds of fruit which, unattended, produced a ready harvest. But none of them equalled in flavour the Date; for the fig-tree was only introduced in the thirteenth century, by navigators from Majorca, and the abundant supplies which it soon began to yield embellished the last days of Canarian independence; and the time was still distant when the grape and the golden orange were to meet, to impress upon the originally sombre physiognomy of the

country the character of an almost paradise-like luxuriance, —when a sacred grove was to be planted in honour of Pomona, in which all the products of the tropical region were to compete in perfection with those of the temperate zone. It is evident that under such circumstances the Date must have appeared to those unsophisticated natives as the most perfect production of Nature. But nowhere could that be the case in a higher degree than in the islands of Lanzarote and Fuertaventura, where, on account of the predominating character of the desert, the number of other trees must have been smaller, and that of the Date-palms larger.

But not only food and dress did the Guauches derive from the Date-tree ; they also, as Viera assures us, knew how to prepare from it a beverage, which replaced the wine, and yielded at the same time vinegar, honey, and sugar. “ In Gomera,” says the author of the ‘Noticias,’ “there is a small cask of the juice used to be extracted from each Palm.” The introduction of the vine and the sugar-cane no doubt caused the downfall of that branch of industry at an early period : at least no vestige of it remains at the present day. But a tree which conferred so many benefits, satisfied so many wants, of the elegant and noble forms of which no

eye could remain insensible, must necessarily have stood in high estimation ; and when the kings of the Guauches placed the bay-leaf as a symbol of their sovereignty on their brows, it is not improbable that the Date-Palm was also planted at the entrance of the cavern serving as their habitations, and that the *Tagoror*, or parliament, was held in its shade.

“With the period of the Norman Conquest, when the Bethencourts began to establish themselves more firmly in the smaller islands, a clear ray of historical light falls upon the scene of our investigation. Directly on the first landing in Fuertaventura, then called Herbania, the gallant Gaudifer de la Salle, the brother in arms of J. de Bethencourt, penetrated without opposition as far as the ‘Ruissel de Palmes.’ That part of the book of the chaplains of the conquerors is descriptive of the condition of the country at that time, detailing in a graphic manner the great abundance of Palms then existing.

“Another time, when colonists from Normandy arrived in Lanzarote, their joy on beholding the beauty of their new country, and the wild, still unchanged dress of the Canarians, ‘qui ne sont vestus que par derrière,’ was only equalled by their predilection for the exotic, unknown fruits : ‘Ils mangeaient de ces dattes et des fruits du pays, qui leur

sembloient fort bons, et rien ne leur faisoit aucun mal.' Even at that time mention is made of Dates and Dragons' blood, as articles of export from Lanzarote and Fuertaventura.

"Thus far the chronicle. Let us now turn to the present. In casting our looks from books and historical hypotheses upon concrete nature, we are obliged to own that in comparison with former times, the number of Palms has decreased, particularly in Teneriffe. The banks of the brooks towards the sea, the valleys of the larger barrancos, have been claimed by cultivation. Agaves and Cactuses now flourish as foreign intruders, where the African Flora once reigned in native power. Perhaps there is no longer in the whole island of Teneriffe any truly wild specimen of *Phoenix dactylifera*; but numerous names of places, which must have been given during an early period of the time of the Conquest, prove that formerly the tree must have been rather frequent. Two large valleys, one in the north, the other in the west, are called to this hour, 'Valle de las Palmas' and 'El Palmar;' in the former, which terminates opposite the rocks of Anaga, the traveller searches in vain for a justification of the appellation—it has become quite historical.

"But although the wild Date-Palms may have disap-

peared, and the cultivated ones appear nowhere in dense groves, yet the landscape is by no means entirely deprived of them. The gardens and courtyards of Santa Cruz in Teneriffe exhibit many a lofty and beautiful specimen, furnishing a most suitable groundwork for the picture presented by the Moorish architecture and the flat roofs of the white buildings of that town. Among the valleys of the south-east coast may be mentioned the Ygüeste de San André, shaded by groves of Bananas, as distinguished by the picturesque grouping of its beautiful, though not numerous, Date-palms. More abundant do these trees become, after passing over the elevated plain of Laguna,—where only a few stunted specimens are to be met with,—and descending by way of the Rodeos the declivities of the milder northern coast. There, about Vittoria, Matanza, and Santa Ursula, they afford, notwithstanding their being rather isolated, the most lovely aspect. They bend their foliage over many a white wall, unfold their crowns over many a rural cottage: there they stand on the boundaries of vineyards, orange-gardens, and fields, watching, as it were, like guardians over the different products, the more pleasing to the eye as they are harmoniously blended with the Canarian and South European forms in one great picture. It was near Santa Ursula

where Chamisso, tired and despairing of reaching, in the short time allotted to him, Orotava, sat down under a Date-tree, gravely to fulfil a promise he gave to his humorous friends at Berlin, to smoke a meerschaum-pipe under Palms; and it was there also that the poet cut several ribs of Palm-leaves to present as walking-sticks to the same friends, previously to his embarking on board to continue his voyage round the world.

“Further on, the renowned vale of Orotava preserves the same character, Palms still continuing to contribute towards the beauty of the landscape. They adorn La Paz, the charming villa of Don Thomas Cologan; a majestic tree overshades the courtyard of a former nunnery at Puerto Orotava, shown with pride to the stranger as one of the observatories of the great Don Alejandro, that being the name by which our immortal Humboldt lives and is venerated in the hearts of all Spanish Creoles. The extreme northern valleys of Teneriffe, where humidity predominates, and the Laurel region inclines to the coast, possess only a few and isolated Palms. At Bajamar we remember a rare sight: the trunk of a Date-tree, covered with a fine Fern (*Davallia Canariensis*),—which generally is *only* to be found in the region of Laurels and Pines,—just as if it had been

a Viñatico (*Laurus Indica*) of the higher forests. The Palms continue to prevail westwards of Orotava, towards Punta de Teno. A splendid avenue of Date-trees of the old stock may be seen in the beautiful gardens of La Rambla, near Realejo de abajo.

“Generally speaking the Date-palm is cultivated in Teneriffe less on account of its fruit, which only arrives at perfection when the roots are properly subjected to irrigation, than as an ornamental and at the same time useful tree, the leaves and petioles of which must suffer themselves to be employed to several domestic purposes, and amongst them to the not very poetical office of brooms—the reason why so many trees with injured crowns are to be met with; mats used in packing up merchandise, for covering up camels’ loads, and instead of carpets, are also wrought of the leaves. The flowering season falls in Teneriffe in February, the fruiting in the autumn. As African sub-tropical species common to the whole coast region, the Date-palm may be considered as attaining to the height of the lower boundaries of Webb and Berthelot’s second “climate” of the Canary Islands, which comprises the region of evergreen forests, but not ascending much higher than that; 2500 feet may be looked upon as the extreme of its vertical distribution.

“The island of Palma did not derive its name directly, as might be supposed, from the Palms occurring on it, but, as proved by historical records, from a translation of the name of the capital of Majorca, for from the largest of the Balearic Isles came the pioneers of its Conquista. But any one anchoring in the roadstead of Ciudad, as we did in August, 1852, and seeing the high terraces of rocks covered with hundreds of gigantic Date-palms, or on climbing up the Barranco de los Dolores, beholding on all sides trees heavily laden with orange-red fruits—a picture of genuine abundance—will perceive that this island, called already by Cadamosto the most delightful of all islands he visited, enjoys with full justice the title of the ‘Isle of Palms.’ And if he who further on passes the Cumbre, and penetrates by way of the valley of Las Augustias into the Caldera,—that wonderful gigantic glen, which, surrounded by perpendicular walls of rock four thousand feet high, enjoys, like a conservatory, an always uniform temperature, allowing plants from all heights to flourish in company of each other,—the Canarian Cedar (*Juniperus Cedrus*, Webb et Berth.), from the most elevated mountain ridge, and *Kleinia neriifolia*, Ait., of the hot coast region,—he may still witness the strange phenomenon of seeing Date-palms and Pine-trees growing

harmoniously together. Leopold von Buch doubted without reason the existence of this vegetative harmony, which had already been mentioned by Viera. Berthelot, that eminent naturalist, has however attested orally and in writing, as well as by means of pictorial illustration, the correctness of the older assertions. But the hand of man, even in this mysterious, almost inaccessible workshop of Nature, the way to which leads through so many dangers, along yawning precipices, has not spared the 'Fauns of the wilderness,' banished hither. It has allowed the fire to accomplish what the axe was not able to do. Only on one inaccessible rock near the Barranco del Almendrero Amargo, stood, in September, 1852, surrounded by Pine-trees, one solitary wild Palm. Heine's conception of the longing of the two trees for each other, so beautifully expressed in one of his sweet elegies, had here found its solution :

“ Ein Fichtenbaum steht einsam
Im Norden auf kahler Höh' ;
Ihn schläfert ; mit weisser Decke
Umhüllen ihn Eis und Schnee.
Er träumt von einer Palme,
Die fern im Morgenland
Einsam und schweigend trauert
Auf brennender Felsenwand.”



J.C. Frank del. et lith.

Thrinax argentea, Lodd.

Vincent Brooks imp.

We know nothing of the Palms of Ferro. Bourgeau, the only botanist who has visited that island, but who has not written anything, might be able to report on them. But Gomera, that woody, western isle, enjoys a high reputation as a Palmy country, where the culture of the Date-tree is a regular branch of industry, to which much attention is paid. The dates of Gomera are considered quite equal to those of Mogador, and they are exported to the whole neighbouring archipelago, showing that there must exist a great number of trees producing them. There is one variety without a stone, and even perfectly wild trees are said to occur among the rocks (*riscos*). Not less distinguished by its Palms,—therefore far surpassing Teneriffe in the Oriental character of its scenery,—is the great, fertile island of Gran Canaria, where the metropolis of the whole archipelago, Ciudad de las Palmas, does not only preserve the mere name of the thick Palm-groves of the beach of Guinguada, on which the conquerors pitched their first camp (Real de Palmas), but also those features that gave rise to it. Roses and jessamines half conceal the white walls, amongst which the airy streets of the city are situated, and numerous noble Palms display their feathery tops, calling to mind some of the scenes in Sheherazade's fairy tales. Several

other names of places besides the last-mentioned, are derived from the tree here treated on; thus, for instance, the curious name of 'Tamaraceite,' which seems to imply a spot on which Palms and Olive-trees grow together.

“Eastward of Gran Canaria, separated by the channel of Bocayna, are the Purpurariæ of the ancients, the islands of Lanzarote and Fuertaventura, where, on account of their low elevation and their proximity to the Desert of Sahara, the Libyan type of vegetation prevails, and where the Date-palm—though only in a cultivated state in the well-watered valleys—no longer surrounded by a luxuriant mass of endemic Canarian species, appears as the predominating tree, and gives the chief character to the landscape. Especially in Fuertaventura there is scarcely one of those square, flat-roofed houses, near which, in company with Fig-trees and Tamarisks (*Tamarix Canariensis*, Willd.), these Palms are not to be found, no brook in the moist sand of which they are not seen, no fountain in the desert near which they do not form an oasis. The same remark applies to Haria, in Lanzarote, Tuinije, La Antigua, La Hampudiente, and many other places in Fuertaventura—the aspect of which reminds one vividly of the Duars of the Arabs—and particularly to the valley of Rio Palmas, in the last-named island, which

we found, in 1852, abounding as much in Palms as it must have been in the fifteenth century, when the Bethencourts gave it the French name of 'Ruissel de Palmes.'

"It was in April, 1852, when I left the hospitable château of La Oliva for Villa Bentancuria, the former capital of Fuertaventura. I was borne by a camel of fine race, the best-suited animal for such an excursion. My two faithful guides, Santiago Bareto and Anastasio Aguilar (the latter, as a soldier in the Canarian militia, was dressed in a most becoming green uniform), were riding on donkeys near my side, and occasionally fastening their beasts to the tail of my camel, made the 'ship of the desert' tow them along like boats. Ere long we had the plain of Oliva behind us, where the wheat was still standing on the field, and entered the Desert at the foot of the Montaña Quemada, an extinct volcano. A deep blue and cloudless sky spread like a high dome over the vast brown plain, which on the left was confined by the central mountain-chain, on the right separated from the sea by a low ridge of hills, whilst far away towards the south, in which direction our way led, it was guarded by a long stretching chain of mountains. The soil, however redundant with verdure during the rainy season, was now quite bare and cracked by

the powerful rays of the sun, and showed, except a few grey and fleshy-leaved Chenopodiaceous shrubs, no sign of vegetation; only where the periodical streams of the winter season had formed a bed, a few tamarisk-bushes were observable. Upon the loose stones scattered about, the heated air was keeping up a trembling motion. The sudden flight of a frightened Houbara-ustard, or the melancholy cry of a Ganga-hen, occasionally interrupted the stillness. At the distance groups of camels, without herdsmen, were observable. The scenery was so entirely African in its character, that one would not have been surprised to behold on the tops of some of the hills the dark tents of the Bedouins, or to see rising the dust of a flock of ostriches. It was a ride through the Desert, full of all the poetry, surrounded by all the melancholy magic, but without any of the horrors, of the Sahara. From the high seat on the back of the camel the whole country could be viewed, and without the fear which about twenty leagues eastwards, on the continent of Africa, would have made itself felt. There were no waves of loose sand, drifted along by the Simoon,—no surprise of Arabian robbers to be apprehended. A good supply of fresh spring water, and a large flask filled with Malvasia from Gran Canaria, and carried by the camel, not even ad-

mitted of a thought of thirst, which on similar occasions had often troubled us. The mind, quite lost in reflections on the mysterious life of nature, became not tired of admiring the poetry of the surrounding objects. My guides now carrying on a merry conversation, then reciting some ballad, or singing the melodious verses of some popular air, rode or walked near my side. We were almost sorry when we arrived at the end of the plain, in a little grove of palm-trees, situated on the foot of a ridge of mountains, the winding paths of which we passed to gain on the opposite side a narrow but fertile valley, well supplied with water, in which lies the old Norman town of Betancuria, with its historically remarkable church and convent of St. Francis, considered as the oldest of the whole Canaries. The Alcalde of the place received us hospitably, and furnished us next morning with guides to Rio Palmas. The road leads along the same little river on which Betancuria is situated; but it is only after a considerably long march, and near the church of Nuestra Señora de la Peña, a celebrated place of pilgrimage, that the real Valley of Palms is reached. There the landscape changes its aspect suddenly: instead of wild Olives, Pistacias (*Pistacia Atlantica*, Desf.) and European fruit-trees, the verdure of which one was hitherto able to

enjoy, you are at once in the midst of most beautiful groves of Palms, still grouped in the same manner as the chaplains of Bethencourt, Bontier and Leverrier, described them, with the only difference that now the farms of peaceful, intelligent country-people are seen in their shade, orchards and cornfields fill up the intermediate spaces, and the number of Palms, in comparison with formerly, has rather decreased than increased. There are still, as in bygone times, luxuriant tree-like tamarisks on the banks of the rivers and rivulets. Rio Palmas may indeed be termed, on account of its fertility, its abundance of Palms, and on account of its forming a natural antithesis to the arid, sterile mountains surrounding it, the most beautiful oasis of Fuertaventura, and it is certainly the largest. Leaving Rio Palmas, granitic rocks are piled one upon the other, the rivulet having dug itself a narrow but deep bed in the stony masses. You have entered the Malpaso, a slippery path, where the water oozing out in every direction renders walking extremely difficult and dangerous, often rendering it necessary to creep on your hands and feet, or to rest on the thick stick which the Isleños term their 'lance.' You reach a grotto, where is a chapel, formerly the shrine of the image of Nuestra Señora de la Peña. A still steeper path leads into the lower

valley, and there again you find yourself in as beautiful a grove of Palms as can well be conceived. How comfortably the foot steps on the green turf! how refreshing the breezes that play with the gigantic leaves! how agreeable the joyous sound of the birds (*Fringilla Hispaniolensis*), which have built their nests on the footstalks of the trees!

“Having accomplished the crossing of the Malpaso, we squatted down to a rustic meal and partook freely of the wine, which, cooled in a neighbouring fountain, was found to be most refreshing. The conversation soon became animated. I had to tell of my native country, and to listen in turn to the miraculous discovery of the image of the Virgin of La Peña. At last Anastasio, who had hitherto been silent, pushing back his curly hair from his forehead, contributed his share to the conversation. ‘Do you see, Caballero, below in the valley, another group of Palms?’ he said, addressing me. ‘Among them is a tree bearing dates without a stone, and they are very sweet and pleasant eating. What a pity that it is not autumn, or else I should go to fetch you some for your dessert. But do you know how these dates originated? No, you say? Well then I will tell you. It is an old story, and many a fleck of snow has since fallen on the Peak of Tenerife;

however you need not believe more of it than you choose. The family of the Bethencourts had conquered our island, but the Almighty did not think proper to let them retain possession of it, and Don Diego Herrera, the same whose monument you saw this morning in the church of the convent, had become lord of this country. Our forefathers—if it is true that we are their descendants—were at that time still living in the caverns of the Sierra, and near the stony *corrals* of their flocks of goats, in the large plains. True they had been baptized and they went to mass, but they still continued to mix many heathenish superstitions and customs with the usages of the Christian religion. Well, then came Don Diego de Alcala and Father Torcaz, both of the Order of St. Francis, to complete the conversion of the Majoreros.* St. Diego became Abbot of the convent of Betancuria; Father Torcaz was his friend, who always accompanied him in his difficult journeys, which he made to preach the Gospel to the new Christians. I dare say the sun often proved rather more hot to his shorn head than he was wont to bear it in Castile; so one day the pious men squatted down, like ourselves, and not far from the very spot we are now sitting, in the shade of a Palm, to rest their

* This is still the Guauche name of the inhabitants of Fuertaventura.

wearily limbs. The soil was strewn with dates, and both ate of them, but alas! St. Diego bit upon a stone and lost one of his—I dare say not very young—teeth. Irritated, he commanded, in the presence of a numerous assembly of Isleños, that the tree henceforward should bear only fruits without stones. Surely the miracle actually took place, and has been repeated every year down to our own day. It is said to have contributed considerably to strengthen the true belief, for in those times people were not quite so fond of ridiculing sacred things as they are in these, or like your servant Santiago in particular, who maintained he knew positively that there were not only here in this island, but also in Gomera, a great many of that kind of Date-trees, and if the Saint had been deprived by each of them of one of his molar-teeth, he must have possessed a great many more than other mortals. That is the story of the Dates without stones!

“It is necessary to observe that the Date-tree is the only indigenous Palm of the Canaries. The Dwarf Fan-Palm (*Chamærops humilis*, Linn.), so common on the coast of the Mediterranean Sea, does not extend as far as these islands. One specimen of it is in the Botanic Gardens at Orotava, which I saw in flower in the autumn of 1852.

Isolated Cocoa-nut Palms (*Cocos nucifera*, Linn.) are here and there to be met with. At Santa Cruz there is in one of the gardens of the suburb, a beautiful specimen, through the fine pinnatisect leaves of which I have often seen, in the winter of 1851-52, the snow of the Ladera de Guimar,—certainly a strange sight. I never heard that in Teneriffe the Cocoa-nut Palm had ever produced fruit, but this is said to be sometimes the case in Gran Canaria. Another elegant representative of the order of Palms, the Palma real de la Havana (*Oreodoxa regia*, Kth.) I observed in several gardens of Teneriffe.

“Let us resume in a few words the conclusions resulting from the foregoing :—

“1. The Date Palm is a genuine (endemic) member of the Canarian flora. Its geographical distribution, as such, is between the coast region and an elevation of 2500 feet, *i. e.* to the lower boundary of the Laurel region; a greater extension upwards being opposed less by a diminished temperature, than by too great a humidity of the air and too great a quantity of rain.

“2. The eastern parts of the Canaries, having a more continental climate, and a lesser quantity of rain in the winter, possess the conditions necessary for the development of this

Palm in a higher degree than the western, in consequence of which there is a greater number of specimens of it to be found; notwithstanding however the Date Palm is at present only found in a few spots of the latter parts truly wild.

“3. All Palms of the Canaries, with a very few exceptions, have exchanged their wild state with that of cultivation.

“4. In comparison with former times the number of Date-trees has at present (in consequence of the cultivation of numerous exotic plants) very much diminished.

“5. The Date-palm reaches in the Canaries the western boundary of its geographical distribution, at least as far as concerns the countries north of the tropic of Cancer; for south of that boundary it not improbably extends to the Cape de Verde Islands.” (Compare page 289.)

From *Phoenix dactylifera*, Linn., we turn to *P. sylvestris*, Roxb.,—called in Bengalese, Khujjoor; in Sanscrit, Khurjura; and in Telinga, Peddaeita,—which Hamilton says so much resembles the true Date-tree, that he has not been able to detect the smallest difference between the latter and this species. *P. sylvestris* is common all over India, and a very handsome Palm, which, according to Griffith, is from thirty-four to forty feet high, but which, according to the statement of Dr. Hooker, must in some places attain a much

greater height, or else he would not be justified in saying that at Tilotho these Palms were so lofty that the climbers [of them], as they paused in the ascent to gaze with wonder at our large retinue, resembled monkeys rather than men." The crown of the tree is about hemispherical, very large and thick, and the leaves are from ten to fifteen feet long. During the cold season this tree yields Tari, or Palm-wine, but the method of extracting it destroys the appearance and fertility of the trees, the fruit of those that have been cut for drawing off the juice being very small. The mode of extracting this juice is by removing the lower leaves and their sheaths, and cutting a notch in the pith of the tree near the top; from thence it issues and is conducted by a small channel made of a bit of the Palmyra leaf, into a pot suspended to receive it. On the coast of Coromandel this Palm-juice is either drunk fresh from the tree, or boiled down into sugar, or fermented for distillation, when it gives out a large portion of ardent spirit, commonly called *Paria aruk* on the coast of Coromandel. Mats and baskets are made of the leaves.

The Bengalese also boil the juice into sugar. In the whole province of Bengal about 15,000 maunds, or about 1,000,000 hundredweight, is made annually. At the age of from seven

to ten years, when the trunk of the trees will be about four feet high, they begin to yield juice, and continue productive for twenty or twenty-five years. It is extracted during the cold months of November, December, January, and February, during which period each tree is reckoned to yield from a hundred and twenty to two hundred and forty pints of juice, which averages a hundred and eighty pints; every twelve pints or pounds is boiled down to one of *goor*, or *jaguri*; and four of *goor* yield one of good powder sugar, so that the average produce of each tree is about seven or eight pounds of sugar annually. Another statement gives a much larger produce: viz., the average produce of each tree is sixteen pints per day, four of which will yield two pounds of molasses, and forty of molasses will yield twenty-five pounds of brown sugar. The difference is so great that it cannot well be reconciled, but I am inclined to give most credit to the first. Date-sugar, as it is called, is not so much esteemed as cane-sugar, and sells for about one-fourth less.

Another East Indian species is *Phœnix farinifera*, Willd., the Chilta-eita of the Telinga language, a dwarf plant, common on the hilly country between the Ganges and Cape Comorin, on dry, barren ground, chiefly of the sandy lands.

Its trunk is about one or two feet high, and so entirely enveloped in the sheaths of the leaves, that it is never seen, the whole appearing like a large round bush. The leaflets are wrought into mats for sleeping upon, etc. The common petioles are split into three or four, and used to make baskets of various kinds ; but they are not so good for this purpose as the bamboo, which is very elastic, much more durable, and splits easily. The small trunk, when divested of its leaves, and the strong brown fibrous web that surrounds it at their insertions, is generally about fifteen or sixteen inches long, and six in diameter at the thickest part ; its exterior or woody part consists of white fibres matted together ; these envelope a large quantity of farinaceous substance, which the natives use for food in times of scarcity. To procure this meal the small trunk is split into six or eight pieces, dried, and beat in wooden mortars, till the farinaceous part is detached from the fibres ; it is then sifted to separate them : the meal is then fit for use. The only further preparation it undergoes, is the boiling it into a thick gruel, or, as it is called in India, *kauji* ; it seems to possess less nourishment than the common sago, and is less palatable, being considerably bitter when boiled ; probably a little care in the preparation, and varying the mode, might improve it ; however it

certainly deserves attention, for whenever rice is too dear, or not to be had, many of the poor are forced to have recourse to this sort of food. Fortunately it is one of the most common plants on this part of the coast, particularly near the sea.

Allied in habit to *Phœnix farinifera*, Willd., is *P. acaulis*, Roxb., the trunk of which is also extremely short: Griffith says that in plants ten years old there is none. It occurs at Behar, on the elevated plains on the north side of the Ganges, and in the plains of Burmah, between the valley of Hook-hoonk and Mogam. A species closely related to, if not identical with this, is mentioned by Dr. Royle in his well-known 'Illustrations,' as inhabiting the Kheree Pass, Tiwalik Hills, at an elevation of 2500 feet, in company with *Pinus longifolia*. Other dwarf species are *P. Onseleyana*, Griff., and *P. pedunculata*, Griff. Recommendable for ornamental purposes is *P. paludosa*, Roxb., the southernmost Indian species of this genus, which forms very elegant, impenetrable tufts, well adapting it in tropical gardens for bank scenery. The trunks of the smaller trees serve for walking-sticks, and the natives have an idea that snakes get out of the way of any person having such a stick; the longer trunks for rafters, and the leaves for thatch.

Genus L. PLECTOCOMIA, *Martius*.

Malacca, Assam, Java, and the Kassya Hills are the principal seats of the four species of which this genus is composed. They have quite the habit of Rattans,—climbing trunks, petioles extended into whip-like thongs, and pinnatisect leaves. Their flowers are diœcious and arranged in large panicles; their fruit is scaly, and either one- or three-seeded.

The longest-known and perhaps the most gigantic species is *P. elongata*, Mart., a native of Java and Malacca, termed by the Malays “Rotang Dahown,” and chiefly used by them for baskets and other wicker-work. Dr. Henderson states that the tails of the leaves are very useful to the police in Java; two of them are tied to a long pole or handle, and used for catching a run-a-muck Malay.

“*Plectocomia elongata*,” says Sir W. J. Hooker, “with its luxuriant foliage and its singularly spiny trunk (the spines being digitate, or united together like the fingers of the hand, or still more resembling the foot of the mole, and admirably formed for strength), can hardly fail to attract attention. Its leaves, when full grown, are of vast length, so long indeed that they seem, as does the trunk, to need

support; and Nature has provided them with the means, for the main stalk of the leaf at the end extends into a lengthened slender tail, armed all along with strong deflexed hooks, by means of which, while running up among the stems and catching hold of the branches of other trees, the foliage and trunk are propped. A yet more wonderful provision of Nature is observed in the young and yet unfolded leaves of this plant during the period when they insert themselves upwards among the branches of the forests, for then these spines are upright, and lie flat against the stalk of the leaf; not becoming reflexed till they are needed as a means of support."

In our gardens we cultivate two species, viz. *P. elongata*, Mart. (*Calamus maximus*, Rein.), and *P. Assamica*, Griff.

Genus LI. PHYTELEPHAS, *Ruiz et Pavon*.

Those who deplore that the great geological convulsions, which our planet had to undergo before the present order of things was established, deprived the New World of its ivory-bearing animals, and only suffered their remains to be preserved in the deposits ascribed to the drift period of our

times, may derive some consolation from the fact that there still exists in the virgin forests of tropical America an ivory-bearing plant, the *Phytelephas macrocarpa*, Ruiz et Pav., producing a substance so exactly resembling to the eye the ivory obtained from elephants as to be frequently passed off for such, and even employed by mechanics as far as its size will allow, in place of that article. When the Vegetable Ivory first came to be imported into Europe for commercial purposes has not yet been accurately ascertained ; but there is reason to believe that it was shortly after the Spanish Colonies—its native country—obtained their independence (about the year 1826), as the narrow-minded commercial policy pursued by the Government of the Peninsula towards its dependencies proved an almost insurmountable obstacle to speculations in raw products, which, like the vegetable ivory, yielded but small pecuniary profits, and could therefore not be introduced into the market under a system the very opposite of that which, under the name of free-trade, has since caused such beneficial changes in commercial and international intercourse. Be that as it may, the vegetable ivory is now largely imported, chiefly from the river Magdalena, into Europe and the United States of America ; but we are still uncertain to what amount, as we have no sta-

tistical information, both M'Culloch's 'Dictionary of Commerce' and Ure's 'Dictionary of Arts, Manufactures, etc.,' being silent on that point. Judging however from the use that is made of the article, the amount must be considerable. I know, from the inquiries instituted by Fred. Scheer, Esq., that in some years no less than a hundred and fifty tons of it were imported into England; and that the "nuts" are shipped from the places where they grow in large quantities is evident from Purdie mentioning, in one of his letters to Sir W. J. Hooker (Botanical Magazine for 1847, comp. p. 14):—"A few days ago (about the middle of February, 1845) thirty tons of the 'nuts' arrived from the Magdalena (at Santamarta), commissioned for (the United States of) America and Germany." The "nuts" may be purchased in the toyshops of the British metropolis for a few pence each, but when bought in large quantities they are obtainable at a very much cheaper rate; in August, 1854, one thousand nuts were sold in London for seven shillings and sixpence.

Long before the attention of commercial men was directed to the vegetable ivory, the existence of the plant producing it was known to botanists. It was during the latter part of the last century that two Spaniards, Ruiz and Pavon,

gave, in their 'Systema Vegetabilium Floræ Peruvianæ et Chilensis,' published at Madrid in 1798, a scientific name (*Phytelephas macrocarpa*, R. et P.) to it, together with a brief description and a notice of its Peruvian names, and its properties and uses. The generic name (from *φυτον*, a plant, and *ελεφας*, an elephant) was certainly well chosen, and has ever since been retained in systematical works; unfortunately the diagnosis attached to it was very imperfect, and that is the reason why the plant has to this day remained without a fixed station in the Natural System. A short time after the publication alluded to, Humboldt and Bonpland discovered the *Phytelephas macrocarpa* in New Granada, and collected some information concerning it, which however, useful as it proved in many respects, did not throw much light upon it in a systematic point of view. Nor did Gaudichaud's labours tend much to advance our knowledge in that direction. That botanist did not see the plant growing wild, and his three plates of it, published in the 'Partie Botanique, Voyage de la Bonite,' unaccompanied as they are by any explanatory description, are almost unintelligible, and moreover they show that he had extravagant notions respecting the species of which the genus *Phytelephas* is composed; he fancying that it was a congregate of

no less than ten species, all of which he seems to have thought sufficiently characterized by the shape of the seeds—a most variable organ in this instance. In 1845 and 1846 Purdie, acting upon instructions from the Royal Botanic Gardens at Kew, did a great deal towards clearing the mist in which the Ivory-plant had been so long enveloped.

In 1848, Martius, towards the end of his famous work on Palms, gave, partly from Gaudichaud's figures, partly from imperfect specimens in his possession, a generic character of *Phytelephas* (Mart., Hist. Nat. Palmarum, vol. iii. p. 306), which greatly tended to place the organization of this remarkable plant in a clearer light. Morren (*Dodonæa*, vol. iii. part ii. p. 74) also wrote some valuable remarks on the seeds of it. In 1849, Sir W. J. Hooker contributed his share towards the perfection of our knowledge of *Phytelephas*. In an able article, published in 'Hooker's Journal of Botany and Kew Garden Miscellany' vol. i. p. 204, he reproduced not only the pith of nearly all that had been written upon the subject by Ruiz and Pavon, Humboldt and Bonpland, Purdie, Martius, and Morren, but also added some valuable observations of his own, as well as a detailed description of the fruit and seed; and, availing himself of the services of Mr. W. Fitch, he illustrated his paper with

two plates, the one representing a view of a grove of Ivory-plants on the banks of the Magdalena (from a sketch of Edward Mark); the other, the fruit, seed, and several toys made from the albumen. For want of perfect specimens of the flowers that author was unable to confirm the accuracy of Martius' description of those organs, or supply the deficiencies which the latter, from similar causes, was compelled to admit in his generic character.

In December, 1847, whilst ascending the river Cupica, I had the good fortune to fall in with the Ivory-plant, and afterwards met with it in various other parts of Darien. A selection from the notes taken on those occasions was subsequently published* (Hooker's Journal of Botany and Kew Gard. Misc. vol. iii. p. 303, and 'Narrative of the Voyage of H.M.S. Herald,' vol. i. p. 222). It contained a general description of the plant, and dwelt upon the close relationship of *Phytelephas* with *Pandanea*. Since then there has not been, so far as I know, any additional information given to the world; and it only remains for me to draw up an account of this remarkable production, as perfect as the various materials, published and unpublished, at my disposal will permit.

The Ivory-plant is confined to the continent of South

America, where it grows between the 9th degree of north, and the 8th of south latitude, and the 70th and 79th of west longitude. It inhabits damp localities, such as confined valleys, banks of rivers and rivulets, and is found not only on the lower coast region, as in Darien, but also on mountains at an elevation of more than 3000 feet above the sea, as in Ocaña. Amongst the Spaniards and their descendants it is known by the name of "Palma de marfil" (Ivory Palm), whilst its fruit is called by them "Cabeza de Negro" (Negro's head), and its seed "Marfil vegetal" (vegetable ivory). The Indians on the banks of the Magdalena term the plant "Tagua," those on the coast of Darien "Antá," and those in Peru "Pullipunta" and "Homero."* It is generally found in separate groves, seldom intermixed with other trees or shrubs, and where even

* At the Great Industrial Exhibition in Hyde Park, the nuts were exhibited by R. Fauntleroy and Sons, sub Class 4, No. 135, under the names of "Corozo" or "Corusco;" and Archer (Popular Economic Botany, p. 296, first edit.) says: "How these names originated is a mystery, as the Indians call the Palm by the names Pullipunta and Homero." It is indeed a mystery; but not as the Indians call the Palm "Pullipunta" and "Homero" (for those appellations are only used in very limited districts), but as the name "Corozo" of which Corusco is evidently a corruption, is generally confined to certain oil-palms, of the central parts of America, belonging to the genera *Attalea*, *Eleis*, and *Bactris*.—B. S.

herbs are rarely met with, the ground appearing as if it had been swept. The trunk is always pulled down, partly by its own weight, partly by its aerial roots; and thus forms a creeping caudex, which is frequently twenty feet long, but is seldom higher than six feet. The top is crowned with from twelve to twenty pinnatisect leaves, the entire length of which is from eighteen to twenty feet. The segments are towards the base of the leaf alternate, towards the apex opposite; they are three feet long, two inches broad, and their entire number amounts generally to 160. All the plants which I saw were dioecious, the males always being more robust, and their trunks more erect and higher, than the females. The inflorescence of both emits a most penetrating, almond-like smell. The inflorescence of the male plant is a simple, fleshy, cylindrical spadix, which has three or four spathes, the flowers of which are densely crowded together, and sessile. They are generally furnished with a small bract, and a calyx consisting of three sepals. The stamens are numerous (thirty-six), the filaments filiform, the anthers linear, erect, affixed nearly at the base, and bicellular; the connective is mucronulate, and the pollen elliptical and furrowed lengthways. The inflorescence of the female plant has three or four spathes, and consists of a

simple spadix, bearing on an average from six to seven flowers, which form a dense cluster, and are surrounded by bracts, placed in a spiral direction, the uppermost five of which, being often much longer than the style, but generally shorter, and pure white, have the appearance of petals; the stamens are numerous, free, sterile, inserted in the torus between the petaloid bracts and the ovary. The ovary is from six- to nine-celled, each cell containing a solitary, sessile, erect ovule, attached to an axile placenta. The style is elongated, splitting into six, seven, eight, or nine branches, stigmatose on the edges. The fruit, a collection of from six to seven drupes, forms clusters, which are as large as a man's head, and stands at first erect, but when approaching maturity—its weight increasing, and the leaf-stalk, which, having up to that period supported the bulky mass, having rotted away—it hangs down. A plant bears at one time from six to eight of these heads, each weighing, when ripe, about twenty-five pounds. The drupes are covered outside with hard woody protuberances, formed in the same manner as those of the trunk of *Testudinaria Elephantipes*. Each drupe contains from six to nine seeds, but generally seven. The testa is thick, bony; the embryo peripheral, and placed near the hilum.

In habit, the *Phytelephas macrocarpa* resembles the *Co-rozo colorado* (*Elæis melanococca*, Gærtn.); so much so indeed, that at first sight the two are easily mistaken for each other. Both have trunks which, after creeping along the ground a few yards, ascend, and attain about an equal height. Their leaves also resemble each other; and their fruit grows in a similar way, attached to comparatively short peduncles. The habit, however, is nearly the only link which connects *Phytelephas* with the order of Palms: its simple spadix, its imperfect flower, its indefinite number of stamens, and its embryo situated in the axis of a fleshy albumen, separate it from Palms, and proclaim it (in conjunction with other characters which it presents) a member of Endlicher's Class *Spadicifloræ*, and Lindley's Alliance *Arales*. Botanists enumerate four Orders as belonging to that great division (*Pistiaceæ*, *Typhaceæ*, *Aroideæ*, and *Pandaneæ*). To *Pistiaceæ* it cannot belong, because (leaving habitual differences out of consideration) it has an axile placentation. Amongst *Typhaceæ* it cannot be placed, because it has a multiovular ovary. With *Aroideæ* it cannot be associated, because it has a drupaceous fruit; and with *Pandaneæ* (including *Cyclantheæ*) it cannot be joined, because it has an axile placentation. Repelled by these and other considerations from

placing it with any of the Natural Orders above mentioned, and finding it impossible to trace out any relationship of it with any other group of plants besides the *Spadicifloræ*, we are compelled to adopt the views of Martius, who looks upon it as the type of a new Natural Order (*Phytelephantheæ*).

The uses of the Ivory-plant may, as far as they are known, be summed up in a few words. The Indians cover their cottages with the leaves of it; but this is only done when those of Palms are not procurable, as the latter last much longer than the former. The seed at first contains a clear insipid fluid, with which travellers allay their thirst; afterwards, this same liquor becomes milky and sweet, and it changes its taste by degrees as it acquires solidity, until at last it is almost as hard as ivory. The liquor contained in the young fruits turns acid if they are cut from the tree and kept some time. From the kernels (albumen) the American Indians as well as European turners fashion the knobs of walking-sticks, the reels of spindles, and little toys, which are whiter than animal ivory, and equally hard, if they are not put under water; and if they are, they become white and hard when dried again. Bears, hogs, and turkeys devour the young fruit with avidity. Purdie says: "En-

closing the seeds is a yellow, sweet, oily pulp, which is collected at the proper season (October), and sold under the name of *Pipa de Tagua*, for one real a pound at Ocaña; a spoonful of it, with a little sugar and water, makes the celebrated *Chicha de Tagua*, said to be the most delicious beverage of New Granada." This statement is difficult to reconcile with the internal organization of the fruit, and requires some emendations. Purdie wrote the letter in which it is contained in July, 1845, after he first saw the Ivory-plant, when he could not know, from personal experience, what took place in October following. He must have gathered it, therefore, from information obtained from the native inhabitants, who, not being versed in botanical terminology, might easily have made a mistake. The "yellow, sweet, oily pulp" can, in my opinion, be nothing save the second state into which the albumen enters, previous to its becoming solid; and I am the more inclined to think that this opinion is correct, as it is borne out to a certain extent by analogy. For in the Isthmus of Panama, and other localities of New Granada, the name of *Pipa* is applied to a beverage prepared from the young albumen of cocoa-nuts, and in a similar way to that described by Purdie. The same author proceeds:—"It has, however, a slightly

drastic property. Although this substance contains much oil, it never becomes rancid by keeping, but at the end of nine months it preserves, in a crude state, all its flavour and quality."

Introduced in our gardens by Purdie, the Ivory-plant has already produced flowers in two places,—a male specimen in 1852 at Schönbrunn, near Vienna; a female in 1855, at Kew, near London.

Genus LII. RAPHIA, *Commerson.*

It is now some years ago since Mr. Smith, of the Royal Botanic Gardens at Kew, succeeded in raising a remarkable water-plant, which at once became the object of general attention and admiration. That plant was *Victoria regia* of Lindley, first made more widely known by the comprehensive descriptions and splendid pictorial illustrations of Sir W. J. Hooker, and now cultivated as the pride and gem of almost every garden in Europe. Those minds which, *nolens volens*, are ever ready to inquire into cause and effect, had, of course, plenty to do to account for the sudden and great popularity of the Royal Water Lily. Some thought it was owing to its interesting history; but that could not be the

case, as its history, however interesting, and however well told in Sir W. J. Hooker's writings, did not exceed in that point that of many other plants which had not received an equal share of popular favour. Others thought that the name which the Water Lily bore was sufficient to answer the question; but however the fact that the name of their justly beloved Queen was associated with it might have influenced the people of England, it could not have done the same in foreign countries. Nor could the flower of the *Victoria*, beautiful as it is, explain the case; for there are flowers far surpassing it in beauty;—nor the curious phenomenon of the high degree of heat developed by the anthers, for that phenomenon is at the best more appreciated by scientific men than by the people, and the experiments of Ed. Otto, Klotzsch, and particularly Caspary, by which it has been placed in a clear light, have only lately been brought to a conclusion. Nothing remains then to account for the sudden and lasting popularity of the *Victoria*, but the dimensions of its leaves. Man is ever fond of strong contrasts; and we, accustomed only in our high latitudes to leaves at the utmost but a few inches across, beheld with astonishment bordering on amazement others, measuring several yards in diameter. But if already the foliage of the

Victoria could produce such a powerful impression, what would be the effect of the sight of a leaf of *Raphia taedigera*, which, though not entire like that of the Royal Water Lily, covers a surface of no less than two hundred square feet, and which is probably the largest foliaceous expansion in the Vegetable Kingdom?

Raphia taedigera, Mart., the Jupati of the Lingoã Geral, is one of the most striking of the many noble Palms which grow on the rich alluvium of the Amazon. The trunk does not generally exceed six or eight feet in height, and is about a foot in diameter, clothed for some distance down with the persistent sheathing bases of the leafstalks and the numerous spinous processes which proceed from them. These spines are sometimes like those of the Patawa (*Enocarpus Batava*, Mart.), but not so thick and strong. Its comparatively short trunk enables us fully to appreciate the enormous size of its leaves, which are at the same time equally remarkable for their elegant form. They rise nearly vertically from the trunk, and bend out on every side in graceful curves, forming a magnificent plume, seventy feet in height and forty in diameter. "I have cut down and measured," says Wallace, "leaves forty-eight and fifty feet long, but could never get at the largest. The segments,

spread out four feet on each side of the midrib, are rather irregularly scattered, and not very closely set ; they drop at the tips.

“The leafstalk is often twelve or fifteen feet long (below the first segments of the leaf), and four or five inches in diameter, perfectly straight and cylindrical. When dried, it almost equals the quill of a bird for strength and lightness, owing to its thin, hard outer covering, and its soft internal pithy substance. But the Indian values it too highly to use it entire. He splits off the smooth glossy outer covering in perfectly straight strips, and makes baskets and window-blinds. The remaining part is of a consistence between pith and wood, and is split up into laths about half an inch thick, and serves for a variety of purposes. Window-shutters, boxes, bird-cages, partitions, and even entire houses are constructed of it. In the little village of Nazaré, near Pará, many houses of this kind may be seen, in which all the walls are of this material, supported by a few posts at the angles, and fastened together with pegs and slender creepers (*sipós*). The hand may be easily pushed through one of these walls, but as the inhabitants do not trouble themselves with the possession of any article worth stealing, they sleep as composedly as if stone walls and iron

bolts shut them in, with all the security of a more advanced civilization. The same material is also used for stoppers for bottles, and has been found admirably adapted for lining insect boxes, holding the pins securely, and being more uniform in its texture than cork." It is also, according to Spruce, used at Pará for flambeaux. The fruit, a large oblong drupe, has a bitter oily flesh.

The Jupati is the only American representative of the genus *Raphia*, and inhabits exclusively the tide-flooded lands of the Lower Amazon and Pará rivers. "When descending from the Rio Negro to Pará, in the summer of 1852, I observed," says Wallace, "some of our Indians who had made the voyage before, pointing out this tree to their less travelled companions as one of the curiosities of the lower country not to be found in the 'Sertão.' In Africa *Raphia* has two representatives; *R. vinifera*, Beauv. (*Sagus vinifera*, Poiret; *S. Raphia*, Poir.; *Metroxylon vinifera*, Spr.), a native of the west coast, yielding a species of wine, which is termed 'Bourdon;' and *R. Ruffia*, Mart. (*R. lyciosa et polymita*, Comm.; *R. pedunculata*, Palis. de Beauv.; *Sagus pedunculata*, Poir.; *Metroxylon Ruffia*, Spr.), a plant cultivated in Madagascar. All three species are to be met with in our gardens. Their trunks are unarmed,

short, thick, and ringed ; their leaves large and pinnatisect, bearing linear segments, having spinulose midribs and edges ; the spadices grow from among the leaves, and are very large, and much-branched ; the flowers are monœcious, greenish or reddish-brown, and the fruit, a one-seeded drupe, is covered with imbricated scales.

Genus LIII. RHAPIS, *Linnaeus filius*.

Closely related to *Chamærops* and *Thrinax*, and inhabiting the eastern parts of Asia, is the genus *Rhapis*, composed of five species, none of which are either distinguished on account of any high degree of beauty or valuable properties. *Rhapis flabelliformis*, Ait., a native of the island of Liu-kiu and southern China, is cultivated in Japanese gardens for ornamental purposes, and yields excellent walking-sticks, called by the English "ground rattans." *R. Cochinchinensis*, Mart., is used for thatch and pillars.

The *Rhapis* are low Palms, with cæspitose roots and reed-like trunks. Their leaves are terminal and palmate, and their petioles surrounded by a fibrous matting. The flowers

are polygamo-dioecious, and of a yellowish colour. Their fruit is still unknown.*

Genus LIV. SABAL, *Adanson*.

The feelings with which a botanist beholds those members of a Natural Order of plants representing its extreme geographical limits are very much akin to those experienced by the people in general at the sight of the harbingers of Spring, the snowdrop, the crocus, or the early tulip, and hence arises the interest attached to the genus *Sabal*, and especially the *Sabal Palmetto*, Lodd., the most northern species of all the Palms. *Sabal*, like *Chamærops*, belongs to the *Coryphineæ* tribe, and is composed of about half-a-dozen species, all of which inhabit America, between the 18th and 34th degree of north latitude. They are either entirely stemless or have a middle-sized trunk; their leaves are palmate; their flower hermaphrodite, arranged in branched spadices, small, and of a dirty-white or greenish colour. The fruit is a round dark green berry.

* In our gardens we cultivate:—*R. aspera*, Hort. (*Chamærops aspera*, Sieb.); *R. flabelliformis*, Ait.; *R. humilis*, Blume (*Chamærops humilis*, Thunb.; *C. Sirotsik*, Sieb.); and *R. Kwanwortsik*, Hort. (*Chamærops Kwanwortsik*, Siebold).

Three species inhabit the sea-coasts of the United States of America, viz. *S. serrulata*, Ræm. et Schult. (*Chamærops serrulata*, Mich.), *S. Adansonii*, Guernsent (*Chamærops glabra*, Mill.; *C. acaulis*, Mich.; *Corypha pumila*, Walt.; *Rhapis acaulis*, Willd.; *Sabal minor*, Pers.; *S. pumila*, Ell.), and *S. Palmetto*, Lodd. (*Corypha Palmetto*, Walt.; *Chamærops Palmetto*, Mich.). *Sabal serrulata*, R. et S., is found in Georgia and Florida, but nothing is recorded of its useful properties, nor is the species itself well known, systematically speaking. It has a creeping trunk, and resembles *S. Adansonii*, but the fruit is double the size of that species. *Sabal Adansonii* is an almost stemless plant, growing in Carolina, Georgia, Florida, and Louisiana: Pursh calls it a plant of little beauty. It is however not entirely without use, as the pithy part of the trunk is edible. *Sabal Palmetto*, Lodd., the Palmetto of the Americans, is a middle-sized tree, which grows, according to Pursh (*Flora of North America*, p. 240) in Carolina and Florida, as far north as latitude 34° 36'. Its roots contain a considerable quantity of tannin; its wood is used for forming almost everlasting wharfs, and its leaves are manufactured into light and durable hats.

One species is met with in the Mexican States, viz. *Sa-*

bal Mexicana, Mart. "I never saw this Palm attain a greater height than from twelve to twenty feet," says Heller (Bonplandia, vol. ii. p. 157); "in Chiapas and Tabasco I found it planted in regular rows, for the sake of its leaves, used for manufacturing the 'sombrosos (hats) de petate.' It is vernacularly termed Palmato (*i. e.* great Palm) in contradistinction to Palmita (*i. e.* small Palm); for the term 'petate' refers more to the dried leaves used for plating the hats than to the tree itself; moreover a peculiar kind of mats are in Mexico and Central America called 'petates.' The word *petate* seems to be of Aztec derivation, and appears to signify 'covering,' for *tepetate* means 'stony covering.' The leaves are prepared for plating by being dried and bleached in the sun, and then reduced to narrow shreds. The leaves of *Corypha inermis* are said to be devoted to the same purpose; but as I have not seen that Palm, I cannot speak from personal experience about it."

The West Indies produce several species of *Sabal*, but our knowledge of them is as unsatisfactory as that we possess of the North American ones. We are even uncertain, or at least have no positive proof, that the best-known species, *S. umbraculifera*, Mart., is a native of that archipelago, as has generally been supposed. Mr. John Smith,

of Kew, says, in one of his memoranda :—“ *S. umbraculifera*, Mart. (*S. Blackburniana*, Hort. Angl., *Corypha umbraculifera*, Hort. Germ.) is the plant called, in the last edition of ‘ Hortus Kewensis,’ *Corypha umbraculifera*, and the two large specimens of it in the Royal Botanic Gardens at Kew were for many years so called ; but although we have long known this species to be quite distinct from the well-known *Corypha umbraculifera* of the East Indies, yet we are still uncertain about its native countr: it is generally supposed to be the West Indies, but we can furnish no evidence of that being actually the case. All the specimens cultivated in England are very old, and it is singular that new ones have never, as far as my personal knowledge goes, been imported. It is by some recognized (by its appearance) as the Great Bull or Thatch Palm of Jamaica: that may be correct, but it is singular that, although we have of late years received at Kew both living and dried specimens of Jamaica Palms, yet this species was not among them. Mr. Blackburn informed me that the traditionary history of this plant is that it came from Africa, and that the two specimens in Kew Gardens were the produce of seeds ripened on his specimens, and sent thither ; which, if correct, must be, judging from the appearance of the two specimens at

present (1855), at least sixty years ago. There is a Fan-Palm in Western Africa specifically unknown to us, but that could hardly be identical with this, as the habit of *S. umbraculifera* has more that of the West India type, rendering it probable that this plant is a native of Cuba, as has been asserted."*

Genus LV. SEAFORTHIA, *R. Brown.*

The shores of New Holland and the islands of the Indian Archipelago are the native countries of this genus, which by some authors is restricted to a very few species, by others made to include a considerable number of those generally grouped together under *Areca*. As I have already mentioned several species under the latter genus, the few words I shall have to say about *Seaforthia* will apply to that genus only in its restricted sense. The *Seaforthias* are elegant trees, with unarmed ringed trunks, large pinnatisect leaves, bearing reduplicate, eroded segments; the flowers are

* In our garden catalogues we find the following species enumerated:—*Sabal Adansonii*, Guern.; *S. Adansonii*, var. *major*; *S. glaucescens*, Lodd.; *S. Havanensis*, Lodd.; *S. Mexicana*, Mart.; *S. minima*? Nutt.; *S. Palmetto*, Lodd.; *S. serrulata*, R. et Sch.; *S. umbraculifera*, Mart. (*S. Blackburniana*, Hort.); and *S. Woodfordiana*, Lodd.

axillary, polygamo-dioecious, placed on branched spadices, and generally greenish; the fruit is an oval one-seeded berry.*

Genus LVI. SLAKIA, *Griffith.*

Slakia geonomæformis, Griff., the Pinang Rambek of the Malays, is as yet the only representative of this genus,—a genus allied to *Bentinckia* (*Kepplera*), from which it differs in its spathes and ruminated albumen. It is rather common in forests near Malacca. Its trunk is from two to four feet high, about half an inch in diameter, unarmed, and distinctly ringed; its leaves are pinnatisect, with linear segments, and from three to three and a half feet long; its spadices are axillary and drooping, bearing simple spikes, which are often two, but sometimes more, in number; its drupe is blackish-purple, and obovately oblong. In our gardens it is still a desideratum.

* Wendland, adopting larger limits for this genus than I have here done, gives the following list of the cultivated species:—*Seaforthia coronata*, Mart. (*Pinanga*, Bl.); *S. costata*, Mart. (*Pinanga*, Bl.); *S. Dicksonii*, Mart. (*Pinanga*, Bl.); *S. elegans*, R. Brown; *S. Kuhlîi*, Mart. (*Pinanga*, Bl.); *S. latisecta*, Mart. (*Pinanga*, Bl.); *S. oryzæformis*, Mart., and *S. sylvestris* Mart. (*Pinanga Javana*, Blume).

Genus LVII. SYAGRUS, *Martius*.

The Palms associated under the name of *Syagrus* are closely allied to the genus *Cocos*, and inhabit the tropical parts of America. They are unarmed trees, with ringed trunks and terminal pinnatisect leaves, having linear segments; their flowers, appearing in the axils of the leaves, are monœcious, and their fruit is a one-seeded, oblong drupe.*

Genus LVIII. THRINAX, *Linneæus filius*.

The "chip hats," so much worn in warm weather in England, have been ascertained to be made of the leaves of *Thrinax argentea*, Lodd., a member of a beautiful genus of Palms, inhabiting the West India Islands and the neighbouring continent. *Thrinax* is composed of about ten species,† all of which have a low or middle-sized trunk, un-

* The following species are cultivated in European gardens:—*Syagrus amara*, Mart. (*Cocos amara*, Jacq.); *S. botryophora*, Mart. (*Cocos botryophora*, Mart.); *S. campestris*, Herm. Wendl. (*Cocos campestris*, Lodd.); *S. Mikaniana*, Mart. (*Cocos Mikaniana*, Mart.); *S. plumosa*, Herm. Wendl. (*Cocos plumosa*, Lodd.); and *S. reflexa*, Herm. Wendl. (*Cocos reflexa*, Hort. Germ.).—*Herm. Wendl. Index*, l. c. p. 38.

† We cultivate in our gardens—*Thrinax argentea*, Lodd.; *T. excelsa*,

armed, but often clad with the persistent bases of the petioles; terminal, fan-shaped leaves; green or greenish-yellow, hermaphrodite flowers, arranged in axillary branched spadices; and a round, one-seeded berry.

The leaves of *T. argentea* are also manufactured into baskets and other kinds of wicker-work in the West Indies, as well as at St. Albans in Hertfordshire; and they are made into brooms in the Isthmus of Panama, whence the tree has received in the latter country the name of "Palma de escoba" (Broom Palm). The leaves of various other species (*T. parviflora*, Sw., *T. pumilio*, Lodd., *T. multiflora*, Mart., etc.) serve as thatch.

Genus LIX. TRITHRINAX, *Martius*.

In a popular work this genus may be dismissed in a few words. Of its useful properties we know nothing. Only one species, *Trithrinax Brasiliensis*, Mart., growing in the *campos* of the province of Rio Grande de S. Pedro, between the rivers Uruguay and Paraguay, may be said to be the Lodd.; *T. ferruginea*, Lodd.; *T. graminifolia*, Hort. (*T. fragilis*, Hort.); *T. parviflora*, Swartz; *T. parviflora*, Hort.; *T. pumilio*, Lodd.; *T. radiata*, Lodd.; *T. rupestris*, Lodd.; and *T. stellata*, Lodd.—*Wendl. Index Palm.* p. 89.

genuine representative of this genus ; for *T. aculeata*, Liebm., from Central America, and *T. mauritiæformis*, Hort. (both cultivated in European conservatories), are doubtful congeners. *T. Brasiliensis* has an erect unarmed trunk, bearing fan-shaped leaves, hermaphrodite or (by abortion) polygamous greenish-yellow flowers, and one-seeded berries.

Genus LX. WALLICHIA, *Roxburgh*.

Like *Caryota*, to which it is allied, the genus *Wallichia* has the peculiarity of flowering only once during the term of its existence, and having leaves the segments of which resemble the fins and tail of a fish ; but the latter differ essentially from those of *Caryota*, by being pinnatisect instead of bi-pinnatisect. The *Wallichias* form a part of the underwood in the forests of Chittagong, Assam, and the sub-Himalayan range, at Darjeling. They are low, spreading Palms, with reed-like trunks, sometimes creeping (soboliferous) ; their leaves are pinnatisect, and furnished with net-like fibres ; the segments are wedge-shaped, variously eroded, and on the upper surface dark green, on the lower whitish with black dots ; the flowers are monœcio-diœcious ; the

berry, containing a caustic juice, is somewhat dry, one- or two-seeded, oblong, or sometimes oblique, and of a red or white colour.

Wallichia, which commemorates the name of the well-known botanist, Nathaniel Wallich, is composed of half-a-dozen species. *W. caryotoides*, Roxb. (*Harinia caryotoides*, Hamilt., *Wrightia caryotoides*, Roxb.), the Chilputta or Belputta of Chittagong, has long been an inmate of our gardens, and is one of the most characteristic species of this genus. It is an elegant tufted Palm, each tuft consisting of several very short trunks; the leaves, ascending, curved, are eight or nine feet long, two and a half feet broad. *W. porphyrocarpa*, Mart. (*Caryota humilis*, Reinw., *Orania regalis*, Bl., *W. Oranii*, Bl.), has also been for some years cultivated in Europe, as has also been another species, *W. densiflora*, Hook., introduced by Dr. Hooker from the East Indies.

Genus LXI. ZALACCA, *Rumphius*.

The Palms composing this genus are spreading, almost stemless plants, without the whip-like elongations of the petioles, characteristic of *Calamus* and *Plectocomia*, and

others of its allies; the petiole, together with the sheath, are both armed with several series of rigid spines; the leaves are pinnatisect; the flowers are monœcious, arranged in round catkins; the fruit is often scaly, containing from one to three seeds (which latter are like berries). All the species inhabit the forests of the islands and continent of Tropical Asia. *Zalacca Wallichiana*, Mart. (*Z. edulis*, Wall.), the Salac Koombar of Penang, common in swampy places about Malacca, the Tenasserim provinces, as well as in Burmah, has a fruit which, like that of the Salac Batool (*Z. affinis*, Griff.) and the Rungum of Malacca (*Z. macrostachya*, Griff.) is edible. The petioles of the leaves of *Z. macrostachya* when split are used for tying on *Atap* of house-thatch, composed of the leaves of *Nipa fruticans*, and are also made into baskets and other descriptions of wicker-work. Nothing is recorded of the other species of this genus,—for instance, the Assam-Koomber of Penang and the Assam-paiah of the Malays of Malacca (*Z. conferta*, Griff.), and the Salak of Penang (*Z. glabrescens*, Griff.)*

* We cultivate in our gardens:—*Zalacca Blumeana*, Mart. (*Z. edulis*, Bl.), and *Z. Wallichiana*, Mart. (*Z. edulis*, Wall.).—*Wendl. Index Palm.*, p. 41.

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