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PHYSIOGNOMY

OF

TROPICAL VEGETATION

IN

SOUTH AMERICA;

A SERIES OF VIEWS

ILLUSTRATING THE PRIMEVAL FORESTS

ON

THE RIVER MAGDALENA

AND IN

THE ANDES OF NEW GRANADA,

WITH

A FRAGMENT OF A LETTER FROM BARON HUMBOLDT TO THE AUTHOR,

AND

A PREFACE BY FREDERICK KLOTZSCH;

BY

ALBERT BERG.

LONDON:

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1854.

TO

HIS ROYAL HIGHNESS THE REIGNING GRAND-DUKE

FREDERICK FRANCIS

OF

MECKLENBOURG-SCHWERIN,

THIS WORK

IS MOST GRATEFULLY DEDICATED

BY

HIS ROYAL HIGHNESS'

MOST FAITHFUL—AND HUMBLE SERVANT,

ALBERT BERG.

PRELIMINARY REMARKS.

The object of the present work is to describe the landscape physiognomy of the vegetation of an interesting portion of tropical America. Powerfully excited by Baron Alexander Humboldt's writings, the artist has himself visited the tropical regions, has studied them diligently and accurately, and, however imperfect his delineations may be found, he can at least vouch for their faithfulness. May they prove an aid to the imagination of those, who, equally with himself, stimulated by the inspired descriptions of the great master, would wish to picture to themselves those regions, so exceedingly favoured by nature.

To figure to ourselves something totally unfamiliar to our minds, without a visible representation of the object, is at all times a difficult matter. Most of the component parts of a landscape, the rocks and the mountains, the air and the clouds, the hue of the water and the swell of the ocean, though presenting a great variety in their particular features, yet, upon the whole, bear a certain resemblance all over the globe. We have, in this instance, but modifications of what we behold daily in our own country; hence, the facility with which the imagination conceives such objects. But it is different with vegetable productions. Here, the different zones present a multiform variety, such as the most vivid imagination is unable, without being assisted by illustrations, to realize.

Of detached plants, specimens from the hot-houses certainly convey a more lively picture than any illustration, but not so as regards their appearance in groups, or those larger forms of the vegetable kingdom, which, in fact, determine the character of the landscape. The artist will be happy, if he has succeeded in contributing some small share to a more intimate acquaintance with the landscape physiognomy of the vegetation of tropical America.

PREFACE.

Any discussion of the question whether every work should have a preface, however exhaustive in itself, would be out of place here, as it is very seldom that any body ever thinks of reading a preface at all. But the author, who is my intimate friend, has just undertaken a tour of art to the Greek Islands at the command of His Majesty, and is thus prevented from writing the preface himself. At the risk, therefore, that no one will ever read the few words which I have willingly promised the author to say in his behalf, I shall state shortly, by way of general explanation, such points as may appear to me sufficiently important to deserve mention.

The author, who is an extremely talented young man of about eight and twenty years of age, has distinguished himself by the great variety of his learning and accomplishments, and notwithstanding the delicacy of his constitution, possesses energy, industry and perseverance in a degree in which such qualities are seldom found united. After he had commenced the study of the law, for which profession he was originally intended, the strong bent of his mind towards art manifested itself so decidedly, that it was impossible to mistake any longer his true calling, and the specimens of his talent which authorized great expectations, justified the determination which he formed with the approbation of judges of such subjects, to exchange the study of law for that of art. From this time he lived entirely for art, and with the assistance of celebrated masters soon succeeded in acquiring the mechanical advantages of a rational school, without however his own genius being thereby prevented from making itself felt.

His study of nature commenced with a residence of some years in Switzerland, which was immediately succeeded by a tour in Italy. He had already enjoyed the favour of H. R. H. the Grand Duke of Mecklenbourg-Schwerin, who fully apprcciated his talents, and whose invitation to accompany him on his travels he now joyfully accepted. He accompanied the Grand Duke to Sicily and Turkey, remained some time in Constantinople, and made a little excursion to the Troad. Having returned to Germany in 1848, he commenced the necessary preparations for a voyage to New Granada, part of the results of which are to be found in the present work. His ardour for this enterprise had already been inflamed by the incomparable descriptions of Alexander de Humboldt, the pride of our millenium.

Having arrived in New Granada in the beginning of October, Mr. Berg had the opportunity of studying the hot district of the Magdalen River in the rainy season, and the mountains of the Quindiù during the dry season.

Though it is far from my intention to pass any critical judgment on the artistic merits of the following plates (which the author has himself lithographed from his own designs), I may be allowed to observe, that they give evidence of a power of grasping the characteristic features of a landscape, with extraordinary life and spirit, as also of very masterly handling. I can further assert that the manner in which the habitual peculiarities of the individuals have been both conceived and executed, is so successful, that it may be recommended to the professional botanist as a pattern of excellence. But these plates possess great interest not only for systematic Botany, but in a still higher degree for geographical Botany,—a branch of learning, which has been raised by our illustrious countryman Baron Humboldt to the rank of a very important science. They are also of great value for the study of Æsthetics in general, but more especially for that of the landscape-gardening,—which if it has recourse to such sources as the plates before us, by the substitution of representatives offering similar changes of form, promises great and hitherto unanticipated results.

Those virgin forests, the originals of the present system of creation, are indeed also exposed to the influences of the seasons, in the same manner as we are accustomed to perceive them in the temperate and colder regions of our globe, but not in the same degree. Those plants for instance, which lose their leaves during the dry season, or the period of whose growth is limited to a definite time, are to be met with far more rarely there, than with us. The effort occasioned by the metamorphoses of the leaves, or by the transformation of the leaves into more highly developed organs, requires rest more rarely there, than is the case with our leaved wood and shrubs. The distinction which is there determined by the wet and dry seasons, corresponding to our Winter and Summer, is only very slightly marked in the development of the vegetable world. A so-called winter-sleep, the reasons of which are never to be sought in any fall of temperature, but entirely in the specific peculiarities of the plants, is almost exclusively confined in those forest regions, to the representatives of the Bignonias, Bombacineas, Marcgravias, Aroideas, Cyclantheas, and the Leguminosæ; and changes in the physiognomy of the vegetable world, when they do occur, are solely dependent upon such events as Nature herself may present.

This, however, is by no means the case with the physiognomy of our own forests, which have for the most part lost their original character through our artificial encroachments. We can indeed determine with certainty, that their characteristics were produced by the common British Oak, the sessile-fruited Oak, the common Beech, the Hornbeam, the Birch, the Alder, the Willow, the Elm, the Scotch Fir and the Austrian black Fir, etc., but we are quite unable to state in what proportions these trees were to be met with, as we possess no pictorial representations of our primæval forests similar to those in the plates before us. Neither are we able to say whether the so-called Pear-tree, the Apple-tree, the *Prunus Avium*, and other trees which are frequently met with in our forests, really belong to our country, or whether they have been brought here and afterwards have grown wild, nor do we know where they come from.

The appearance of our forests changes with nearly every fresh generation of man, and it requires no prophetic spirit to be able to foretell that these changes will increase in the same ratio that science succeeds in bringing the experience of practicable vegetable physiology into general application. As confirmation of this position I will adduce a single example. It is a well known fact that the actual value of a forest is in proportion to the amount of carbon it contains. It has further been confirmed that the development of the seeds consumes a much larger proportion of carbon than all the other parts of the plant. Mules or mongrels which are produced by the crossing of the organs of fructification of two legitimate species, have the remarkable and invariable property of forming no seeds, because the pollen which is formed in the anthers of such blossoms, does not possess the power of developing its pollen-tubes, which are absolutely necessary to the act of fecundation. But the carbon which in legitimate species is employed in the formation of the seeds, can be diverted to the formation of the wood in the Mule-species, and this is found to be actually the case, without the slighest injury to the wood, in respect either of its durability or of any of the numerous purposes to which it may be applied. On the contrary, the microscopical analysis of the wood of bastard-trees, has shown that the membranes of the cells are thicker than in the wood of legitimate species from which they were produced; and this justifies the conclusion, that notwithstanding its more rapid growth, the wood of bastard-trees gives promise of a greater degree of firmness than we have been accustomed to find in the wood hitherto employed. Bastards bear in their habit unmistakeable traces of the characters of the parent plants, but they invariably differ from the latter in the much greater rapidity of their growth, as also in their general appearance, and if planted together therefore in greater numbers, are calculated to change the physiognomy of the landscape.

The subject to which I have above alluded is one of great financial importance to every country, and well deserves the attention of governments. Should it at some future time be adopted in practice on a larger scale, it will conduce very materially to the interest of the state. A very few years are sufficient to enable us to recognise the advantages of this procedure, and very few trials are necessary to produce conviction that the necessary manipulations are extremely easy and attended with very little trouble. For this purpose I would recommend the fecundation of the Scotch Fir (*Pinus sylvestris*) with the pollen of the Austrian black Fir (*Pinus nigricans*), of the common British Oak (*Quercus pedunculata W.*) with the pollen of the sessile-fruited Oak (*Quercus Robur W.*), of the common small leaved Elm (*Ulmus campestris L.*) with the pollen of the Wych-Elm (*Ulmus montana Smith.*) and of the common Alder (*Alnus glutinosa*) with the pollen of the white Alder (*Alnus incana.*) In the above mentioned examples of Pines, Oaks and Alders, which belong to those plants whose blossoms possess separated sexes, it is only necessary, that before the full development of the female organs and for a certain period after the fecundation has taken place (which is effected by means of a dry-hair pencil), the female blossoms which are used in the crossing, should be carefully enveloped in some cotton texture, admitting the access of the air but excluding the pollen of the male blossom of the same plant. The reception of the pollen of a different species takes place most readily when the sky is bright and clear, and in the morning hours between six and nine. Dull rainy weather is unfavourable even to the normal act of fecundation, but still more so to the abnormal process effected by crossing. The stigma which is susceptible of conception exudes either a vaporous, or a moist, sticky, sometimes even a fluid juice. This property ceases immediately after the act of fecundation has been completed, while in the case of the pollen being entirely excluded, or only indifferent dusty matter being sprinkled upon it, the humidity of the stigma continues for a longer period. This stadium is the one best calculated for the application of the pollen and thus effecting the crossing. The pollen preserves for several days the property it possesses of forming pollen-tubes, as soon as it is brought into connection with the slimy fluid secreted on the stigma, and may therefore be collected for this purpose several days before.

Fr. Klotzsch.

Schoeneberg, near Berlin,
Jan. 1854.

FRAGMENT OF A LETTER

OF

BARON ALEXANDER HUMBOLDT TO MR. ALBERT BERG.

If in the noble creations of painting our imagination delights to find animated pictures of exotic scenery, this enjoyment is by no means exclusively confined to the majestic in the forms or in the richness and wild luxuriance of the soil which such pictures may present, but is at the same time reflected in our understanding. It reminds us of the intimate relation between the distribution of forms and the influences of climate depending on the altitude of the plateaux, as also on the latitude. It is this relation which, by presenting to us the wonders and peculiar characteristics of the vegetation, renders that, which at first seemed only picturesque, both instructive and suggestive in the field of Physical Geography.

Before I enter, my dear Sir, upon the charm spread over the delightful pages which you have brought from the tropical regions of South America, I have thought it right to determine the point of view from which I consider the publication of the drawings you were kind enough to present to me, both as useful and desirable in a high degree. These happy conceptions, displaying at once fine talents and the inspiration of a deep love of nature, will possess an interest all the greater, inasmuch as they refer to countries which had not yet been visited by distinguished artists. Speaking generally, it is only within the last few years that any persons have devoted themselves with much interest to the representation of the great forms of the equatorial zone, and their varied groupings under their real *physiognomical* aspect. Your work is quite worthy of appearing at the side of those of your illustrious predecessors.

Having lived for several years with my excellent friend M. Bonpland on the declivity of the great Cordillera de los Andes, and in the very same countries which you have visited, I must bear testimony to the admirable truth with which you have succeeded in representing not only the interior of the virgin forests, but also that alpine vegetation of the Cordilleras which offers an entirely different character. You have not contented yourself with seizing the type of the greater productions of the vegetable world by placing them in the foreground, but you have also represented their individuality and that curious interlacing of the roots above the soil, of which the forests of our temperate zone offer no example. The drawings of the passage of the Cordillera in the *Paramo de Quindiù* which you are going to publish, will give great interest to your work. The breadth of the chain interrupted by valleys and ravines is so considerable, that not wishing to be carried in a little chair of Bamboo reeds on the backs of the natives, I required twenty-four days for my journey from the small town of Ibagué to that of Cartago. I have found the highest point of this route, that of the division of the waters, to be at an elevation of 1798 toises (10788 Par. feet) above the level of the South Sea. It is the *Garita del Paramo* where we have encamped in a portable hut made of the large leaves of the Marantaceæ, and is almost 600 feet higher than the summit of Etna. In a much more southerly passage of the Cordilleras, at the *Paramo del Assuay* (S. Lat. $2°\frac{3}{4}$) between the towns of Alausì and Cuença, I have found the highest point of the route at the *Ladera de Cadlud* at an elevation of 2428 toises (14568 Par. feet), which is nearly the height of the summit of Mont Blanc. The Paramo de Quindiù presents the very extraordinary phenomenon of a group of Palm-trees which may be classed amongst the *alpine plants*. To this group belongs the *Wax-palm* (*Ceroxylon Andicola*), the *Palmito del Azufral* (*Oreodoxa frigida*) and the *Caña de la Vibora* (*Kunthia montana*). Whilst the family of the Palm-trees generally only vegetates in the tropics in a zone where the mean temperature of the air is from 22° to 24° of the centigrade thermometer, and is not found on the declivity of the Cordillera at a greater elevation than 2000 or 2500 feet, the alpine Palm-trees which we have just mentioned are first found at Quindiù (with a northern latitude of 4°26′ to 4°34′) at an elevation of 6000 feet with a superior limit of 9000 feet. This is a region which in this zone is still 5400 feet from the inferior limit of perpetual snow, and in which, according to my observations, the thermometer often falls in the night to 4°, 8 and to 6 above the freezing point. To you, my dear Sir, belongs the great merit of having been the first to represent the physiognomical traits of the Wax-palm, whose majestic and slender form, according to the stems which I ordered to be cut down, attains a height of 160 to 180 feet. The drawings in which you have represented these Palm-trees are the most graceful ornament of your work.

The association of the Wax-palm with the Coniferæ (the yewtree-leaved *Podocarpus*) and the Oaks (*Quercus Granadensis*, similar to our northern Oaks) forms as remarkable a contrast as the mixture of Palm-trees

with Pines (*Pinus occidentalis*) and with the *Mahogany* (*Swietenia Mahagoni*) of the warmer regions of the *Isla de Pinos* in the south of Cuba, and in the *Pinal* of the *Cayo de Moya* in the north of Cuba, which Christopher Columbus already mentions 'with astonishment' in his Journal of Navigation of November 1492. Types which we call northern, supposing them to belong exclusively to cold and temperate regions, appear again with the same *facies*, but in very different species, in the tropical regions of America and the Indian Archipelago. It is this circumstance which occasioned me to say in one of my earliest works, that the inhabitants of the equator, where the climates follow each other on the plateaux as on different stories, have the privilege of contemplating at the same time all the stars which glisten in the vault of heaven, and almost all the forms of vegetable life.

The view of the volcano of *Tolima*, which may be enjoyed from several points of the eastern side of Quindiù, has supplied the subject of one of your most picturesque sketches in Plate III. The volcano, which is of a very regular shape, and like the *Cayambé de Quito*, rises in the form of a truncated cone, forms the background of the landscape; while in the foreground, the soil is perceived to be encumbered with a most luxuriant growth of the tree-fern, the Heliconia and Passiflores, which climb to the top of the trees. It is a great advantage of your collection, that, through the care of an excellent botanist, Dr. Klotzsch, my friend and colleague at the Academy of Berlin, you have been able to add to your drawings the botanical names of a great number of species, and this with the greatest accuracy. As this learned man is Director of the great collection of the Herbarium, he has been able to consult the reports of M. Bonpland and myself, in which we have indicated the localities, as also the descriptions given by M. Kunth, in our '*Nova Genera et Species Plantarum*.' In your beautiful drawing, the vast snowy masses appear in the horizon through a clearing in the forest. They stand out against the azure of the tropical sky at an apparent but illusive proximity. A formidable eruption of the *volcano of Tolima* took place on the 12th March, 1595, and devastated the entire province of Mariquita, since which time it seemed almost extinguished. A celebrated chemist, M. Boussingault, accompanied by M. Gondot, the botanist, ascended it to the height of 13,240 feet, which is very near to the region of perpetual snow, in order to examine the composition of the vapours emanating from the clefts of *trachytic* rock, which has itself emerged from the bosom of a formation of *micaceous and amphibolic schist*. Recently the volcano has again been in activity. It deserved a place in your work and in my views of the Cordilleras, all the more, as it seems to me to be the loftiest summit of the whole northern hemisphere of the New Continent. I made a trigonometrical measurement of the Tolima in the valley of the Carvajal, on the west of Ibagué, and found it 384 feet higher than the Popocatepetl, the great volcano of Mexico.

Descending with you, my dear Sir, from the heights of the Cordilleras, to the lower regions of the valley of the Magdalena, I take much pleasure in bearing the same testimony to the truth with which you have seized its character. Having passed fifty-six dull days in navigating this great river, I had sufficient time to become acquainted with the distribution of its vegetation. The affectionate interest which I take in yourself, induces me to advise you to leave to your interesting drawings, so excellently drawn upon stone, that character of sketches which they have had in their original state. All later additions to objects of which we received happy inspirations, take off a little from the spirit of the drawing. I do not mean to say that the technical perfection of a drawing carefully finished on the spot, may not add to the effect and to the truth of the character of the landscape; but a traveller in his rapid progress through places difficult of access, is very seldom in a position to finish his sketches at leisure. The travels in a beautiful part of the East, which you were so happy as to make before your journey to New Granada, have fortunately prepared you to seize with talent in different zones the aspect of the forms which are the real elements of the beauty of a landscape.

Potsdam, May 1853.

NEW-GRANADA.

The studies for these illustrations have been compiled in New-Granada, between the 4th and 12th degree of northern latitude, principally on the river Magdalena, in the eastern Cordillera between Ocaña and Santa Fè de Bogotà, and in the Cordillera de Quindiu, on the mountain pass between Ibaguè and Cartago. These two great mountain-chains issue from the knot of the Paramo de Guanacos, where there is likewise the source of the Magdalena river, along the banks of which, diverging but slightly, they then run at some distance from each other in a northern direction. Spurs of both chains project on various spots close to the river, which, at Honda, they finally contract. Here the great valley widens. The Cordilleras stretch a considerable distance along the river, as far as almost the eighth degree of latitude, where the Cordillera de Quindiu loses itself in the plain. The river then bends to the north-west, joins the Cauca, and flows into the vast plain, which is bounded in the north by the Caribbean sea.

Nearly all the climates of the globe are to be met with here in a small space. Thus, while on the coast and on the banks of the Magdalena a middle temperature of 28° (C) prevails, the summits of the Cordilleras rise to the heights of everlasting snow.

Here the landscape elements are found in a rare abundance: the mighty river, the primeval forest of the plain and of the mountains in the greatest variety, and the picturesque dwellings of the natives, raised amidst Bananas and Sugar-cane, and overshaded by Coco-palms and powerful Ceybas. The eye of the traveller now roves from the declivities of the mountains over the vast wooded plain of the Magdalena river, or glides over an ocean of clouds to the summits of the mountain-chain opposite, rising from it like islands; now he beholds himself confined amidst deeply furrowed Alp-vales, here wildly cleft, there clothed with a lovely vegetation and refreshed by rapid torrents. From the wonderful magnificence of blossom of the Paramo-shrubs, the traveller, having quitted the extreme Oak-forest, ascends the naked rock, where an icy wind lashes ragged clouds through the rarified air. Here, save where bare cliffs or majestic summits, capped with snow, stare heavenward, he beholds, as far as the eye can reach, nothing but thick, uninterrupted forest, which everywhere covers the land. This forest assumes the most different aspects, according as the local conditions vary, and, by its endless variety, strikes the traveller with ever renewed astonishment and admiration.

The Quindiu Mountains.

A toilsome mountain-path leads from Ibaguè, across the Cordillera de Quindiu to Cartago. It is but a short time, since this Andes-pass has become fit for crossing with the mule, though still with much trouble and not without danger. Many native travellers prefer even now being borne across by Cargueros or Cargadores, whose step they deem safer and more convenient than that of the beasts of burden. These Cargueros are mostly Indians of an incredible strength and perseverance. For a small sum these poor fellows carry the traveller on a light Bamboo-chair, which is fastened to their backs in the manner of a basket, up the steep, slippery paths across the impassable mountains.[1] The mules, it is true, often choose the very brink of the path, running along precipices, and one is often compelled, in travelling over long tracts of the dense forest, to stoop low over the neck of the animal, for fear of being dragged down by overhanging branches and creeping plants. The magnificence of nature, however, is an ample compensation for all the hardships one has to undergo. The aspect of the landscape is absolutely grand. The mighty sides of the valley are clothed to their summits with dense primeval woods, and the brilliant snow-capped cone of Tolima rises giant-like into the clouds. Now, one rides along a steep declivity, covered but slightly with vegetation, through which foaming torrents are rushing; now one finds oneself amidst the profound darkness of the primeval forest, or in a narrow defile, arched over by graceful Palmettoes.

[1] Baron A. Humboldt. Vues des Cordillères.

The vegetation of the Quindiu is declared to be one of the most vigorous, even by such travellers as are acquainted with other parts of the tropics. The landscape physiognomy acquires a special peculiarity by two species of Palms, rising high up the mountains; these are the Wax-palm (Ceroxylon Andicola)[1] and the Oreodoxa frigida,[1] a Palmetto. The former is perhaps the tallest species of Palm known; it forms straight trunks of 180 Paris (10 Paris feet equal to 10 feet, $\frac{89}{100}$ inches English) feet high,[2] which on their surface produce an exsudation of white dust; this, being scraped off and melted, yields a wax fit for giving light. This Palm, in dense forests, intermixed with leaved wood, attains a height of 9100 (Par.) feet above the level of the sea,[3] while the lower boundary of the perpetual snow, in these valleys of the Andes, is at 14640 (Par.) feet.[4]

The eye, if not veiled by the darkness of the forest, loves to look down the sunny dells, or to pursue the light clouds as they gather of an evening in the valleys, move along the declivities and are caught by lofty Palms. In the higher regions of the mountains the Wax-palm forms forests of a great extent, and, far as the eye can reach, the mighty ridges are here clothed with its white trunks, which, bursting forth from amidst the dark leafy roof of dicotyledonic trees afford the beautiful sight "of a forest above a forest."

[Observation: The plants marked in the text with a † may be identified by referring to the index and the plate accompanying it.]

Ad fol. 2.

A hollow above the Quebrada del Toche, about 6500 *feet absolute height.*

Moisture and shade, such as are met with in a narrow ravine, produce a particularly fresh and luxuriant vegetation. Here Heliconias† grow in great vigour; between them, tall Solanums†, bearing leaves of three feet length. The slender Palmetto, Oreodoxa frigida†, too, loves these shady spots and their trunks are thickly covered with the climbing grass, the Chusquea scandens† (Bambuseæ)[5]. The delicate Palms are shaded by the denser foliage of Lecythis dubia† and other dicotyledonic trees. Besides the Solanums, Thevetias† and gigantic Aroideas† are found growing, and here and there a fern-tree (Alsophila) lifts its curly head. Everywhere creepers are ramping in the loftiest trees, and hanging down in graceful tendrils. In the dark ravine a deep silence prevails, broken only by the loud dropping of water from the trees; for these forests are real condensators of the atmospheric moisture, and, even in sunny weather, are in a constant state of humidity, whereby a beautifully fresh and brilliant colouring is produced.

On the ground are seen, in a motley confusion, shrublike Crotons (Euphorbiaceæ), Ocotea mollis, O. macrophylla (Laurineæ),[6] Citrosma macrophyllum (Monimieæ),[7] Ardisias (Myrsineæ),[8] Symplocos (Styracineæ),[9] Aralia Quinduensis (Araliaceæ),[10] Berberis Quinduensis (Berberideæ),[11] Schmidelia occidentalis (Sapindaceæ),[12] Fuchsia Quinduensis (Onagreæ),[13] several Melastomas, for instance Melastoma coronatum, and Rhexias (Melastomaceæ); — and herblike — several species of the Salvia genus (Labiatæ), Beslerias (Gesneriaceæ), Mutisia grandiflora, Espeletia grandiflora (Compositæ),[14] Oxalis hedysaroides, O. Schraderiana and O. scandens (Oxalideæ) and Moñina parviflora (Polygaleæ).[15]

Ad fol. 3.

Primeval forest at an elevation of about 7000 (*Par.*) *feet; in the distance Mount Tolima.*

Mount Tolima, 17280 (Par.) feet high,[16] is the culminating point of the Quindiu mountains, and, unless the Sierra nevada de Santa Marta prove higher, the most elevated summit north of the equator in America. Its conical shape shows it to be a volcano, and its activity as such is still in the memory of the inhabitants of Ibaguè; even to this day it is said, according to the statements of the Indians, who collect brimstone by the sides of the mountain, to exhale vapours from some of its fissures.— The sight of the perpetual snow makes a particularly strong impression, where it is seen in contrast to the abundance of tropical vegetation. Thus, Mount Tolima, where the forest suddenly begins to clear, appears as in a frame of most luxuriant plants. The dazzling whiteness of the large masses of snow, and the deeply saturated verdure of the foliage, the glaring fields of ice and the exuberance of aboriginal forest, as here viewed at one glance, form the most striking contrasts.

[1] Kunth, Synopsis plantarum æquinoctialium orbis novi. vol. IV. p. 355. [2] Baron A. Humboldt, Aspects of Nature, translated by Mr. Sabine, two vols. in one. London, 1849, vol. II. p. 139. [3] Ibid. p. 128. [4] Baron A. Humboldt, Observations astronomiques, vol. I. p. 302. [5] Baron A. Humboldt, Aspects of Nature, vol. II. p. 183.— Kunth, Synops. pl. vol. IV. p. 353. [6] Kunth, Synops. vol. IV. p. 363. [7] Ibid. p. 364. [8] Ibid. p. 373. [9] Ibid. p. 373. [10] Ibid. p. 381. [11] Ibid. p. 383. [12] Ibid. p. 383. [13] Ibid. p. 390. [14] Ibid. p. 375, 378. [15] Ibid. p. 389. [16] Baron A. Humboldt, Observations astronomiques, vol. I. p. 302.

Those clear spots possess moreover an additional charm in their vegetation. Here, where the dense forest is interrupted by an unevenness of the soil, or by some rill of water, the plants, which form the underwood, appear in a particularly beautiful development, while, in the thicket of the forest, they grow in an exuberant and chaotic manner, appearing often but as an irregular confusion of boughs, leaves and blossoms of various hues and formations.

Solanums† grow here, and the Heliconia villosa†, bearing a beautiful red blossom; young Wax-palms (Ceroxylon Andicola)† and Palmettoes (Oreodoxa frigida)† break vigorously forth through the underwood. Between them, trunks of Myroxylon† (Leguminosæ)[1] and Urostigma† (Artocarpeæ) are rising, richly overgrown with Passifloræ (P. manicata, P. difformis, P. longipes),[2] with Aroideæ and Bromeliaceæ†, and overshading graceful Fern-trees†. Here, too, are found Piper rude, Peperomia foliosa, Peperomia mollis (Piperaceæ),[3] Galium piliferum (Rubiaceæ),[4] Soliva pygmæa (Compositæ),[5] Lobelia Surinamensis (Lobeliaceæ),[6] and Salvia tortuosa (Labiatæ);[7] then Croton costatus (Euphorbiaceæ),[8] Witheringia rhomboidea and Witheringia riparia (Solaneæ),[9] Besleria sanguinea, B. elegans, B. calcarata (Gesneriaceæ),[10] Citrosma echinatum (Monimieæ),[11] and the Cyperaceæ: Cyperus melanostachys, Mariscus flavus, Scirpus montanus.[12] Then Pothos myosuroides (Aroideæ),[13] Bomaria floribunda (Amaryllideæ),[14] Desfontainia splendens (Solaneæ).

Ad fol. 4.

Forest on the ridge between Buena vista and the Quebrada del Toche, about 7000 (*Par.*) *feet abs. height.*

The passage through the Quindiu mountains is almost continually up and down hill. Only on the top of the ridge, which rises above the Quebrada del Toche, the path, for a short distance, is tolerably even. Here we meet with a very beautiful forest of lofty trees, and in the flat hollows, which partly get filled with water in the rainy season, Palmettoes and tree-ferns grow in a wonderful exuberance and vigour. The fronds of the young Oreodoxa frigida† here often attain such astounding dimensions, that, on comparing them with older specimens, one is scarcely able to identify them.

The Clusia volubilis is here frequently seen ramping in the trees, whose trunks, as well as the stems of Palmettoes and Fern-trees, are covered with Bromeliaceæ and other epiphytical plants, wherever there is a spot left bare by the creepers. The underwood consists of Psychotria hirta (Rubiaceæ)[15] and Citrosma petiolare (Monimieæ),[16] intermixed with Solaneæ† and Aroideæ†, which latter climb the very tops of trees.

Among the herbs we find Eryngium Humboldtianum (Umbelliferæ),[17] Ranunculus geranioides (Ranunculaceæ),[18] Hypericum stellarioides (Hypericineæ), Oxalis lotoides (Oxalideæ); a highly graceful grass, Olyra arundinacea, and Scirpus trichoides.

Ad fol. 5.

Declivity near the Alto de las Sepulturas, about 8000 (*Par.*) *feet high.*

In the cooler regions, at heights of 8000 to 9000 feet, the vegetation begins to thin. The growth of the trees and the underwood still continues vigorous; the creeping plants, however, appear no longer in the same abundance as rather lower down. Powerful trunks of Ceroxylon† rise above the dark-leaved Oak-forest (Quercus Tolimensis†).[19] Podocarpus taxifolia and densifolia[20] (a yewtree-like conifera) grow beside the Oreodoxa frigida†, and the Gunnera pilosa (Urticeæ)[21] projects its large, sharp, dark green leaves between Salvia sagittata (Labiatæ),[22] Petitia Quinduensis (Verbenaceæ),[22] Loasa papaverifolia (Loaseæ),[23] Luzula gigantea (Junceæ),[24] Scirpus exiguus (Cyperaceæ),[25] Melastoma rubiginosum (Melastomaceæ),[26] Aralia jatrophæfolia (Araliaceæ),[27] Fuchsia Quinduensis (Onagreæ).[28]

Ad fol. 6.

Palm-forest near El Gallego, above 8500 (*Par.*) *feet high.*

At a height of nearly 9000 feet a kind of shed for travellers has been raised on a jut of the mountain. It is

[1] Kunth, Synops. pl. vol. IV. p. 394. [2] Ibid. p. 362. [3] Ibid. p. 348. [4] Ibid. p. 379. [5] Ibid. p. 378. [6] Ibid. p. 375. [7] Ibid. p. 366. [8] Ibid. p. 360. [9] Ibid. p. 369. [10] Ibid. p. 368. [11] Ibid. p. 364. [12] Ibid. p. 350. [13] Ibid. p. 349. [14] Ibid. p. 354. [15] Ibid. p. 379. [16] Ibid. p. 364. [17] Ibid. p. 382. [18] Ibid. p. 382. [19] Ibid. p. 358. [20] Ibid. p. 358. [21] Ibid. p. 359. [22] Ibid. p. 366. [23] Ibid. p. 390. [24] Ibid. p. 353. [25] Ibid. p. 350. [26] Ibid. p. 391. [27] Ibid. p. 381. [28] Ibid. p. 390.

constructed of rude trunks, and covered with Palm leaves, and, though open at the sides, yet it affords some protection against the rain, in a spot, where, in the absence of this shed, the wayfarer would have to pass the cool nights without any shelter against the inclemencies of the sky. The spot is called El Gallego. Immense steeply sloping mountain walls here form a valley of wonderful grandeur. Majestic Wax-palms† rise from the depth, breaking through the dark foliage of the Oak-forest†. The Oreodoxa frigida† is here of a more slender growth than in the lower parts ; its fronds however are not so rich and luxuriant. Alpinias†, Escallonia myrtilloides, E. Tubar (Escalloniaceæ),[1] Trigonia sericea (Trigoniaceæ), Thibaudia scabriuscula and Th. longifolia (Vaccineæ),[2] Lycium gesnerioides, the beautiful shrub-like ilex-leaved Desfontainia splendens (Solaneæ)[3] and Bacharis polygalæfolia (Compositæ)[4] cover the declivities with an abundance of shining green leaves and with a beautiful variety of blossoms. Tree-ferns† even here like to be shaded by larger trees. A species, nearly akin to our wild strawberry (Fragaria vesca), grows on the ground with Klaprothia menzelioides (Loaseæ)[5] and Rubia scabra (Rubiaceæ),[6] while the graceful Passiflora glauca is climbing on the shrubs.

It is difficult, while staying in these lonely parts, to procure the necessary provender for the mules. They are usually left to themselves, two bars being drawn across the road at some hundred yards distance on each side from the shed, to prevent their running away. Through the forest they cannot escape, the underwood being too dense. The scanty grass on each side of the road is soon consumed, and they eat but reluctantly the leaves of the Chusquea scandens and some Palms, which the muleteers cut for them. Here companies of native travellers, coming from opposite directions, often meet in the evening. A large fire is then lighted outside the shed, and travellers have an opportunity of displaying their talents for the culinary art. Rice, Bananas, Potatoes, and some game shot on the road form the ingredients of the repast, and savoury Cocoa refreshes the weary wanderer.

The groups of dark figures, which, chilly, and closely wrapped in their large Ponchos encircle the fire, present a highly picturesque appearance. The bold outlines of the surrounding forest stand out darkly against the sky, and the white trunks of the Wax-palm, glittering in the reflex of the reddish flame, are set off brilliantly by the darker sky and foliage.

Ad fol. 7.

Oaks and tree-ferns at a height of 6500 (*Par.*) *feet.*

The Quindiu mountains greatly abound in tree-ferns. In spots, particularly favourable to their development, viz. on moist, shady declivities, most different species of them are often seen together on a small space of ground. Here a slim, naked trunk rises to a considerable height, adorned with a few downbent, tapering fronds, whose leatherlike, finely designed pinnuls are of a dark hue (Cibotium†, undescribed species); there, the shorter trunk, covered with brown fibres is furnished with a rich dense crest of decompound fronds, of a beautiful light green colour (Alsophila†). In some species the fronds adhere to the trunk long after having withered, forming closely beneath the crest, a thick dark reddish tuft, with which the light green of the younger shoots strikingly contrasts. In others, the young shoots are not unlike crosiers in their appearance (Balantium†).

A strong physiognomical contrast to the light, manifoldly pinnated foliage of the Ferns is formed by the heavy, broad leaves of the Cecropia†, which, adhering to the tops of thin branches, protrude here and there through the foliage of Oaks† and Cinchonaceæ (Cinchona pubescens).

The trunks in these regions are covered with Fabronia polycarpa, Orthotrichum longirostrum (true Mosses)[7] and Anthurium myosuroides (Aroideæ), while Passifloræ (P. longipes, P. difformis) are ramping on low shrubs. The Carica-species† with their indented leaves have a peculiar growth, being particularly striking where they appear among Podocarpus (Coniferæ), Ocotea mollis (Laurineæ),[8] Fuchsia Quinduensis (Onagreæ), and other small-leaved bushes. A small Palm with broad pinnæ (Chamædorea†) twines its thin annulated stem through the shrub, which here chiefly consists of Witheringia rhomboidea and W. riparia (Solaneæ), Aralia Quinduensis (Araliaceæ,)[9] and the winding Negretia mollis (Papilionaceæ),[10] while the ground is covered with Peperomia foliosa (Piperaceæ),[11] Olyra arundinacea (Gramineæ),[12] Salvia sagittata (Labiatæ), Luzula gigantea (Junceæ),[13] Espeletia grandiflora, Eupatorium fuliginosum (Compositæ),[14] Ranunculus Bonplandianus (Ranunculaceæ),[15] and some shrubby Gesneriaceæ (Besleria tricolor, Besleria sanguinea). A new species of Scrophularineæ, nearly akin to our Veronica serpyllifolia, also grows here.

[1] Kunth, Synops. pl. vol. iv. p. 390. [2] Ibid. p. 373. [3] Ibid. p. 396. [4] Ibid. p. 375. [5] Ibid. p. 391. [6] Ibid. p. 379. [7] Ibid. p. 347. [8] Ibid. p. 363. [9] Ibid. p. 381. [10] Ibid. p, 395. [11] Ibid. p. 349. [12] Ibid. p. 353. [13] Ibid. p. 353. [14] Ibid. p. 376. [15] Ibid. p. 382,

Ad fol. 8.

Forest in the Serro of Ocaña, about 7000 (*Par.*) *feet high.*

[This plate, representing an aboriginal forest in the Serro de Ocaña (in the eastern chain) is here superadded to the series in order to convey an idea of the variety of vegetation in different parts of the Andes, though under similar circumstances. The place is situated under the eighth degree of northern latitude and on the western declivity of the eastern Cordillera, while the former plates represent forests on the eastern slope of the Quindiu or middle chain.]

Though under circumstances quite similar to those, in which the Quindiu pass of Ibaguè is placed, the forests of the eastern Cordillera nevertheless greatly differ in their vegetation. The forests of the mountains between Ocaña and the Paramo de Cacuta (or Cachirì) abound in mighty Fern-trees (Cyathea†, Balantium†). Their trunks are often entwined with Carludovicas† (Carludovica funifera†), while larger Cyclantheæ (Cyclanthus cristatus†) shade the ground with their broad leaves. Of the Palms growing here (a species of the Iriartea† and the Geonoma undata†), neither has the least resemblance to the Palms of the Quindiu. This Iriartea is particularly beautiful. Its trunk is of a dazzling white, thirty to forty feet high, of an arm's thickness and furnished with long internodia. The sheath of the froud forms an upright continuation of the trunk itself, and the few fronds are regularly pinnated, somewhat broader at their extremities, and end in a flabelliform, more or less truncated apex, that looks as if it were bitten off. This Palm is uncommonly graceful; its stem always slim and straight, while the annulated stem of Geonoma undata is always curved.

A deep shade is formed by the dense foliage of Anona Quinduensis (Anonaceæ),[1] Ladenbergia macrocarpa (Cinchonaceæ), Myroxylon Toluifera (Cæsalpineæ),[2] and Icacorea Guianensis (Myrsinaceæ).[3] Aroideæ cover the trunks of Gomphia lucens† and the tendrils of Passifloreæ (P. glauca, Tacsonia lanata) and Polygaleæ (Securidaca volubilis)[4] render the wood impenetrable. Here and there a tall Solanum† is seen rising and the banks of the cool torrent are covered with beautiful Ferns (Dicksonia†).

It is not always either safe or easy to cross these rapid mountain-streams, uay, sometimes it is impossible for weeks together to cross a water, which, at other times, appears but as a small rill. When, in consequence of heavy rains, the water is swollen, the Arrieros examine the ford with great caution, ere they venture into it with their animals. If it is found passable, the mules are unloaded and unharnessed; several men, maintaining their stand in the rapid torrent only by clinging to each other, under much pushing and crowding make the reluctant beasts cross the stream, holding them by their heads and tails. Baggage and clothes are carried over, uplifted in the hands, to prevent them from getting wet, or they are transported over by a tree, laid across the torrent. Provided these crossings are not too toilsome, they generally form the gayest scenes, especially when the company is numerous and has many Indians in its train. The fresh bath is welcomed by the strong-limbed fellows and the labour is performed under shouts and joking. The most ridiculous situations often arise by the stubborn beasts refusing to take the right ford, or one of the company, in his zeal, stumbling over a hidden stone and disappearing for a moment in the floods. By broader and deeper waters, ropes, made of leather straps or creeping plants, are found, by which the baggage is dragged across, while men and animals swim over.

The Magdalena River.

At Honda the river, amidst wild roarings, and rising in high waves, forces its way through a narrow defile. It is navigable for small craft even for a considerable distance above Honda, and, down the river, canoes, managed by able pilots, can pass the rapids of Honda. Up stream, however, boats and their cargoes have to be carried a long way by land, if they are to continue the journey up the river above Honda. The current is so rapid, that, while up stream the distance between the estuary and Honda, under the most favourable circumstances, with a light canoe and at low water, takes at least six weeks; in the opposite direction it is performed in eight to twelve, or at high water even in five days. Freighted vessels require three months and upwards to perform the journey up. The distance in a straight line, without counting the numerous windings, is about 400 geographic miles (60 to a degree).

The voyage down has a great charm, while, in the contrary direction, it is very fatiguing and tiresome. Either bank is uninterruptedly covered with mighty aboriginal forest. The river, whose water is very muddy, is not deep, but it is of majestic breadth, and towards its mouth, branches out into many arms. There are some only about thirty feet broad, and thickly overgrown with aquatic plants; others, again are very wide, and near the mouth, the river in many places has the appearance of an extensive lake with numerous islands.

[1] Kunth, Synops. pl. vol. IV. p. 382. [2] Ibid. p. 69. [3] Ibid. p. 382. [4] Ibid. p. 389.

Sand-banks abound in all parts of the Magdalena. Here the hideous Caimans bask in the sun, sometimes forty to fifty in one spot. At night, these very sand-banks serve the traveller as resting-places, and he is glad, after having spent the whole day in the narrow canoe, to stretch his weary limbs on the soft sands. Here great masses of wood have been piled up by the current in the wet season, and dried up by the sun after the retreat of the waters. They take fire by the least spark, and, sometimes make enormous bonfires, which frighten the mews and other birds, that have their nests in the sand.

A river voyage in the dry season is very fit to give an idea of animal life in the tropics. Then the animals, from the want of water in the forest, are compelled to come to the river's side. Herds of droll Monkeys move noisily along the tops of the highest trees; Parrots of all kind, sizes, and colours, from the small Perriquito up to the Macaw, fill the air with their yelling shrieks. Tapirs, Guinea-pigs, Agutis and Armadils people the underwood, and Iguanas are seen climbing over slender branches. Here and there a serpent lies coiled up on a bough, and Humming-birds, glittering in all the hues of the rainbow, whirr about the blossoms of the forest. Hocco-fowl (Paujils) and many other birds of the hen and pheasant-tribe tire the ear with their monotonous screams. The clumsy Tortoise plumps shyly into the water, and occasionally a Jaguar is seen quenching his thirst in the river.

Of water-fowls there are a great variety. Several species of Herons, Ibis, Spoonbills, innumerable quantities of Mews and many kind of Ducks are met with. At the river's mouth, near the sea-coast, the trees are covered with the large nests of Pelicans. At night the dismal noise of howling Monkeys is blended with the roaring of the Jaguar.

This animal lives in fierce feud with the Caiman, and the traces of their struggles are often visible in the sand of the banks. The Indians relate, that, when the Jaguar is about to cross the river, he previously sets up a loud roaring, to scare away the Caimans, which then are seen quitting the banks and even the surface of the water, and crawling away into the mire. These monsters of the deep are in general very shy on hearing a noise, savage and dangerous as they are otherwise. Early in the morning thirty or forty of them are sometimes seen in a quiet bay, swimming slowly along the surface of the water. They move along imperceptibly, seemingly with open jaws; for suddenly the long head of the monster starts forth from the water, holding a large fish, while, all around, a great number of fishes, startled by the noise, bound up high out of the water. The Caimans in the muddy water bear much resemblance to huge floating trees, and this is supposed to deceive the fish.

The vegetation is magnificent. The eye is charmed by the variety of the outline of the forest, arising from its being composed of so many different kind of trees, which now appear as mighty sheds on stout trunks, now, as in the instance of the Mimosæ, bearing light and feathery foliage on slender stems.

Everywhere the trunks are thickly overgrown with creepers, winding their graceful tendrils from tree to tree and hanging down in beautiful festoons. The Guaduas, representatives of the Indian Bamboos, are highly beautiful, appearing either in large independent groups or projecting their enormous canes from amidst the thicket of the shore. They are distinguished by the regular curving of their canes, forming almost sections of a circle, and by their fine grasslike foliage.

The magnificent Palma real (Cocos butyracea)[1] is found nearly all along the river, and, of smaller Palms, species of Bactris, and Astrocaryum. A slender Euterpe is met with near the mouth of the river Sogamozo, and the beautiful foliage of Heliconias and strong canes of Sacharum (S. contractum, S. dubium), partly cover the banks.

Ad fol. 9.

Huts of Indians near Naré.

The huts of the native Indians continue to this day in the same state as they were described by the first discoverers of this part of the world. Stout Bamboo-canes, stuck perpendicularly into the ground and occasionally joined by tendrils of creepers, constitute the walls, and the roof is thatched with Palm-leaves. There are no windows, yet the huts are light and airy, the lattice-like walls freely admitting wind and sunshine.

The Indians of the Magdalena river have very little wants; their furniture is very simple. Some Tortoise-shells serve as dishes, a hollow stone is used for grinding maize and cocoa. Spoons, large and small basins and cups they make of the fruit of the Tutuma-tree (Crescentia Cujete) and enormous pumpkins or calebasses are used as bottles and jugs. They are skilful hunters, though their implements are very primitive, being nothing but rudely cut bows, and arrows of enormous length, made of the stems of large Gramineas (Sacharum) and armed with points of iron or hard wood. With these they kill birds and fishes very dexterously, and the light

[1] Kunth, Synops. pl. vol. iv. p. 355.

cane prevents their dead booty from sinking in the water. Their nets and hammocks of the fibre of an Agave† are very well wrought; so are their baskets, which they colour with their native dye-woods. For his nourishment an Indian wants but a few Plantains (Musa paradisiaca†), Cocos palms (Cocos nucifera†), Yuccas (Manihot Aipi); occasionally he grows some Oranges, Papayas and other refreshing fruit-trees around his hut, which is generally shaded by mighty Ceybas (Bombax Ceyba) (Bombacineæ),[1] by Hura crepitans† (Euphorbiaceæ), and Persea cinnamomifolia† (Laurineæ)[2]. Maize and Sugar-cane, which latter is generally consumed in a raw state, he cultivates according to his wants, and he exchanges the produce of his chase and of his field for the most necessary articles of dress, straw-mats, tobacco and some earthenware, brought to him by river-faring tradesmen.

The Indians either dwell in detached huts on the banks of the Magdalena, in the profoundest solitude of primeval forest, or they live together in small villages. They never cut out more of the forest than is just wanted for their huts and their small plantations, which is very little if compared to the space wanted by a man in northern climes to grow his necessary food.

Shrubs of Bunchosia Hartwegiana (Malpighiaceæ), Amyris sylvatica (Amyrideæ), Guazuma tomentosa (Büttneriaceæ),[3] Psychotria acuminata (Cinchonaceæ), Tabernemontana grandiflora (Apocyneæ),[4] Callicarpa (Verbenaceæ) and the creeping Smilax officinalis grow exuberantly into the plantations, as also the Luzula gigantea, Juncus prolifera and J. microcephalus (Juncaceæ),[5] Melanthera Linnæi (Compositæ),[6] Sida althæifolia (Malvaceæ),[7] Cuphea spicata (Lythrarieæ), Callisia ciliata (Commelineæ),[8] Artanthe appendiculata (Piperaceæ), and, having originally been planted, but now growing wild, Cassia occidentalis (Cæsalpineæ) whose seeds, when ripe, are gathered, roasted and used in Naré as a stomach-strengthening beverage (according to General O'Leary "wild Coffea"). Indios bravos, *i. e.* wild Indians, still live in the deepest forest, but the traveller does not come into contact with them. The Indians who are met with in the settlements on the Magdalena, speak Spanish, dress in cotton, and — call themselves Christians; but their faith is nothing but a superstitious worship of saints.

Ad fol. 10.

The forest of S. Agnes near Puerto de Ocaña.

The Magdalena receives the waters of many tributary rivers from both Cordilleras. Where they enter the plain, the vegetation is mostly particularly vigorous. The strong evaporation of the, as yet, cool mountain-stream, as it descends into the warmer regions, and the heat of the sun, reflected by the sides of the opening valley, produce a pressing-hot atmosphere, highly saturated with moisture, which is most favourable for the development of plants and insects, but noxious and almost insupportable to men. The forest, here, bears distinct traces of the periodical inundations. The underwood is almost wholly wanting close to the water; at a greater distance off are found: Eugenia ruscifolia (Myrtaceæ), Psychotria Carthaginensis, P. lupulina, Faramea odoratissima (Cinchonaceæ), Hirtella mollicoma (Chrysobalaneæ),[9] Inga Humboldtiana (Mimoseæ), Pauletia picta (Cæsalpineæ),[10] Ægiphila læta (Verbenaceæ),[11] the arborescent Buena (Cosmibuena, Ruiz and Pavon) latifolia (Cinchonaceæ), and Ardisia ferruginea (Myrsineæ).[12] The fall of the river is still very rapid here, and by the destruction all around one may judge of the power, with which the swollen river effuses its waters over the banks. Powerful trees and mighty trunks of the Palma real (Cocos butyracea†) are strewn about in wild confusion, torn from their roots, and, here and there, barring up the river.

This Palma real is a most stately tree. Its trunk is rather stout, but its great beauty consists in the abundance and exuberance of its fronds, which are about twenty-five feet long and closely garnished with long and narrow pinnæ. The rhachis is strong and elastic, without being stiff and its gradual tapering towards the extremity causes a graceful nodding of the frond in the slightest wind. Monkeys venture a leap from great heights down on the top of these fronds, which being laid hold of by them, bends low down. It is too elastic and yielding to hurt them. Sometimes the whole trunk is covered with creepers, rising pyramidally from the ground. In many places the trunk is encircled by Caulotretus scandens† (a Cæsalpinea, called Matapalo or tree-killer by the natives), which winds its strong branches serpent-like round other trees, and gradually kills them. Another ornament of the Palma real is a small Fern, which takes root generally immediately beneath the crown, in the remains of the withered fronds, and forms there a lovely fresh-green wreath, contrasting beautifully with the darker and more subdued tint of the Palm fronds.

A slender Fan-palm (Lepidocaryum†) grows here. Orchids and large Aroideæ cover the branches of Spondias lutea† (Terebinthaceæ), which is overgrown with Bomarea formosissima (Amaryllideæ), Passiflora

[1] Kunth, Synops. pl. vol. IV. p. 387. [2] Ibid. p. 363. [3] Ibid. p. 387. [4] Ibid. p. 373. [5] Ibid. p. 353. [6] Ibid. p. 377. [7] Ibid. p. 386. [8] Ibid. p. 354. [9] Ibid. p. 393. [10] Ibid. p. 394. [11] Ibid. p. 366. [12] Ibid. p. 373.

vitifolia (Passifloreæ) and Echites riparia (Apocyneæ).[1] Here and there oddly shaped trunks of Bombax Mompoxense† (Bombacineæ) and Pharmacosycea dendroctona† (Moreæ), the latter with board-like excrescences of the root, are seen rising. Puyas† (Bromeliaceæ), eight or nine feet high, stretch their long, narrow and prickly leaves wide over the ground, and vigorous canes, as Oryza latifolia† (Gramineæ) cover the banks in some places.

Ad fol. 11.

Bay in the Magdalena River near S. Pablo.

Where the strong current strikes against prominences of the banks, it gradually washes away the sandy soil. Trees are undermined and carried away. They are driven ashore in other places, and, in quiet water, aquatic plants, animal and vegetable remains are caught between their branches, and, when rotten, with the sand of the river form a slimy mud. This is strengthened by young shoots and fibres from the roots of trees on shore. It gradually thickens, and, at the retreat of the water, becomes solid soil. Thus, in quiet bays, the river continually adds to the land, what it washes away at sharp angles and wherever the current is strong.

The woods consist here of Maclura tinctoria† (Moreæ), Rhinocarpus excelsa† (Terebinthaceæ),[2] a Morus† akin to Morus celtidifolia, of Amyris pinnata (Amyrideæ),[3] Hasseltia pubescens and Hasseltia floribunda (Tiliaceæ), [4]Cupania latifolia (Sapindaceæ), Lætia apetala (Bixineæ).[5] The slender white stems of a graceful Euterpe† shine through the darkish green of the shrubs, among which are found Guazuma tomentosa (Büttneriaceæ),[6] Bunchosia Hartwegiana (Malpighiaceæ), Psychotria acuminata, Rondeletia brevipes (Cinchonaceæ), Tabernemontana grandiflora (Apocyneæ), Callicarpa acuminata (Verbenaceæ),[7] Ardisia micrantha (Myrsineæ),[8] Mimosa ignova (Mimoseæ) and Pionandra Hartwegii (Solaneæ), and among the herbs Gesneria eriantha and G. spicata (Gesneriaceæ),[9] Aphelandra Hartwegiana (Acanthaceæ) and Cassia Mutisiana,[10] a Cæsalpinea furnished with thick, setacious, expanding hairs. Bamboos (Guadua angustifolia†)[11] stretch their long canes over the water and stout reeds (Sacharum contractum†, S. dubium) render the banks in some parts inaccessible.

Ad fol. 12.

A branch of the Magdalena River near Regidor.

Guaduas†,[12] representing the Bambusæ of India, are met with both in the hot plains and in the mountains. The largest and most beautiful kinds, however, prefer a moist and hot atmosphere. The cane grows to a height of forty-five to fifty feet; all the branches and twigs are perfectly developed before the leaves appear. As it grows older, the cane bends gradually down to the ground till it withers. Narrow arms of the river, called caños by the natives, are often totally arched over by the canes, and the broken light, entering through the delicately woven roof of the grass-like foliage, has an almost magic effect. The canes, set off darkly against the transparent leaves appear not unlike the ribs of a gothic vault.

In this part of the river a species of Willow,[13] probably Salix Humboldtiana, is rather of frequent occurrence; here and there it covers the banks, and small islets are wholly overgrown with it. A thorny Astrocaryum† is found in the thicket of the shore between Inga coruscans (Mimoseæ),[14] Artanthe tuberculata (Piperaceæ), Micania Bogotensis, Micania leiostachys (Compositæ), Rondeletia eriantha (Cinchonaceæ), Cordia alliodora (Cordiaceæ). Of herbaceous plants occur Angelonia salicariæfolia, Capraria biflora (Scrophularineæ)[15] Hydrolea spinosa (Hydroleaceæ),[16] Sida acuta (Malvaceæ), and the floating Jussiæa sedioides (Onagreæ).

Ad fol. 13.

Banks of the Magdalena in the neighbourhood of S. Pedro.

The margin of the forest on the river side generally consists of a thick hedge of luxuriant shrubs, intermixed with canes and small thorny Palms. Croton salviæfolius and C. leptostachys (Euphorbiaceæ),[17] Chamissoa macrocarpa (Amaranthaceæ)[18] and a great many creepers render the thicket impenetrable. Heliconias†

[1] Kunth, Synops. pl. vol. IV. p. 372. [2] Ibid. p. 395. [3] Ibid. p. 164. [4] Ibid. p. 387. [5] Ibid. p. 388. [6] Ibid. p. 387. [7] Ibid. p. 366. [8] Ibid. p. 373. [9] Ibid. p. 368. [10] Ibid, p. 394. [11] Ibid. p. 353. [12] Baron A. Humboldt, Aspects of Nature, vol. II. p. 183.—Humb. et Bonpl. Plantes équinoxiales I. p. 68. tab. 20. [13] Baron A. Humboldt, Aspects of Nature, vol. II. p. 195. [14] Kunth, Synops. pl. vol. IV. p. 393. [15] Ibid. p. 367. [16] Ibid. p. 371. [17] Ibid. p. 360. [18] Ibid. p. 365.

delight the eye with their fresh verdure and lovely blossoms, and Panicum trichoides and Echinolæna polystachya cover the ground, intermixed with Aphelandra pectinata, Dipteracanthus leucanthus, Scorodoxylum Hartwegianum (Acanthaceæ), Dorstenia Contrayerva (Moreæ), Ponthieva rostrata and some other Orchids, and the charming Alpinia occidentalis (Amomeæ).[1] Having penetrated through the thicket of this hedge, the forest is found comparatively clear of underwood, but the growth of the trees, as Theobroma bicolor (Büttneriaceæ,)[2] Lecythis dubia (Lecythideæ),[3] Gustavia speciosa (Myrtaceæ), Cecropia Humboldtiana (Artocarpeæ), Sponia mollis, Momisia aculeata (Celtideæ), Sapium salicifolium (Euphorbiaceæ),[4] Coccoloba nitida (Polygoneæ)[5] and Pharmacosycea anthelmintica† (Moreæ) is enormous. The slender stem of an Euterpe† offers a striking contrast to the big trunk of the Palma real†. Many trees are so thickly covered with creepers, that it is impossible to make out their original foliage.

[1] Kunth, Synops. pl. vol. iv. p. 356. [2] Ibid. p. 387. [3] Ibid. p. 391. [4] Ibid. p. 360. [5] Ibid. p. 364.

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PLATE 1.

A view from the slope of the eastern Cordillera, on the road from Santa Fè de Bogotà to Ambalema, at a height of about 5000 *feet, looking to the west. In the centre is seen the village of San Juan, in the distance the river Magdalena and in the extreme background the Cordillera de Quindiu with its summits Tolima and Mesa de Erveh.*

I. Cocos butyracea, called Palma real or Palma dulce by the natives of the river Zenu (Sinou), Palma de Cuesco or Palma de vino by the inhabitants of Melgar; named Corrozo de los Marenos in the Cauca valley; Palma de Mill Pesos of Martius.
II. Heliconia Bihai.
III. A species of Attalea.
IV. A species of Alnus.
V. Urostigma. (A Fig).
Besides these we also find in this place Befarias (Rhodoraceæ), the Carludovica tetragona, the Perrottetia Quinduensis (Celastrineæ), the Rhexia tenella, Melastoma Mutisii, M. octonum, M. setinode, M. lacerum (Melastomaceæ).
VI. Mesa de Erveh.
VII. Nevado de Tolima.

PLATE 2.

A hollow above the Quebrada del Toche, about 6500 (*Par.*) *feet abs. height.*

I. Heliconia Bihai.
II. Oreodoxa frigida.
III. Aroideæ.
IV. Solanum.
V. Solanum.
VI. Chusquea scandens.
VII. Thevetia.
VIII. Lecythis dubia.

PLATE 3.

Primeval forest at an elevation of about 7000 (*Par.*) *feet; in the distance mount Tolima.*

I. Heliconia villosa.
II. Ceroxylon Andicola. Wax palm.
III. Oreodoxa frigida.
IV. Tree-fern: Cyathea.
V. Solanum.
VI. Urostigma. (An American Fig).
VII. Myroxylon.
VIII. Bromeliaceæ.

PLATE 4.

Forest on the ridge between Buena vista and the Quebrada del Toche, about 7000 (*Par.*) *feet abs. height.*

I. Fern-tree: Cyathea.
II. Iriartea Palm.
III. Oreodoxa frigida.
IV. Ardisia tetrandra.
V. Solanum.
VI. Aroideæ.

PLATE 5.

Declivity near the Alto de las Sepulturas, about 8000 (*Par.*) *feet high.*

I. Ceroxylon Andicola. Wax palm.
II. Oreodoxa frigida.
III. Quercus Tolimensis. Oak.

PLATE 6.

Palm-forest of El Gallego, at an elevation of more than 8500 (*Par.*) *feet.*

I. Ceroxylon Andicola. Wax palm.
II. Oreodoxa frigida.
III. Quercus Tolimensis. Oak.
IV. Balantium. (Tree-fern).
V. Alpinia.

PLATE 7.

Oaks and tree-ferns, at a height of 6500 (*Par.*) *feet.*

I. Quercus Almaguerensis (Cupuliferæ). Oak.
II. Cecropia (Moreæ).
III. Cibotium (undescribed species). Tree-fern.
IV. Chamædorea.
V. Trunks of Quercus Almaguerensis.
VI. Tree-fern: Balantium.
VII. Tree-fern: Alsophila.
VIII. Carica.
IX. Alsophila.

PLATE 8.

Forest in the Serro de Ocaña, about 7000 (Par.) feet high.

I. Iriartea.
II. Tree-fern: Cyathea.
III. Carludovica funifera (Cyclantheæ).
IV. Cyclanthus cristatus.
V. Geonoma undata.
VI. Gomphia lucens, entwined with Aroideæ.
VII. Tree-fern: Balantium.
VIII. Solanum.
IX. Dicksonia.
X. Shrubs entwined with creepers; such as Securidaca volubilis, Tacsonia lanata, Passiflora glauca etc.

PLATE 9.

Huts of Indians near Naré on the Magdalena.

I. Cocos nucifera.
II. Musa paradisiaca (Musaceæ).
III. Persea cinnamomifolia.
IV. Agave (Agaveæ).
V. Hura crepitans.

PLATE 10.

The forest of S. Agnes near Puerto de Ocaña.

I. Cocos butyracea. Palma real.
II. Oryza latifolia.
III. Lepidocaryum.
IV. Bombax Mompoxense.
V. Spondias lutea.
VI. Caulotretus scandens.
VII. Pharmacosycea dendroctona.
VIII. Puya.
IX. Siphonia (Euphorbiaceæ

PLATE 11.

Bay in the Magdalena river near S. Pablo.

I. Euterpe.
II. Guadua angustifolia (Gramineæ).
III. Sacharum contractum, S. dubium.
IV. Maclura tinctoria.
V. Rhinocarpus excelsa.
VI. Morus.

PLATE 12.

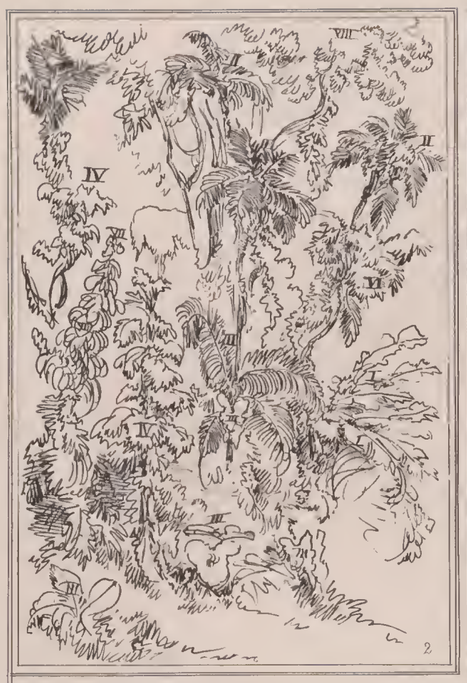
A branch of the Magdalena near Regidor.

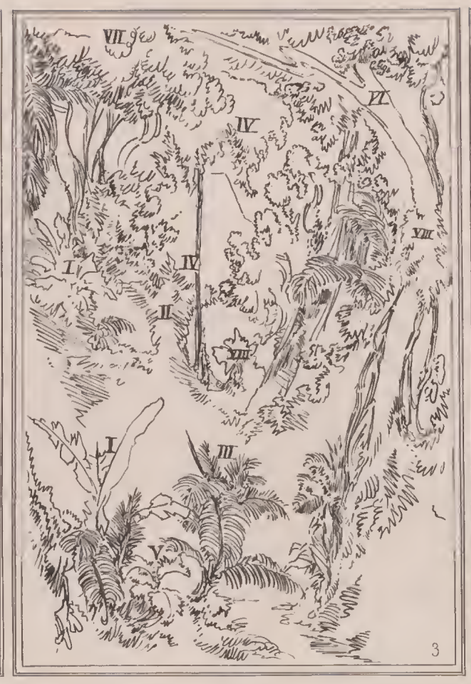
I. Guadua angustifolia.
II. Cocos butyracea. Palma real.
III. Astrocaryum.
IV. An islet covered with Salix Humboldtiana.

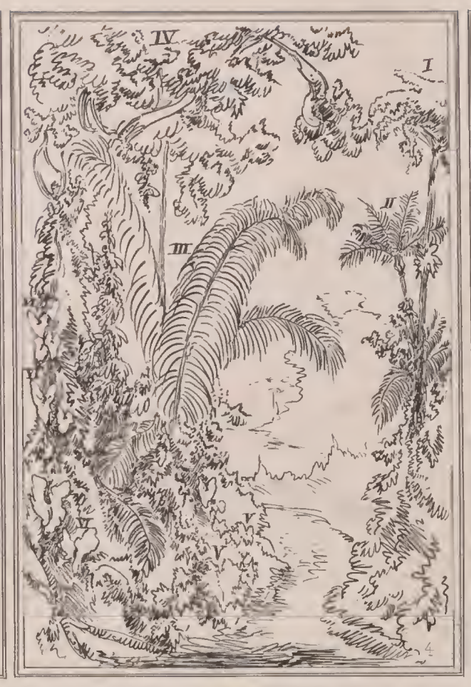
PLATE 13.

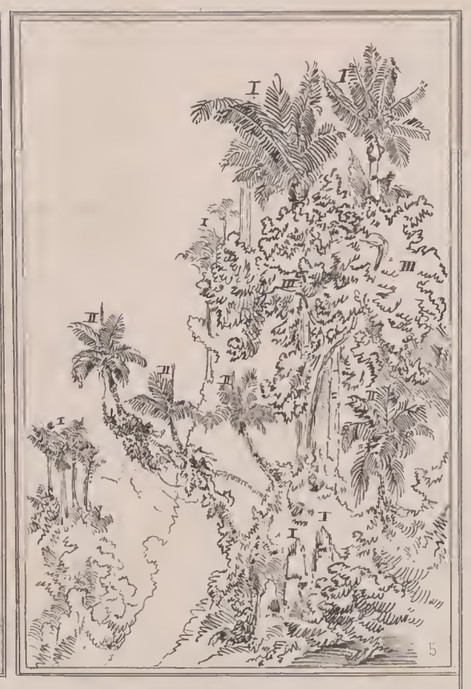
Banks of the Magdalena in the neighbourhood of San Pedro.

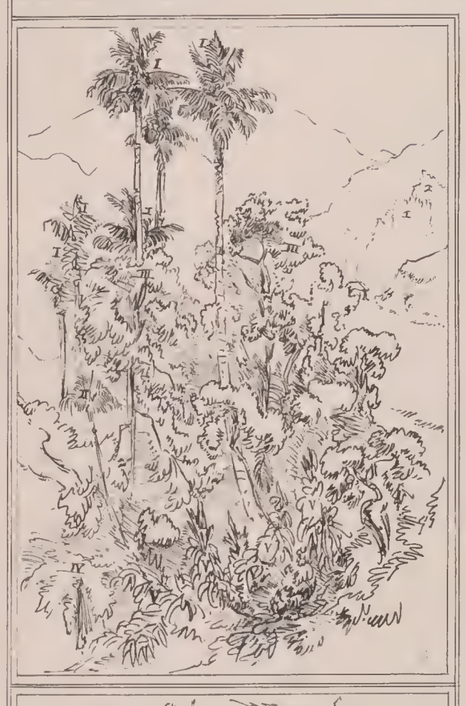
I. Cocos butyracea. Palma real.
II. Euterpe.
III. Heliconia Bihai, Heliconia latispatha (Musaceæ).
IV. Sacharum contractum, S. dubium.
V. Pharmacosycea anthelmintica.

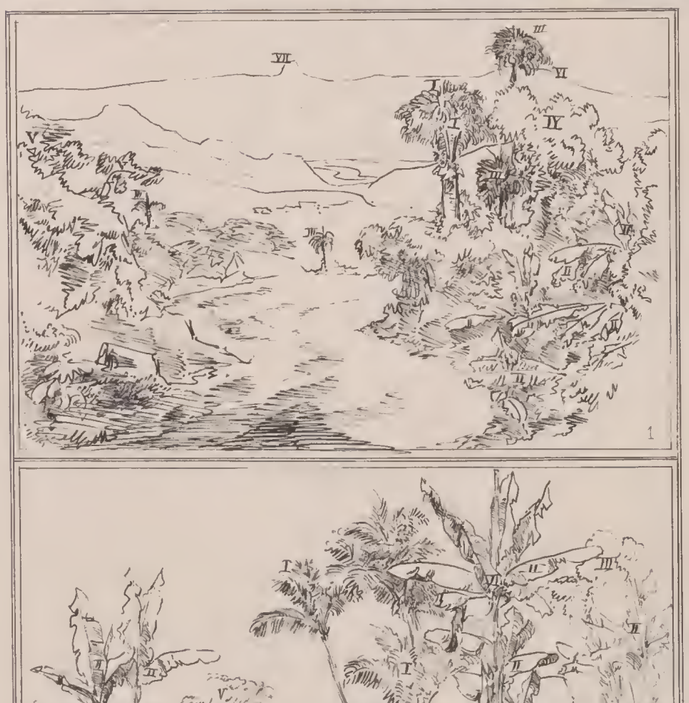


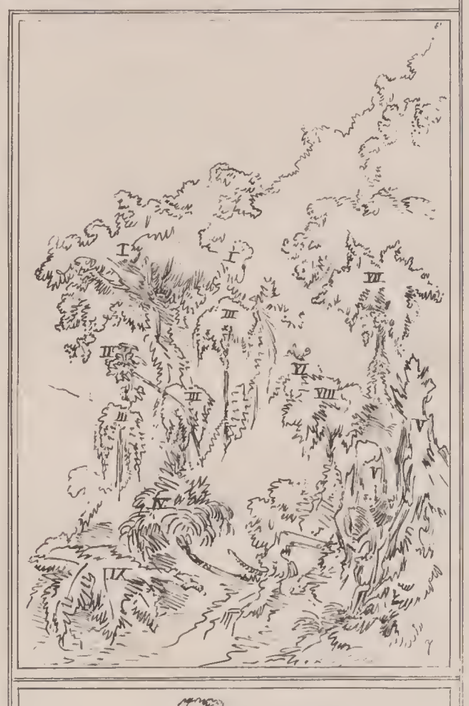


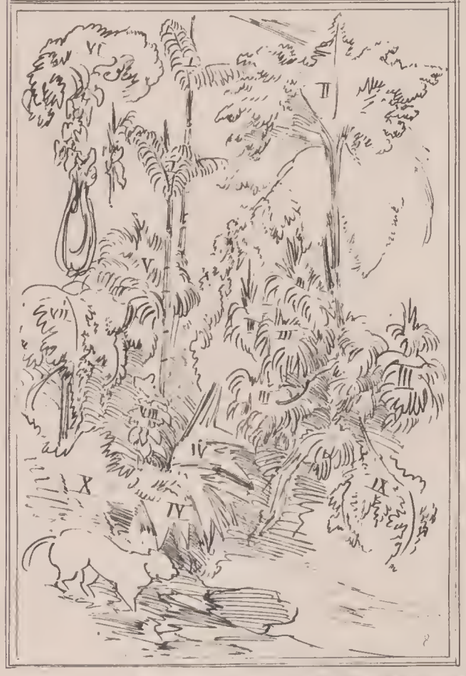


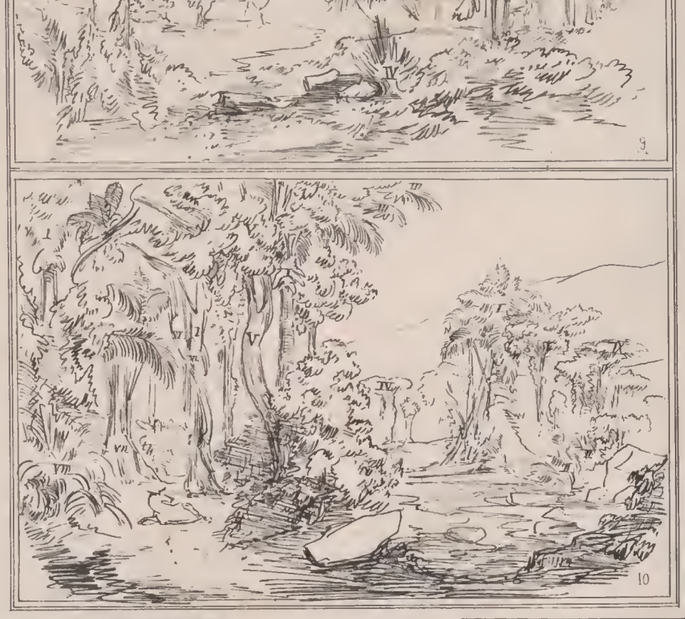


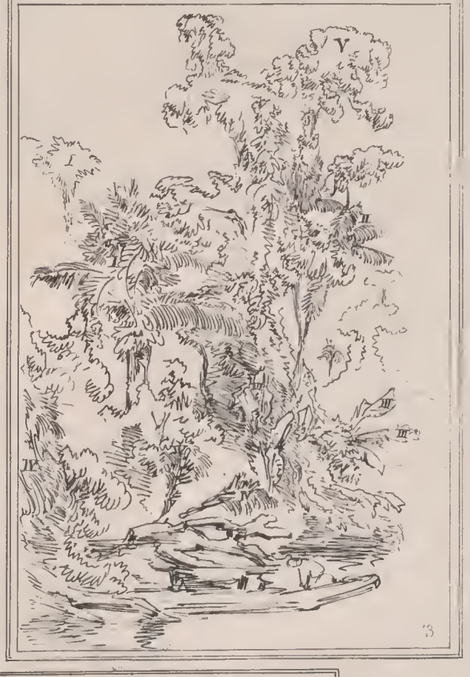


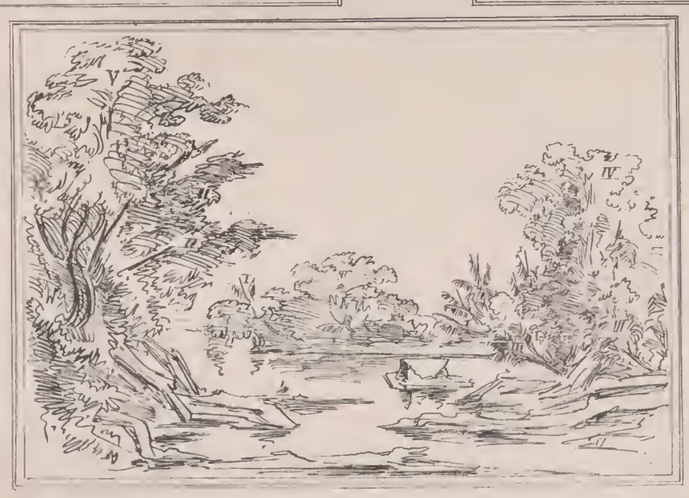


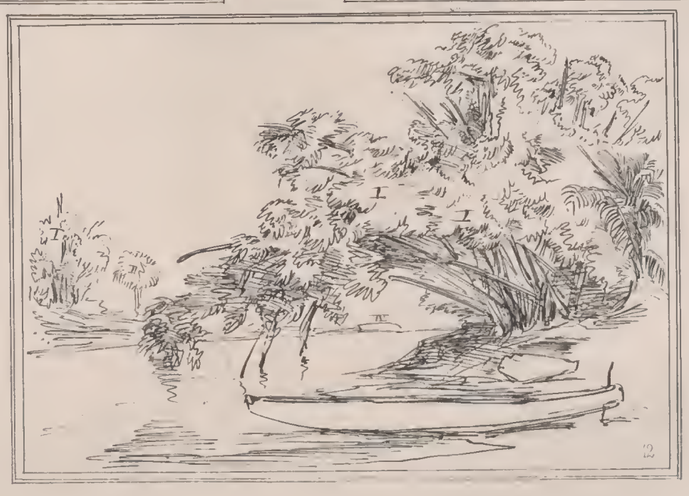


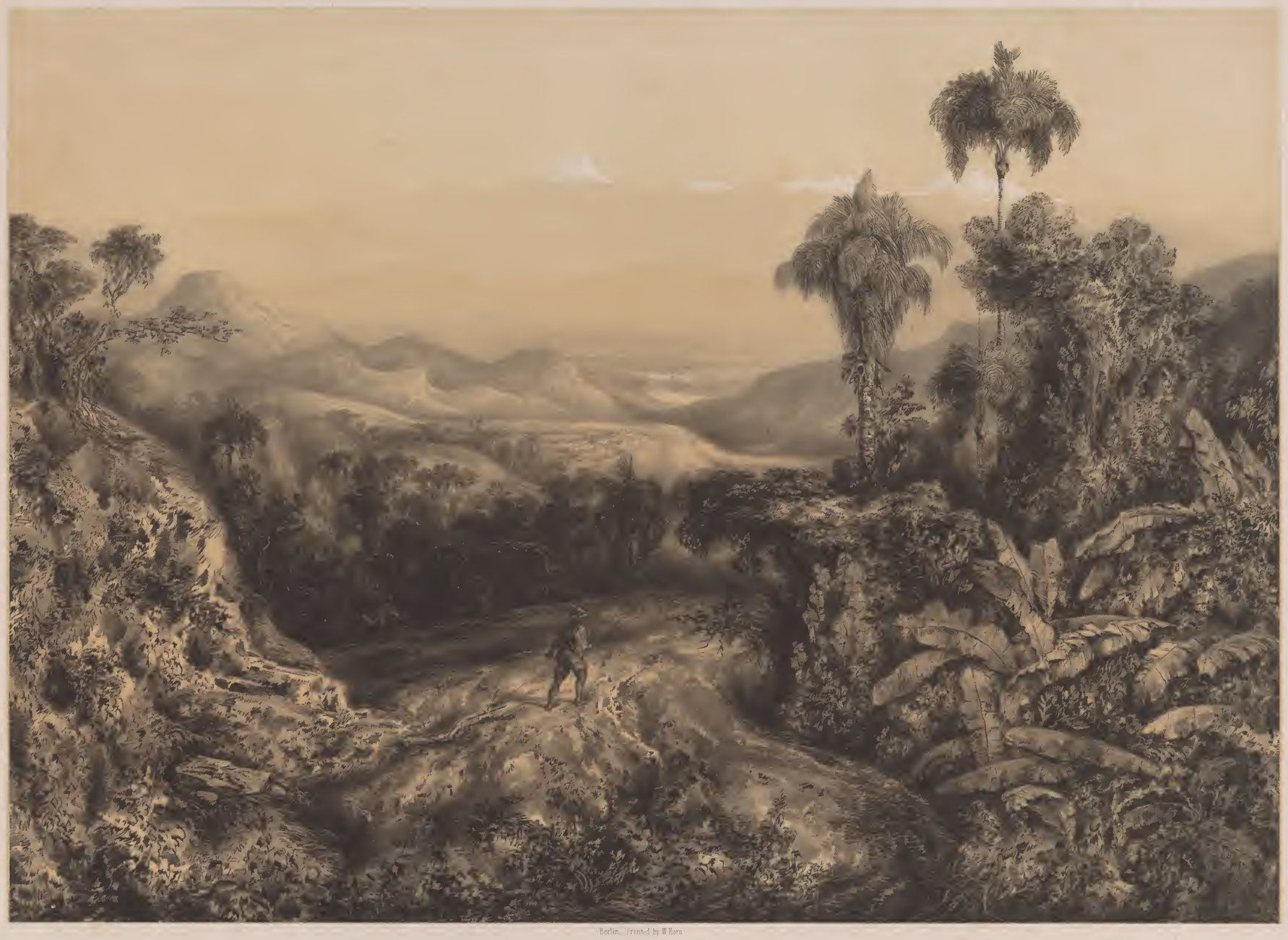












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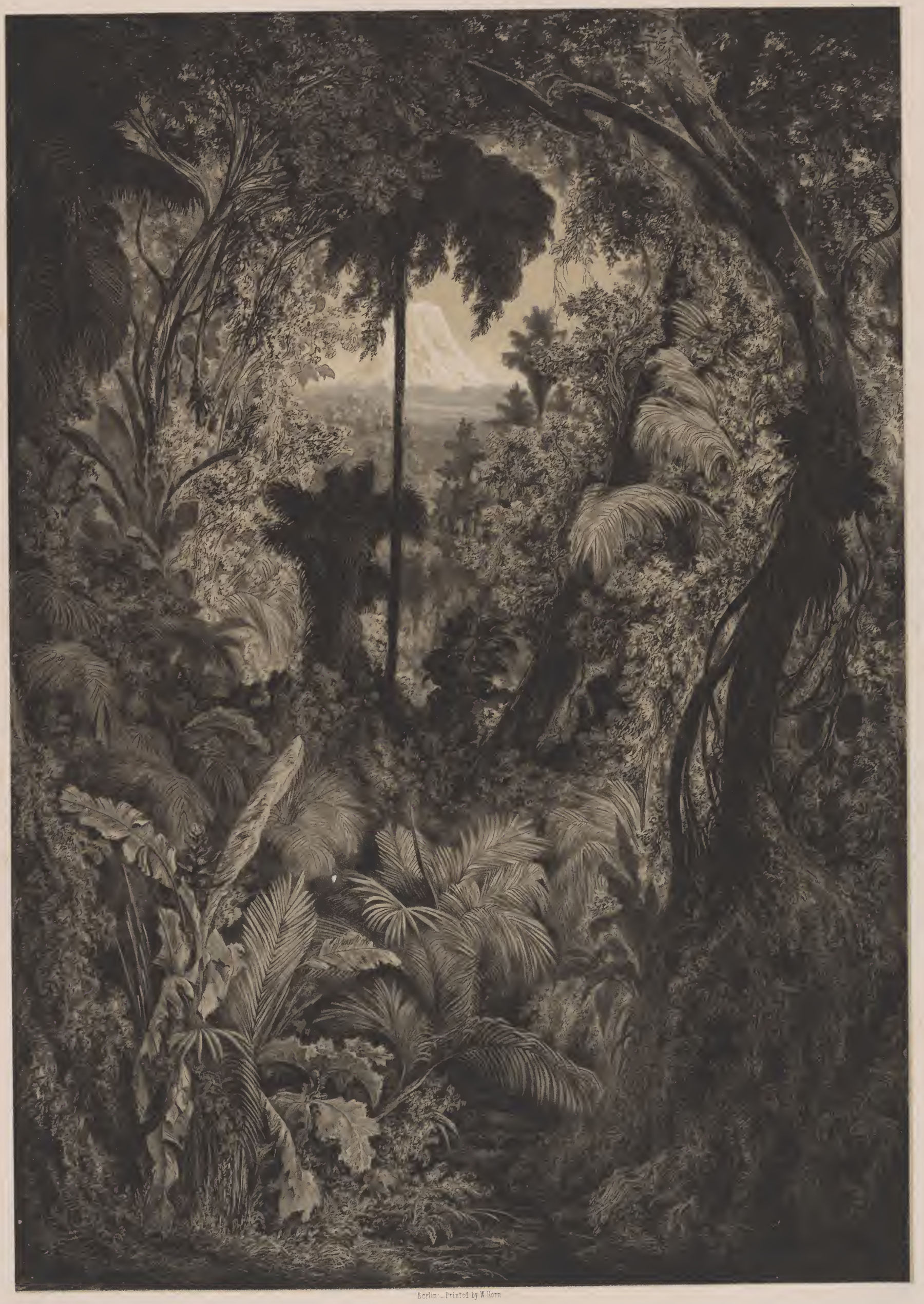

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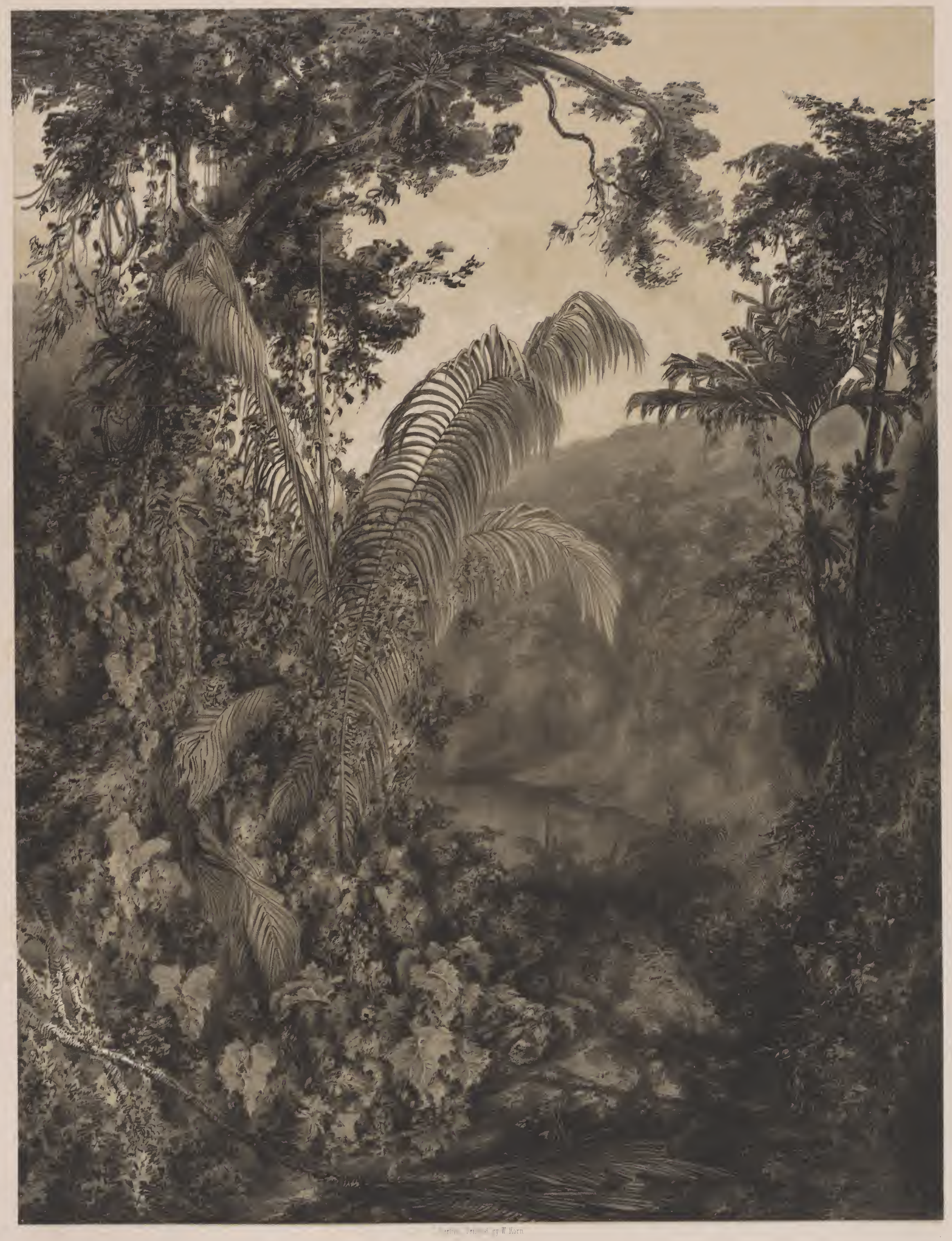

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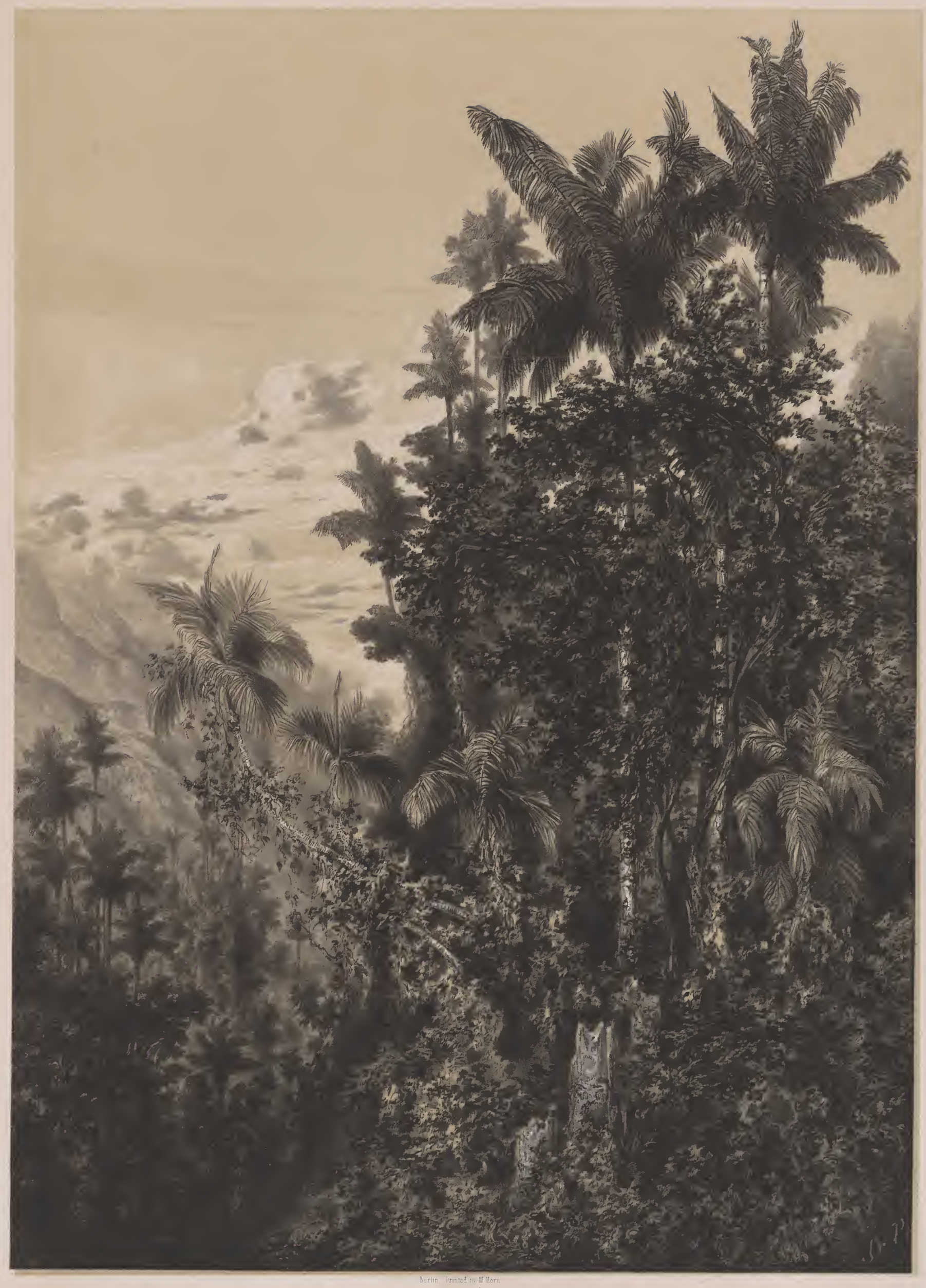

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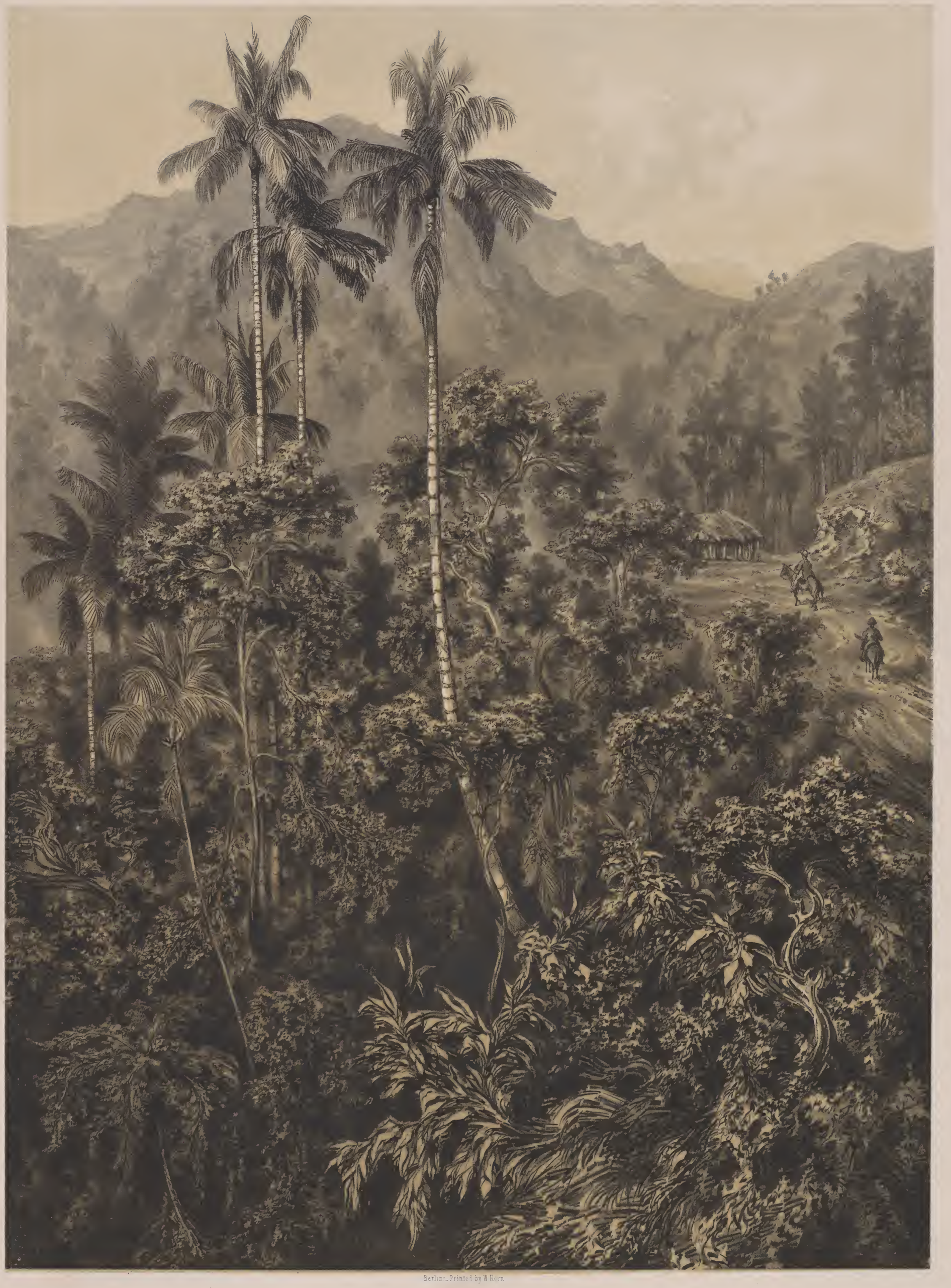

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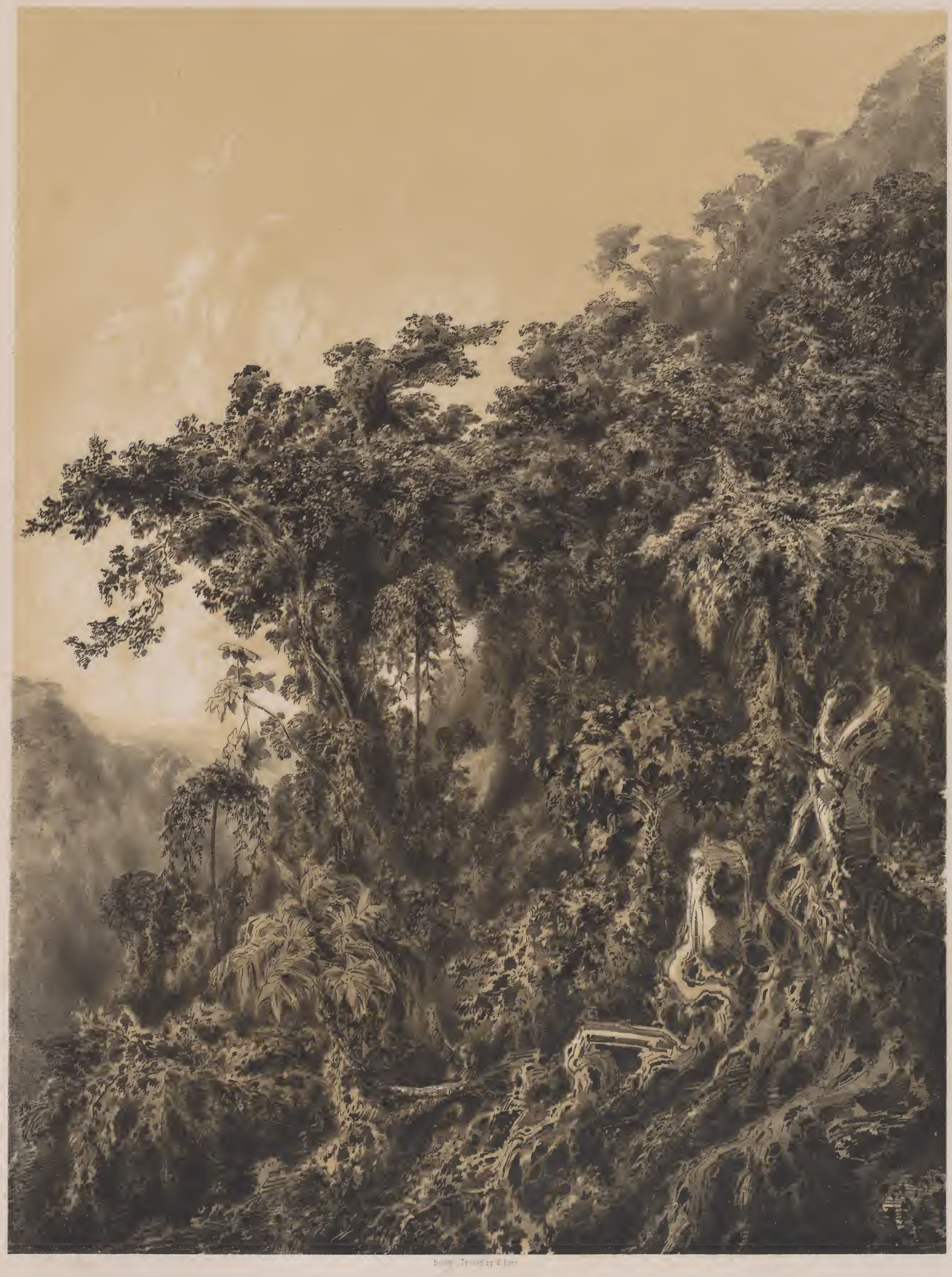

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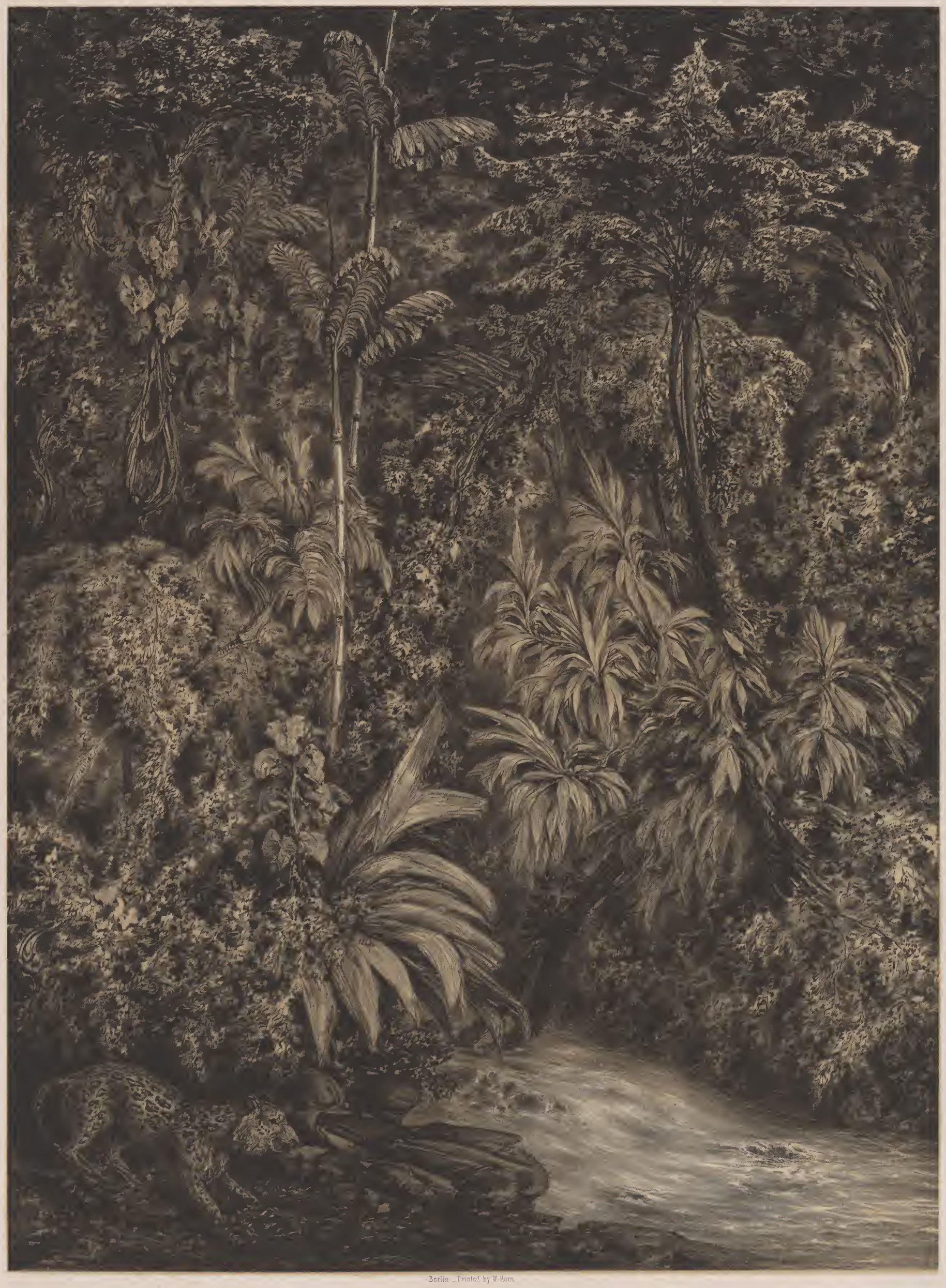

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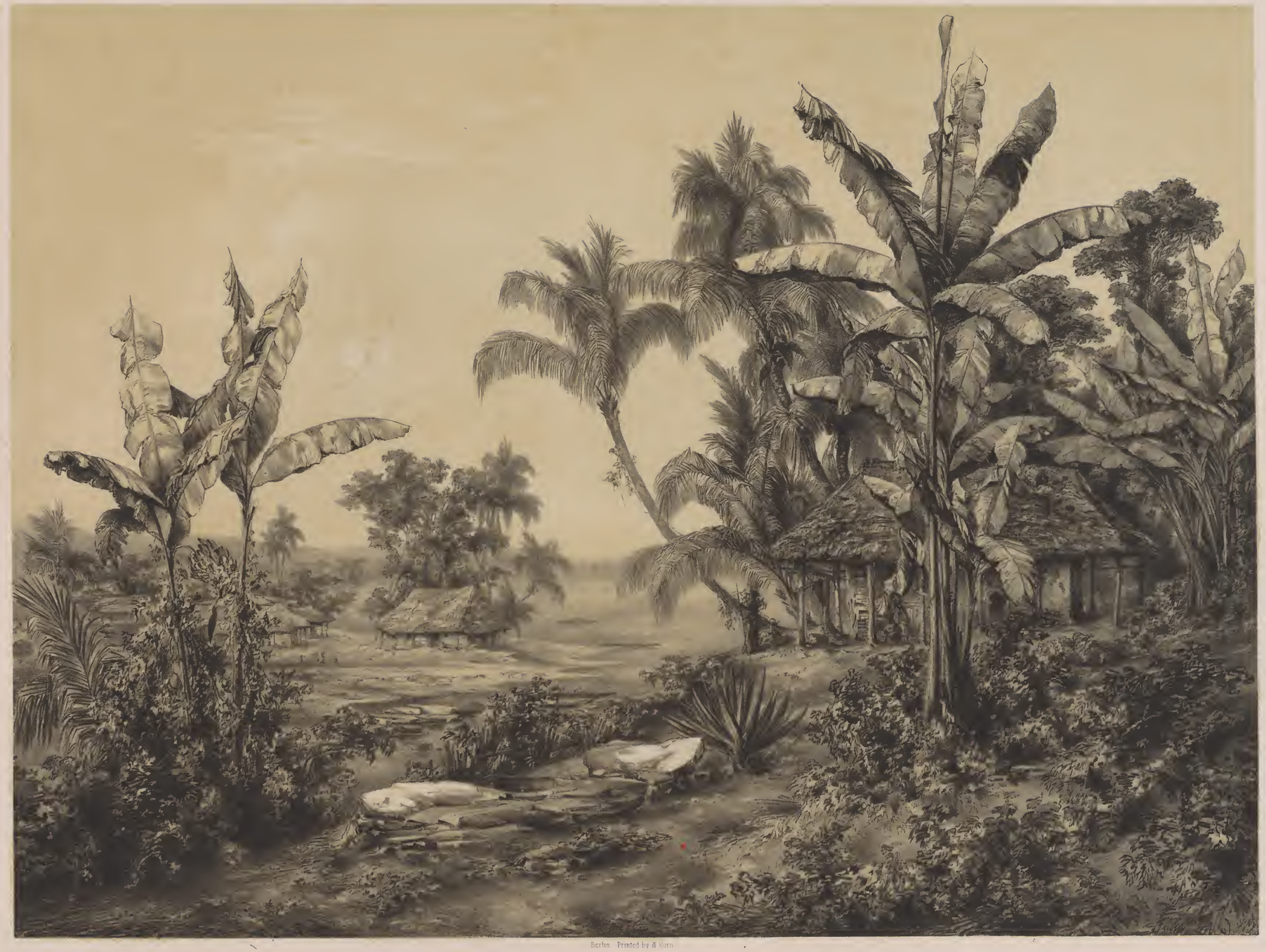

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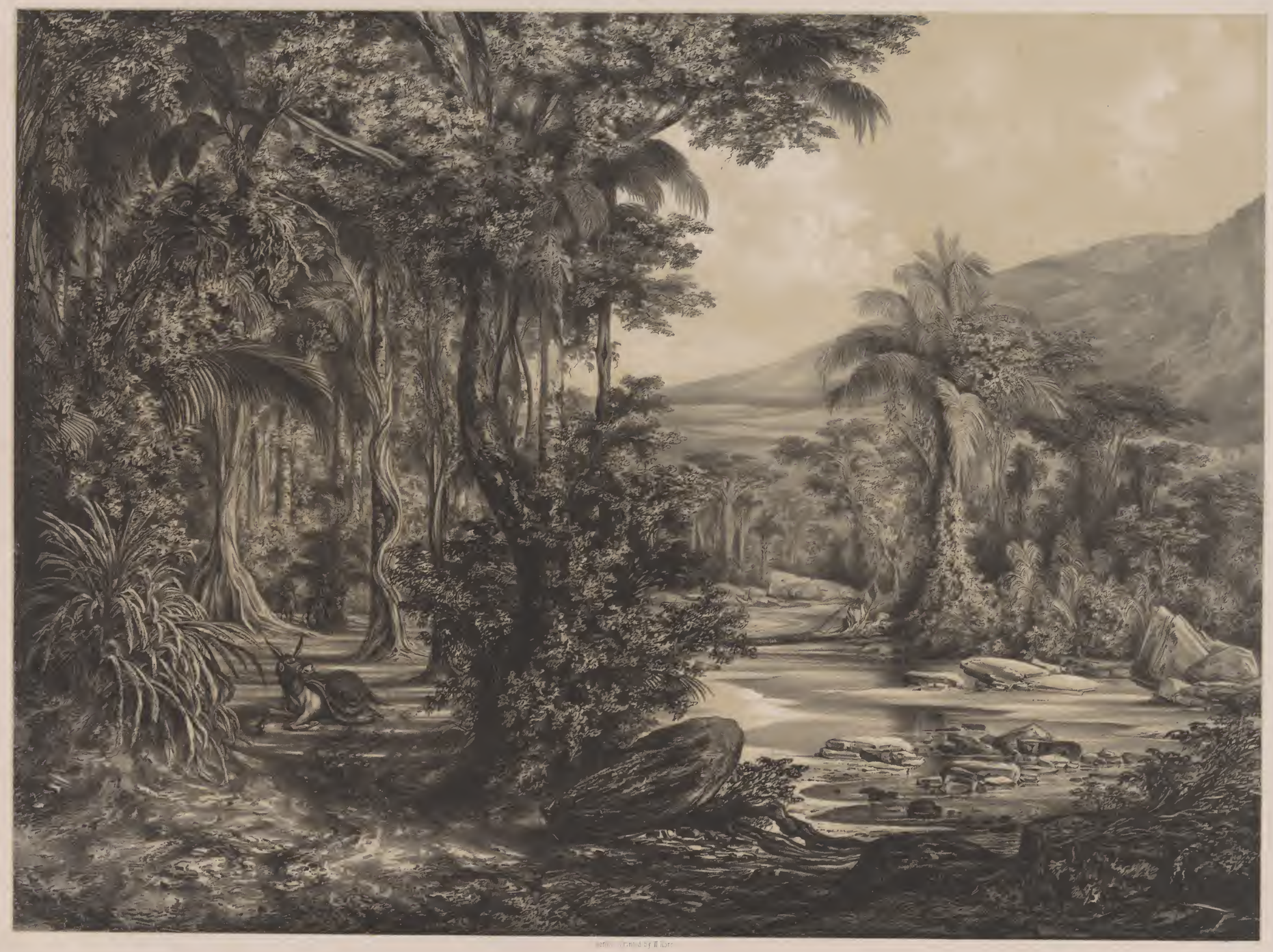

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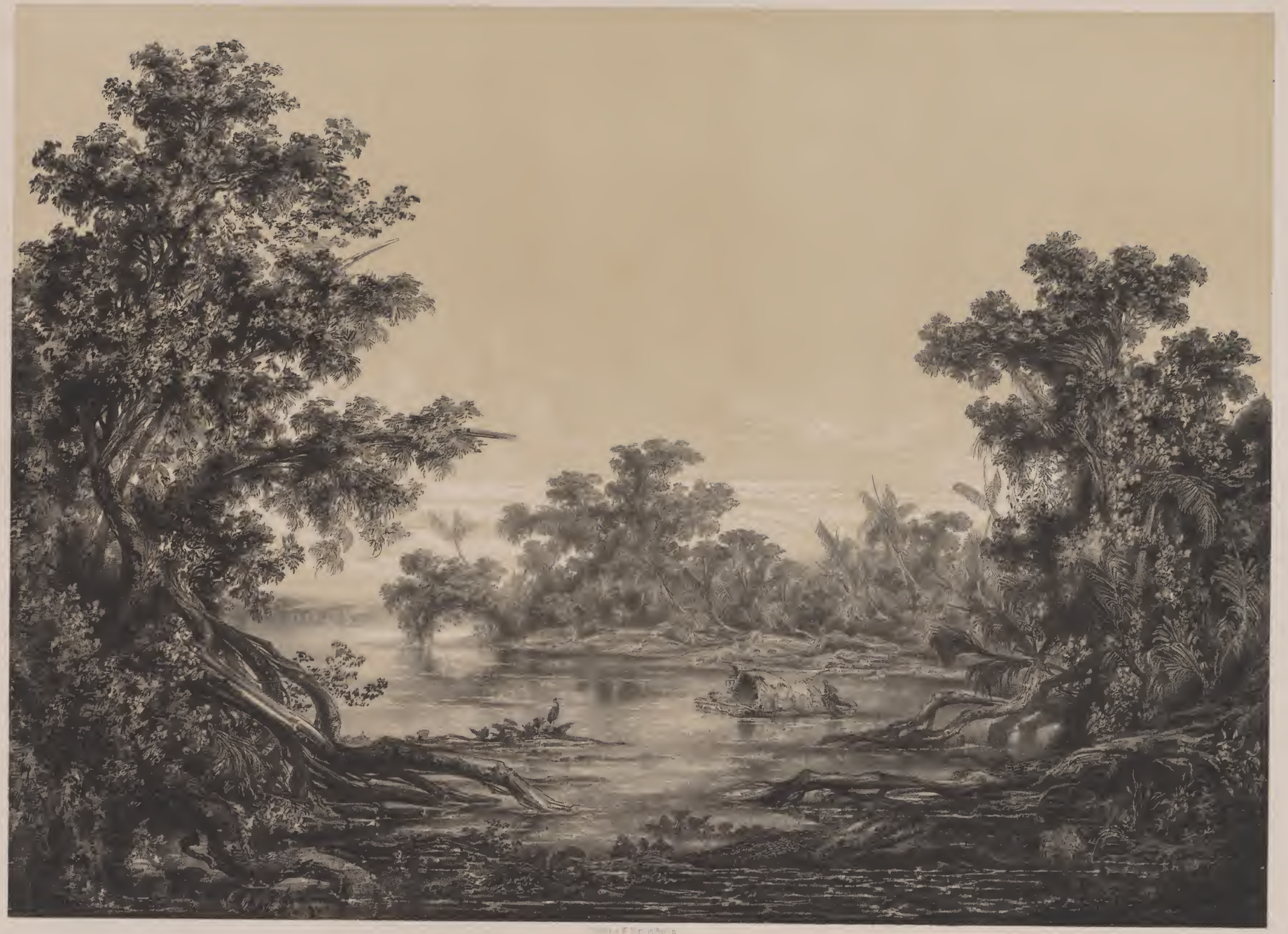

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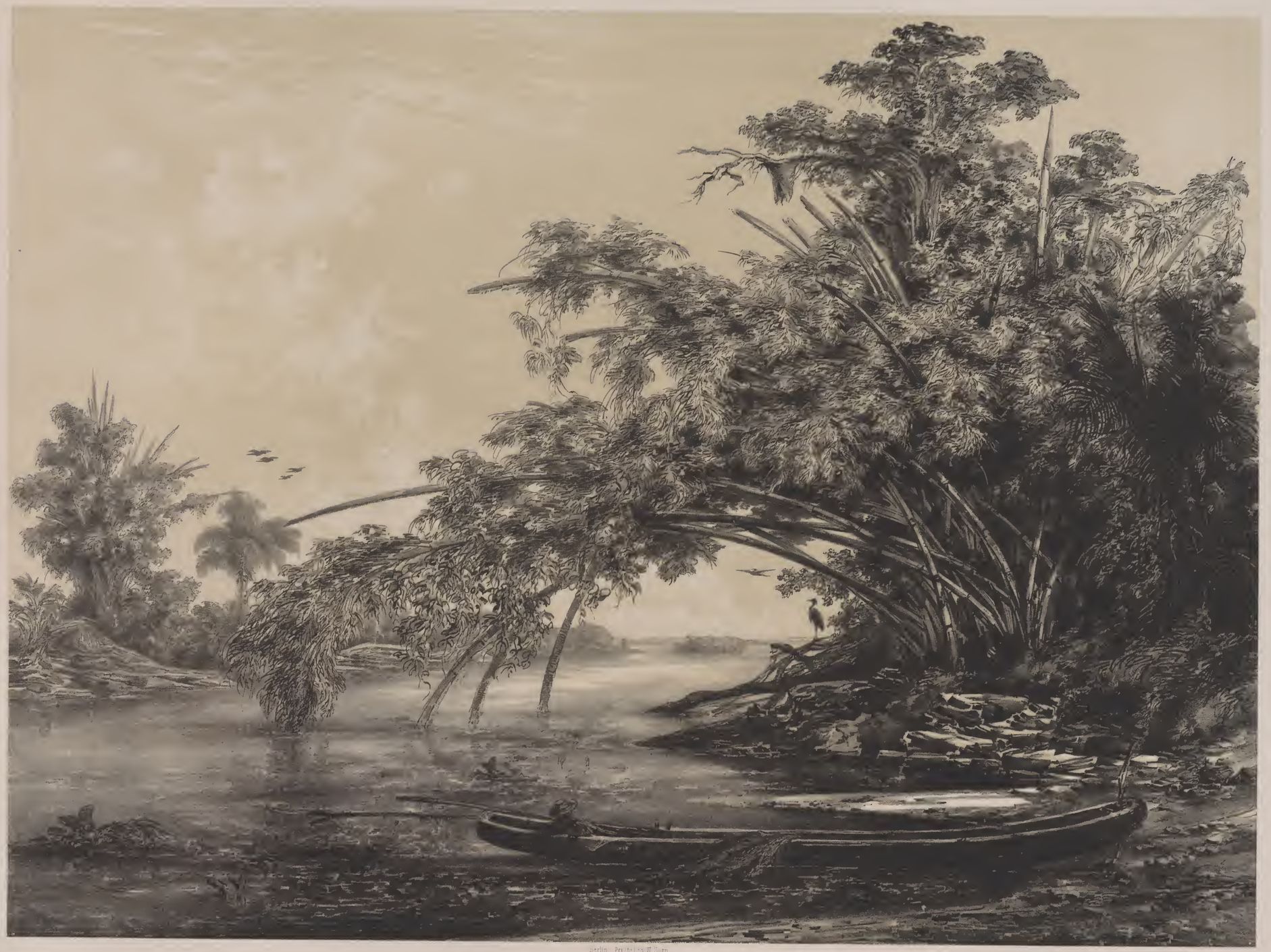

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