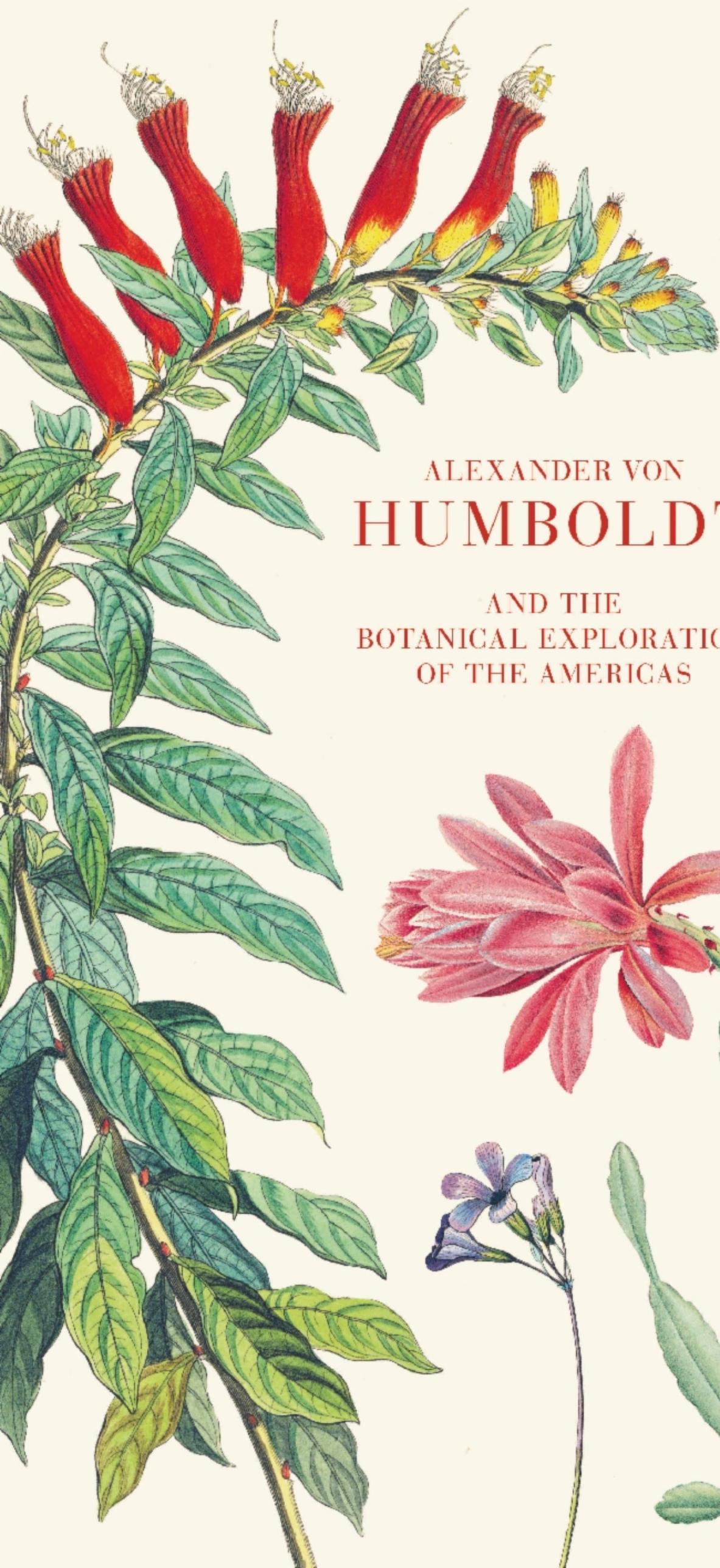


H. Walter Lack



ALEXANDER VON
HUMBOLDT

AND THE
BOTANICAL EXPLORATION
OF THE AMERICAS



 PRESTEL

ALEXANDER VON
HUMBOLDT

AND THE
BOTANICAL EXPLORATION
OF THE AMERICAS



ALEXANDER VON
HUMBOLDT

AND THE
BOTANICAL EXPLORATION
OF THE AMERICAS

BY

H. WALTER LACK

Prestel
Munich · London · New York

FOREWORD

Page 6

INTRODUCTION

Page 8

HUMBOLDT

HIS YOUTH, STUDIES AND TRAVELS THROUGHOUT EUROPE

Page 12

HUMBOLDT AND BONPLAND

THE GREAT EXPEDITION AND HOW THEY RECORDED
THEIR BOTANICAL FINDINGS

Page 18

WILLDENOW

PUBLICATION OF THE RESULTS IN BERLIN,
HAMBURG AND STUTTGART

Page 36

HUMBOLDT

PUBLICATION OF THE RESULTS
IN PARIS AND BOGOTÁ

Page 44

BONPLAND AND TURPIN

PUBLICATION OF THE RESULTS IN PARIS

Page 50

KUNTH AND TURPIN

PUBLICATION OF THE RESULTS IN PARIS

Page 62

HOOKER

PUBLICATION OF THE RESULTS IN LONDON

Page 78

DUNAL

PUBLICATION OF THE RESULTS IN PARIS

Page 82

KUNTH AND DELILE

PUBLICATION OF THE RESULTS IN PARIS

Page 86

HUMBOLDT, BONPLAND AND KUNTH

THE LATER YEARS

Page 90

ORDER OF PUBLICATION

Page 100

POSTSCRIPT

Page 102

PLATES

Page 105

BIBLIOGRAPHY

Page 271

INDEX

Page 273

FOREWORD

Alexander von Humboldt again? Hasn't enough been written about him already? The question is justified and demands an answer. This is not, however, simply another comprehensive account of the life and work of the man who is arguably Prussia's most eminent and multifaceted scientist; rather, the publication considers how much of a contribution Humboldt and his associates made to recording the diversity of the plant kingdom.

Considering that botany was never the real focus of Humboldt's interests, one has to wonder whether there is any justification in singling out for closer examination such a small part of the bewilderingly complex activities of a scholar who was a man of private means and never married, but who produced extremely valuable and lasting contributions to a wide range of scientific disciplines. Botany, in the sense of recording the great diversity of the plant kingdom, was of some importance to him in his early career as an inspector of mines and during the famous expedition that he and Aimé Bonpland undertook to Latin America as well as during the subsequent evaluation of their findings; thereafter, however, his interest in it clearly waned.

A number of reasons have nevertheless encouraged the author to write this particular volume. Firstly, the

methodology applied by Humboldt and his associates was pioneering and astonishingly modern. As they recorded the diversity of plants in the field, in their studies and studios, field notebooks were maintained, specimens numbered, botanical illustrations produced and research results were published with strict attention to procedure and detail. Secondly, and in contrast to many other scientists of his day, Humboldt succeeded in building up a small team with whose help he published the expedition's botanical findings, an aspect of his work that has scarcely been recognised to date. Thirdly, the reasons why Humboldt and his associates — as almost every scientist does today — worked where conditions were best for them, need to be outlined; at the time that meant Paris, not Berlin. Fourthly, their momentous expedition became a model for many subsequent undertakings — privately organised expeditions which, although carefully planned, were executed with a high degree of flexibility without ever losing sight of their aim to publish detailed findings as soon as possible in an appropriate medium. Fifthly, the botanical texts in particular remain influential to this day: for the first time, they described and illustrated hundreds of northern Andean, Cuban and Mexican plants that were new to science and reliably named them. Sixthly,

the observations made during the expedition were an early and convincing description of a subdivision of botany that hitherto had merely been outlined — that of plant geography (phytogeography).

The author does not intend to write a hagiography. As happened to many others, Humboldt and his associates also made mistakes; part of what they regarded as new to science, was not, in fact, due to older publications from Spanish and French botanists. Having complemented each other brilliantly in the field, Humboldt and Bonpland had serious disagreements in Paris, the project's finances were frequently precarious, data where specimens were found were mixed up from time to time, and collaboration between Carl Sigismund Kunth in Paris and the botanists at the Royal Botanical Herbarium in Berlin did not work, although political reasons may have played a role in that.

Nor is it the author's intention to produce a comprehensive compendium on Humboldt. Countless letters, reviews, commentaries and articles deal with the complex, labyrinthine structure of 'Partie 6: Botanique' of Humboldt's renowned *Voyage aux régions équinoxiales du Nouveau Continent* (Account of the Journey to the Equinoctial Regions of the New Continent) and its complicated publication, which Horst Fiedler and Ulrike Leitner covered in exemplary fashion in a publication by the Berlin-Brandenburg Academy of Sciences. The present volume attempts to forge links between the botanical part of the account of Humboldt's American expedition available in print and corresponding source material — letters, field notebooks, herbarium specimens, illustrations and plant prints — and to provide an

impression of the work undertaken by a small group of scientists.

The volume is richly illustrated both to highlight the value Humboldt and his collaborators placed on the additional documentation by way of images and to reveal the remarkable achievements of artists working — unbelievably — largely from pressed and dried plants, yet were still able to depict a selection of the colourful wealth of forms found in the flora of Latin America. What is more, only very few libraries hold complete, full-colour editions of 'Partie 6: Botanique' of Humboldt's magnificent and costly account of his travels. Viewing the large-size volumes is usually only possible by appointment in supervised reading rooms with restricted opening times. Reproduced on a considerably smaller scale than the original prints, the eighty-two plates included in this volume are a small selection of Humboldt's pictorial documentation; nevertheless they convey a lively impression of the superb quality of depiction that was very close to the team's heart — and which cost Humboldt a fortune.

A new and more precise picture emerges of how Humboldt and Bonpland undertook botanical field work and how the botanical aspects of the expedition to Latin America were written down and published. Containing more pages and plates than all the non-botanical sections together, the botanical research was the fruit of the joint effort of three outstanding figures: Humboldt, Bonpland and Kunth, whose names will forever be associated with the botanical exploration of Latin America.



INTRODUCTION

Neither Humboldt, Bonpland nor Kunth knew the concept of 'biodiversity' as such which only entered the scientific and political debate in 1985, yet they were very much aware of the biological diversity that existed in the world around them (fig. 1). Biodiversity encompasses various levels, three of which are especially important: genetic diversity, of which scientists had only a hazy notion before the concept of genes was developed, and which Humboldt, Bonpland and Kunth can only have guessed at; the diversity of species that fascinated all three of them, and which Kunth spent his whole life recording, while Bonpland devoted a few years to it; and the diversity of habitats, including correlations between plant life and ecological factors that Humboldt addressed in his *Essai sur la géographie des plantes accompagné d'un tableau physique des régions équinoxiales*, [Essay on the geography of plants, with a table on the physical features of the equinoctial regions], based on his observations in the Alps, on the Canary Islands and in the Cordilleras of South and Central America.

Remarkably the diversity of species and of habitats varies widely across the globe. Regions of extreme diversity, such as the Highlands of New Guinea, exist alongside others of extremely low diversity such as the tundra in the northern hemisphere. On their expedition through Spain's American colonies, Humboldt and

Bonpland roamed regions where there was a vast diversity of species. They reacted to what they saw with enthusiasm and were similarly thorough as collectors.

When setting about recording the diversity of species, one would always start by finding a plant in the field, more specifically one or several exemplars of a species and take a sample of it — sometimes the whole plant, but much more frequently of a part of it. Usually this sample was pressed and dried between paper or permanently preserved in fluids such as alcohol or formalin. A sample becomes a specimen by including information about the circumstances in which it was collected: the exact location, time and details about the collector. Specimens are fundamentally unique; they are objects that occur in one location only and are thus irreplaceable — although for safety's sake it is an old tradition to distribute fragments or duplicates among colleagues. Following preservation, the characteristics of a living plant such as scent and colour are generally lost, so additional details in the form of entries in a field notebook are highly desirable. They increase the value of the specimen and greatly simplify the task of retrieving the plant in situ. The sum of the specimens forms a collection. Even it is incomplete, imperfect and visually of little appeal

to amateurs, it still reflects the diversity of the plant species contained within it. Ideally, such botanical collections are permanently deposited in a public institution accessible to the scientific community for study and comparison.

A detailed examination of a newly found plant, or at least of a sample taken from it, is essential when recording biodiversity. Using precise terminology at all times, the aim is to make comparisons based on which groups of similar specimens can be formed, and then to write a description of the plant that permits its unambiguous identification at a later date, either by means of precisely measured data or by stating its observed variability. Successful descriptions of plants enable a specialist to gain an exact picture of the examined plant without having to refer to the specimen. The greater the number of characteristics observed and the greater the number of individual specimens examined, the higher the quality of a description will be. It is standard practice to specify in a text all the sources — i.e. all the specimens — to which a description refers.

was not the ideal man to undertake it. Humboldt therefore felt obliged to look around for a more suitable co-worker, whom he found in Kunth.

A life-like picture is a two-dimensional representation of a three-dimensional object, in this case of a plant or part of one. Compared to a description in words, a picture has the unbeatable advantage of instantly conveying the overall impression made by a plant; when executed with sufficient care, it can also reveal considerable details that frequently prove very hard to describe in words alone. On the other hand, a major disadvantage of a picture, as opposed to a description, is that it is relatively labour-intensive and expensive to produce. While working in the field, Humboldt and Bonpland produced numerous plant illustrations (of which, however, only one single illustration has survived). Based on these and on specimens, specialists in Paris, most notably the botanical illustrator Pierre Jean François Turpin, produced finalised versions or produced new illustrations that have come down to us almost in their entirety.

As is usual in science, the recording of biodiversity ends only on publication, i.e. when information is made accessible by being deposited in a public library in printed form. In this case, information means a description of a plant, its name and an illustration of it that, nowadays, are published almost exclusively in journals. In keeping with the conventions of his day, Humboldt had his results

ON THEIR EXPEDITION

through Spain's American colonies,

Humboldt and Bonpland roamed regions

where there was a vast diversity of species. They reacted to what they saw with equal enthusiasm and were

similarly thorough as collectors.

Scientific communication about biodiversity is not achieved primarily through descriptions of plants, but by means of scientific names. They are almost always difficult and time-consuming to establish, and it is a task that requires great expertise. Essentially the question is whether the plant is already known or whether it first needs to be given a scientific name; in the former case, who was the first person to name it? There are usually two groups of specialists: experts with knowledge of the flora of a particular — and often very narrowly-defined — area, or experts with knowledge of a particular and often narrowly-defined group of plants, such as a family or genus. If no expert is available — as was the case when Humboldt and Bonpland returned from America — comparisons with an already named scientific collection must be undertaken, or research undertaken on published plant descriptions and illustrations in specialist libraries. Using such aids, unknown specimens can be identified or, if necessary, described and given a scientific name for the first time. While Paris was the ideal place for such work, Bonpland

published in book form — as 'Partie 6: Botanique' in nineteen massive volumes being part of *Voyage aux régions équinoxiales du nouveau continent*. While there was — and still is — no obligation to add a printed botanical illustration to a published botanical description, it did — and still does — greatly facilitate work, especially at a time when botanical terminology was just becoming canonised. The publication of botanical illustrations, however, required the involvement of other specialists such as engravers. In Paris, various workshops produced work for Humboldt; their anonymous colourists added watercolours on the engravings.

The triad of specimen, printed description and printed illustration, plus supplementary annotations such as the location where a specimen was found, is to this day regarded as the ideal standard because it provides a comprehensive notion of the plant in question. This is the model employed by Humboldt in the botanical section of his South American account although, in keeping with the custom of the day, only a fraction of the plants described was also illustrated. The extensive text and its associated illustrations are now available online; the specimens deposited at the Muséum National d'Histoire Naturelle in Paris and at the Botanisches Museum in Berlin-Dahlem are additionally accessible in the form of a microfiche edition. The field notebook remains unpublished and Turpin's pen-and-ink drawings and watercolours have never been the subject of a scholarly examination.

The living material, seeds or fruit that Humboldt and Bonpland sent back to Europe — and which was cultivated in various botanical gardens including Schöneberg near Berlin, Paris and Malmaison — has a special role. Despite being limited in extent, it included several novelties whose descriptions, scientific names and illustrations appeared in separate publications.

Time and again, Humboldt was and continues to be hailed grandiloquently as the second Columbus, as the man who discovered America, particularly Latin America, for the second time. This is largely nonsense — at least as far as botany is concerned: during his long reign, King

Carlos III of Spain dispatched no less than seven botanical expeditions to his American dominions. For a number of different reasons, the greater part of what they found went unpublished for a long time. Humboldt's major achievement was to ensure the prompt publication of his botanical results — even if that took almost three decades and cost him a large share of the fortune he had inherited. It also meant, however, that a fundamental contribution was made to our knowledge of the botanical diversity found in the northern Andes, Cuba and Mexico.

Depending on one's temperament, the task of recording the diversity of species can rightly be described either as 'never-ending toil' or 'never-ending synthesis'; the same can be said of the diversity of habitats. Together with their French and Spanish predecessors, Humboldt, Bonpland and Kunth laid the foundations for our understanding of the region's plant life. A huge amount of work was needed then, and is still needed now: in the more than two hundred years since Humboldt and Bonpland returned to Paris, the number of plants known in the areas they explored has proliferated and there is still no end in sight. The diversity of species continues to be a source of fascination; however, there is now growing confidence that during the third century after the great expedition this work will be continued in a synthetic way, like the *Flora neotropica* project, resulting in an even better understanding of the phenomenon.

The beginnings of it all, however — in Berlin, La Rochelle and Leipzig — were relatively modest.

Extended caption:

1 | Heads of Compositae, 1807–20

See plates 52, 11, 10; 51, 54; 53, 56, 17 and 57, 18, 58



HUMBOLDT

HIS YOUTH, STUDIES AND TRAVELS THROUGHOUT EUROPE

Friedrich Wilhelm Heinrich Alexander Freiherr von Humboldt was born on 14 September 1769, very probably in Berlin at Jägerstrasse 22; it is also possible, however, that he was born in the then outlying village of Tegel where his parents owned an estate. Alexander's father was Alexander Georg Freiherr von Humboldt, who was born in Zamenz (now Szczecinek in Poland), a retired army officer and lord-in-waiting at the Prussian court; Alexander's mother, a Berliner by birth, was Marie Elisabeth Freifrau von Humboldt, widowed von Hollwede, née Colomb. With the Crown Prince, the future Friedrich Wilhelm II, King of Prussia, as his godfather, Alexander was christened in Berlin Cathedral, the city's principal Protestant church. Growing up in well-to-do circumstances and educated by select tutors, the young Alexander was destined from the start to become a member of the Prussian elite.

In hindsight, after almost 250 years, his childhood and adolescence reveal early signs of a special interest in the natural world in the form of insects, stones and plants; it earned him the soubriquet of 'the little apothecary'. His first specific contact with the diversity of the plant kingdom came from a visit by Ernst Ludwig Heim, a doctor from Spandau, who on 30 July 1781 noted in his diary:

Rode to Tegel and lunched with Frau Majorin von Humboldt; explained to young Humboldt the twenty-four classes of plants according to Linnaeus, which the elder [Wilhelm] very readily grasped and whose names he immediately retained.

Alexander's own recollection of this lesson sounds less enthusiastic:

He [Heim] had a large collection of mosses, and one day took the trouble to explain the Linnaean classes to my older brother. Adept at Greek even then, he learned the names by heart; I affixed *Lichen parietinus* [*Xanthoria parietina* (L.) Th. Fr., a lichen] and *hypnum* [*Hypnum* spec., a moss] onto paper, and in a matter of days our pleasure in botany vanished.

It is unknown whether this early contact with botany determined Alexander's decision in the spring of 1788 to seek the acquaintance of a student called Carl Ludwig Willdenow.

Another remarkable thing about Humboldt's youth (fig. 2) is the fact that he received instruction from Daniel Chodowiecki — then Berlin's leading draughtsman and graphic artist. At a young age he had mastered engraving and etching and as a mere seventeen-year-old exhibited a chalk drawing at the Royal Prussian Academy of Arts and

2 | Johann Heinrich Schmidt, *Alexander von Humboldt*, 1784



3

Mechanical Sciences in Berlin. The ability to draw in a true-to-life manner was to prove very useful on his great American expedition.

Willdenow was only four years older than Humboldt. He had trained in his father's pharmacy on the corner of Unter den Linden and Friedrichstrasse in Berlin (fig. 3), had undertaken further studies at Johann Christian

this perilous odyssey, I fancy I am back at the corner of Friedrichstrasse in your room, near to your heart....

He concludes his letter thus: "With brotherly love your old pupil Alex. Humboldt". Five years later when reviewing the years around 1790, Humboldt writes of Willdenow:

THE SIGHT OF FOREIGN
plants in the herbaria
filled my fancy with the promise
which the vegetation of
warmer climes must offer me.

Wiegleb's academy in Langensalza, and had started to read medicine at the University of Halle. An enduring friendship appears to have developed quickly between the two men — although few letters exist to prove it. In Havana on 21 February 1801, Humboldt wrote to Willdenow, by then an apothecary, Professor of Natural History at the Collegium medico-chirurgicum and a full member of the Royal Academy of Sciences in Berlin:

When I think back to the times when I brought you *Hordeum murinum* to be identified, when I recall that botanical studies ... stirred in me the urge to visit the world of the Tropics.

Humboldt's words give an idea of just how important meeting Willdenow must have been for him; the passage in the letter also proves that he was concerned with identifying plants from and around Berlin — in other words that he cared about plant diversity. A few lines further on he writes:

How wonderful are the links in a human life. Sometimes when I dream about a happy end to

His gentle, amiable character made botany even more precious to me. He did not give me formal lessons; instead I took him plants I had collected, and he classified them for me. I was thus filled with enthusiasm for botany, especially for the cryptogams. The sight of foreign plants in the herbaria filled my fancy with the promise which the vegetation of warmer climes must offer me.

In the *Gazette littéraire de Berlin*, Humboldt — at the age of twenty — published an annotated French translation of a Latin text under the title 'Sur le Bohon-Upas' in which he describes the upas tree [*Antiaris toxicaria* (Pers.) Lesch.]. He made others sit up and take notice with two sentences

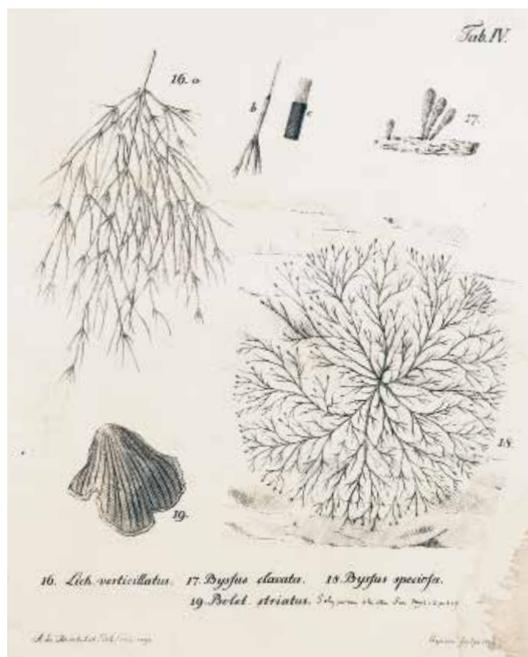


4

in his second publication, *Mineralogische Beobachtungen über einige Basalte am Rhein* [Mineralogical Observations of Certain Basalts on the Rhine], in which he states:

Every stone is certainly not destined to be a home to every plant. Here Nature follows laws that are as yet unknown; they can be fathomed only when botanists provide more inductive data.

Humboldt was twenty-one years of age when his second paper was published. Like many other young men from good homes, he had also already travelled outside the Holy Roman Empire: brief visits to France, where the Revolution had just broken out, the Republic of the United Netherlands and England can be proved. Humboldt paid a visit to the Royal Garden at Kew outside London; he visited the Physic Garden of the University of Oxford and met the most eminent botanists then working in England — including Sir Joseph Banks, the youthful President of the Royal Society, John Sibthorp, Sherardian Professor at the University of Oxford, and James Edward Smith, who a short time before had purchased Linnaeus's library and scientific collections. Humboldt's travelling companion, too, was a scientist with botanical interests, George Forster. He had accompanied Captain Cook on his second circumnavigation of the globe and had painted realistic watercolours of the flora and fauna of the very high southern latitudes. Humboldt might also have met Ferdinand and Franz Bauer, brothers then producing realistic botanical illustrations for Sibthorp in Oxford and Banks in Kew respectively. In a letter written in Havana, Humboldt would later compare the quality of their work with that of Atanasio Echeverría. A brief stay



5

in Paris in July 1790 gave Humboldt his first impression of the city that would become the centre of his life for over two decades.

Humboldt took up his studies at the Electoral Mining Academy of Saxony in Freiberg on 14 June 1791. Remarkably, it was the cryptogams that intrigued him when he first went down the pit. In September that year, he wrote:

While mining practicalities fill much of my time, I have nevertheless started work on the local flora, in particular the cryptogams. Every day I am astonished at the wealth of underground vegetation and the persistence of its forms. The plants and sponges drawn by [Giovanni Antonio] Scopoli in the tunnels of Schemnitz [now Banská Štiavnica in Slovakia] I find here to be so similar that it appears he had the same specimen. I draw the new species and observe the progress of the vegetation, as I can often return to the lichen on successive occasions. I undertake trips of my own when I hear that, in an old working, a man has found a quantity of rotten wood, the principal source of my *Flora fodinarum* [tunnel flora] ... I hope to have my small *Specimen Florae Frybergensis* published this coming winter.

As so often, this estimate was overoptimistic: it was not until May 1793, having taken his degree and following his appointment as a Prussian Mines inspector, that he was able to publish *Florae Fribergensis Specimen* (fig. 4; A specimen of the Flora at Freiberg) in Berlin. Dedicated to Willdenow, the book is a classic of cave botany that describes the various forms of aphotic fungi and lichens Humboldt had encountered in the tunnels around Freiberg

3 | J. F. Fechtel, *Berlin from Tempelhofer Berg*, 1781

4 | A. v. Humboldt, *Florae Fribergensis specimen*, 1793. Title page

5 | J. S. Capieux, *Fungi that Inhabit Mine Workings*, 1792

and contains four copper engravings by Johann Stephan Capieux after his own drawings (fig. 5); it appeared in German one year later. On 20 June 1793, Humboldt was elected a member of the Imperial Academy of Sciences Leopoldina and, in mid-July, he was awarded the Saxon Elector's Gold Medal in the Arts and Sciences for his work on cave botany. There followed years of service in the Prussian Mines Administration punctuated now and again by lengthy trips throughout Europe.

Humboldt first visited Vienna in the autumn of 1792 when he took the opportunity to make the acquaintance both of Nikolaus Joseph Edler von Jacquin, Professor of Botany and Chemistry and director of the University of Vienna's Botanic Garden, and his son and successor in all three positions, Joseph Franz Edler von Jacquin. Of his second visit to the city, from mid-August to mid-October 1797, Humboldt wrote:

I have stayed here and at Schönbrunn for some months in order to prepare myself for my journey to the Tropics in the inexpressible treasures preserved there.

This is a reference to the collections of living and preserved plants and animals as well as rock samples, minerals and ethnographica that Jacquin Sr and others had had shipped to Vienna and Schönbrunn from the Caribbean and from northern Latin America. The greenhouses at the emperor's summer residence at Schönbrunn then housed the largest collection of tropical plants in Europe; for Humboldt, aged twenty-eight, Jacquin Sr was the first scientist who had spent years living and working in the Tropics in the New World. The 'West Indies' — in other words the islands of the Caribbean — had earlier emerged in letters as a possible destination on a round-the-world trip, but were not yet considered in greater detail. On 21 April 1798, Humboldt noted in a letter written in Salzburg: "In fourteen days I shall be in Paris. I shall see everything more clearly there."

Following his father's early death, Humboldt's mother died too of cancer on 19 November 1796. A short while later, Humboldt wrote to Willdenow:

My unfortunate mother has finally passed away. For compassion's sake, one wished it to happen.

Humboldt and his elder brother were the beneficiaries of her will. The Ringenwalde [now Dyszno in Poland] estate fell to Humboldt who, on 22 April 1798, sold it for 72,000 talers. Combined with the sum he inherited in cash, he was now a wealthy young man who saw himself in a position to finance an expedition and publish its results.

On 12 May 1798, Humboldt arrived in Paris where his brother and sister-in-law, Caroline, had already been

living for a number of months. He took a room at the Hôtel Boston at number 7, rue du Colombier, and immediately set about contacting scientists in the French capital. Although there is no proof, it is probable that at this opportunity at the latest Humboldt acquainted himself with the Muséum d'Histoire Naturelle — whose administration had been reorganised five years earlier — and the Jardin des Plantes, formerly the Jardin du Roi (fig. 6), both located on the Left Bank. By chance, he met a surgeon who was four years his junior, a man born in Saint-Maurice near La Rochelle on the Atlantic coast: Aimé Jacques Alexandre Goujard Bonpland about whose early years and life as a student only a little is known — in contrast to Humboldt. Bonpland was the son of Simon-Jacques Goujard Bonpland, a doctor and the principal surgeon at the infirmary at La Rochelle and his wife Marguerite-Olive, née de la Coste. Humboldt wrote in retrospect:

You know that, when going out, one hands in the key and always exchanges a few polite words with the caretaker's wife. As I did so, I would often meet a young man carrying a vasculum. It was Bonpland; that is how we met.

Bonpland had trained as a botanist under Antoine-Laurent de Jussieu and René-Louiche Desfontaines, both Professors at the Muséum d'Histoire Naturelle and members of the Academy of Sciences in Paris. It was Bonpland who truly became the botanist on the great expedition.

On 15 October 1798, the Prussian legation in Paris issued Humboldt with a passport for eighteen months; his destinations were given as Marseilles and Algiers. Five days later, he and Bonpland headed south via Lyons and Avignon. In Marseilles they waited in vain for a boat that would take them to North Africa. They botanised round about Marseilles and finally decided to travel to Madrid by way of Barcelona and Valencia. In the first extant letter from the Spanish capital, Humboldt writes:

I have been here for 5 days and have been revelling in all the flora of Latin America that the Botanic Garden contains. I no longer have thoughts of Africa and shall travel from here by packet to Tenerife and probably to the wholesome Danish West Indies [now the US Virgin Islands of St. Thomas, St. Croix and St. John] ...

Making the acquaintance of Philipp Baron von Forell, the Elector of Saxony's envoy, opened up new perspectives. He supported Humboldt's request for permission from Carlos IV, King of Spain, to undertake an expedition to the Spanish colonies. At the royal summer residence of Aranjuez only a few weeks later, a passport was issued for Humboldt and Bonpland and the two companions set out for La Coruña.



6

Written in the port city on 5 June, two letters reveal something of Humboldt's general aims:

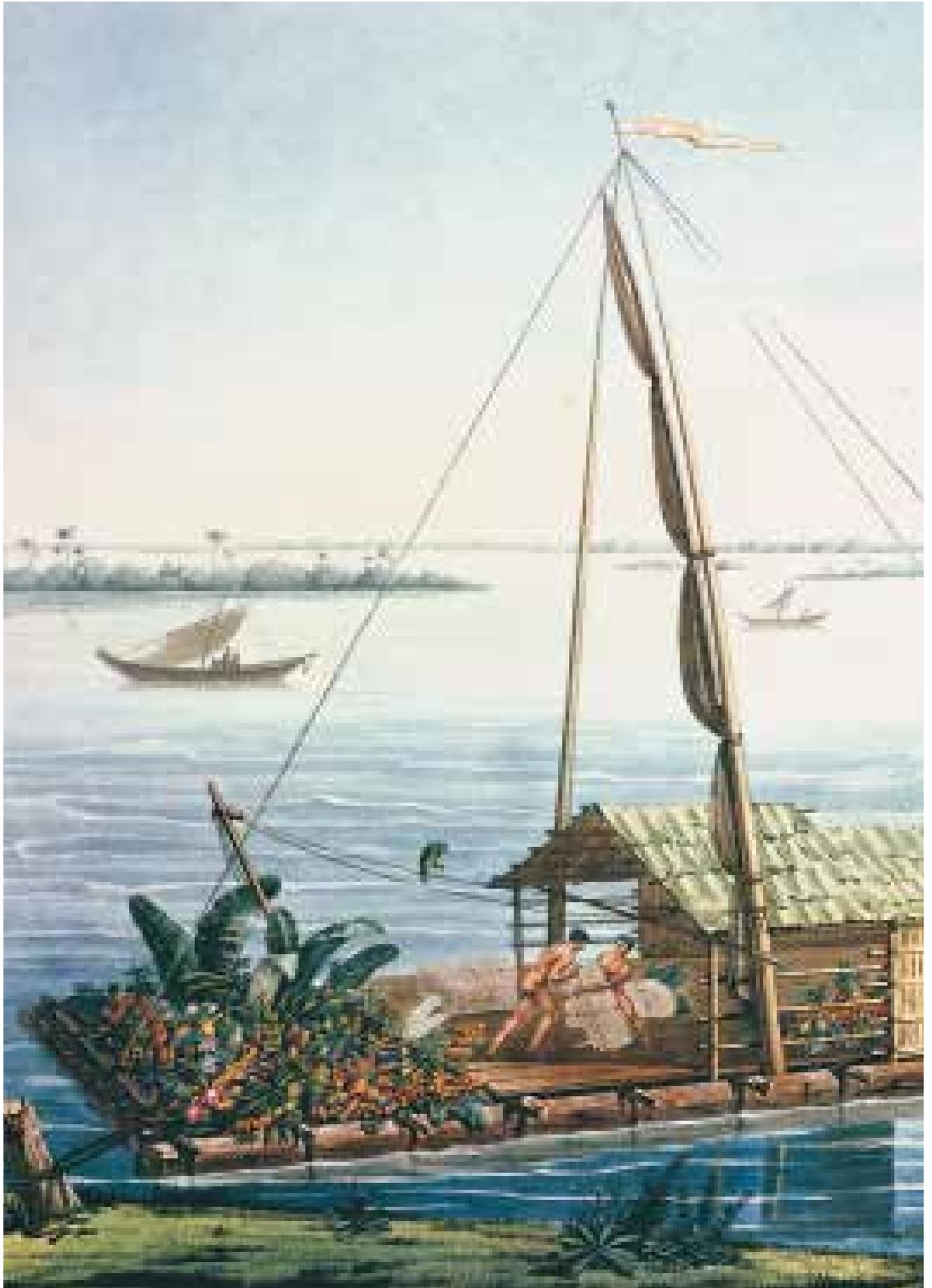
With the most glowing recommendations and in a multitude of favourable conditions, I embark on my great journey ... I shall collect plants and fossils ... although they are not the main purpose of my journey. It is the combination of forces, the influence of inanimate creation on the living flora and fauna that I shall direct my gaze at all times ... and in a letter to his friend Willdenow who, in Berlin, had by now already published the first volumes of the fourth edition of Linnaeus's *Species Plantarum* containing no fewer than 2,425 pages, he writes:

I trust we shall meet again in good health ... Memories of you accompany me. Man must want the Great and the Good; the rest depends on Fate.

Extended captions:

- 2 | Johann Heinrich Schmidt, *Alexander von Humboldt*, 1784
Pastel on paper
Deutsches Freies Hochstift, Goethemuseum, Frankfurt am Main
- 3 | Johann Friedrich Fechhelm, *Berlin from Tempelhofer Berg*, 1781
Oil on canvas
Stiftung Stadtmuseum, Berlin
- 4 | A. v. Humboldt, *Florae Fribergensis specimen*, 1793
Title page
Library, Botanischer Garten und Botanisches Museum
Berlin-Dahlem, Freie Universität, Berlin
- 5 | Johann Stephan Capieux, *Fungi that Inhabit Mine Workings*, 1792
Copper engraving
Capieux after A. v. Humboldt, *Florae Fribergensis specimen*, 1793, t. 4, Berlin
Library, Botanischer Garten und Botanisches Museum
Berlin-Dahlem, Freie Universität, Berlin
- 6 | F. D. Née, *View of Jardin du Roy in Paris*, c. 1780
Coloured copperplate
Alexander v. Humboldt – Sammlung Hein, Stadtmuseum, Berlin

6 | F. D. Née, *View of Jardin du Roy in Paris*, c. 1780



HUMBOLDT AND BONPLAND

THE GREAT EXPEDITION AND HOW THEY RECORDED THEIR BOTANICAL FINDINGS

The story of the expedition undertaken by Humboldt and Bonpland — with all its moments of triumph and disaster, with its trials, dangers and privations — has been told ad nauseam in virtually countless variations and with meticulous attention to detail. More recently, scientists and journalists have followed the carefully reconstructed route, made documentary films about individual stages of it and, in exhibitions in Latin America and Europe, introduced audiences to a section of the material shipped to Europe together with images of the adventure — as it later came to be glorified. A detailed account of the expedition is, therefore, uncalled-for here. Suffice it to say that the two voyagers visited the Spanish viceroyalties of New Granada, Peru and New Spain, which in today's political topography are Venezuela, Cuba, Columbia, Ecuador, Peru and Mexico, followed by a short stay in the eastern United States before returning to Paris, the starting point of their trip.

A number of general points covering the expedition deserve special attention. It was not a government project, but a private enterprise financed by Humboldt himself. Many doors opened quickly for him thanks to letters of recommendation and good contacts among the elite of the Spanish colonies. There was no predetermined route;

much depended on shipping services which happened to be sailing and from the time it took the two voyagers to make progress by canoe, along tracks and roads — over which, of course, they had only limited influence. It appears to have been a matter of coincidence that the route they took led them through areas of the greatest botanical diversity. Even by current standards, Humboldt and Bonpland collected a vast amount of data. Constantly measuring, observing and collecting, they covered a distance of more than six thousand kilometres by land and climbed to altitudes of several thousand metres (fig. 10). On top of this are the considerably longer distances they covered by sea: the most important stretches being from La Coruña in Spain to Cumaná in present-day Venezuela, from there to Havana, from Trinidad on Cuba to Cartagena in present-day Columbia, from Callao in present-day Peru via Guayaquil (fig. 7) to Acapulco in present-day Mexico, from Veracruz in present-day Mexico via Havana to Philadelphia in the United States and, finally, from New Castle, again in the United States, to Bordeaux in France. It should also be stressed that recording plant diversity represented only one of a great many tasks to which Humboldt and Bonpland applied themselves, albeit performed with great persistence and rigour. Whether that particular activity

71 P. A. Marchais, *Raft on the River Guayaquil* (detail), 1813



8

8 | F. G. Weitsch, *Humboldt and Bonpland at the Foot of Chimborazo*, 1806/07



was the most significant fruit of their shared journey will probably always remain a contentious issue between specialists in the various disciplines.

Historiography that focussed on the heroic deeds of individuals soon made an exaggerated myth out of Humboldt and turned a trip undertaken in partnership into the very epitome of a scientific expedition. As this happened, it was not only Bonpland's work that was eclipsed; to a large extent, earlier and later Spanish expeditions to Latin America were too — every single one of them state-funded and run. It would, however, be inappropriate to mention the journey undertaken by Humboldt and Bonpland in the same breath as the great circumnavigations of the globe: the daring undertaking of Ferdinand Magellan, one of whose ships, the *Victoria*, was the first to sail around the world; James Cook's first circumnavigation of the globe during which he discovered and charted the east coast of Australia, or indeed the second one under his command during which ships first sailed south of the Antarctic Circle. Nor was Humboldt the 'second man to discover the Americas'. Only in the rarest of cases did he enter unknown territory — as he did together

expedition is not so much their thorough preparation as their rigorous execution of it, the meticulous documentation of their observations and, more than anything else, the speed with which they published their results.

Contrary to popular belief, the course of an expedition is less important than the objects collected on it, the observations entered in notebooks and the events recorded in diaries. Like many explorers before and after him, Humboldt made diary-like notes on his expedition. Their contents and structure have been aptly described thus:

Besides accounts of the expedition, they [the American diaries] contain numerous other notes of a scientific nature — astronomical, geomagnetic, barometrical, botanical and zoological, to name only a few. While they were systematically recorded in individual notebooks during the expedition, when they came to be used, the notebooks were later taken apart. Towards the end of his life, Humboldt had all diaries bound in leather in a random order. Among his scientific notes there are tables of measurements, explanations of his own measuring techniques and comparisons with those of other researchers, comments on the instruments used, details of measurements performed, descriptions of mountains, minerals, rivers and lakes, flora and fauna ... Later appendices to his own notes, postscripts or corrections to earlier mistaken views add to the confusion of the whole thing.

THEIR EXPEDITION

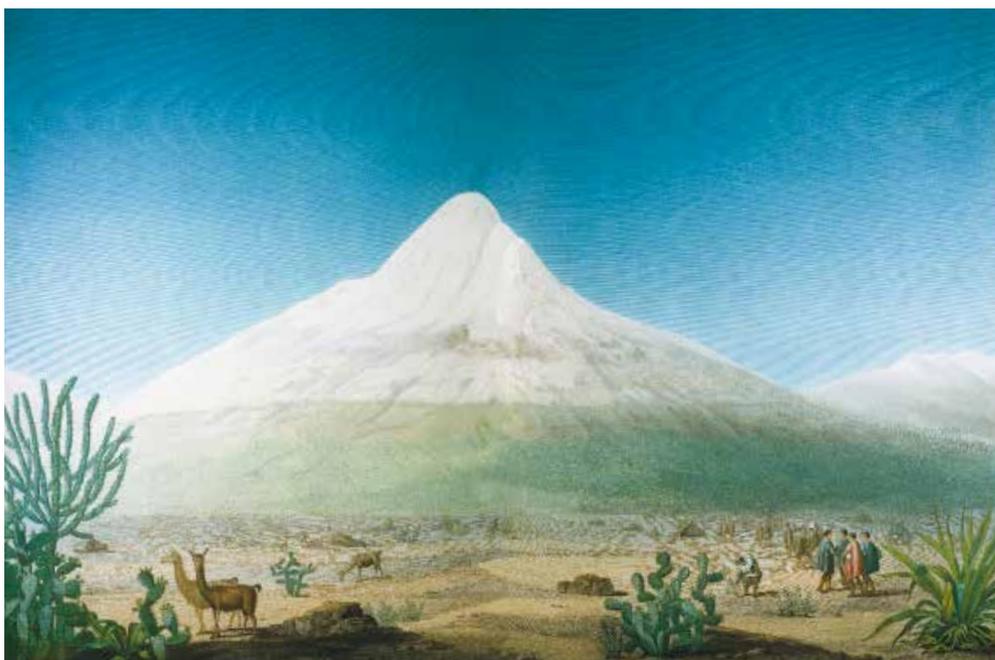
can be viewed as the greatest such
undertaking to come out of Prussia.

with Bonpland and Carlos Montúfar, their Spanish escort, while trying to reach the summit of Chimborazo (6,310 m; figs. 8, 9), then considered the world's highest peak. Even if they were lacking in detail, printed maps of the areas through which Humboldt and Bonpland travelled existed even decades before their trip, as did communication networks and at least irregular shipping links both within the Spanish territories and to Europe. It should also be kept in mind that Humboldt and Bonpland spent many months in towns — in Caracas, Havana, Bogotá, Quito and, above all, Mexico City.

As a private expedition Humboldt's and Bonpland's achievement remains outstanding. Their expedition can be viewed as the greatest such undertaking to come out of Prussia, a state that then had only a limited interest in shipping and overseas territories. Like Humboldt and Bonpland, members of other major expeditions had to learn the correct use of equipment and read extensive scientific literature before setting off. However, what is remarkable about Humboldt's and Bonpland's

Written between 1799 and 1859, the year Humboldt died, this synthesis cannot be viewed as a travel diary in the conventional sense. Rather it is the sum of six decades' worth of thoughts, observations and reflections in and about Latin America.

Only the first part of this voluminous material, written in Humboldt's unmistakable and rather illegible hand, was used in the *Relation Historique* that forms Part 1 of the *Voyage aux régions équinoxiales du Nouveau Continent* (Account of the Journey to the Equinoctial Regions of the New Continent). The text breaks off when Humboldt visits the city of Cartagena and sets off for the Río Magdalena in April 1801; publication of the travel diary was discontinued.



9

The Atlas géographique et physique des régions équinoxiales du nouveau continent [Geographical and physical atlas of the tropical regions of the New Continent] is to be seen as a substitute for Mexico and forms Part 3 of the *Voyage aux régions équinoxiales du nouveau continent*. Thanks to the work of the Alexander von Humboldt Forschungsstelle, a research centre within the Berlin-Brandenburg Academy of Sciences, a comprehensive, annotated selection of texts from all sections of the American journal is available. They reveal Humboldt — who knew how to express himself fluently in French, Spanish, German and Latin — to be a versatile naturalist and critical observer also of the political, economic and social conditions in the Spanish colonies.

Unlike the excerpts from the American travel diaries, the so-called *Journal Botanique* has yet to be published. It is not a diary in the conventional sense either, but a field notebook containing descriptions of numerous plants and animals observed and collected in the field, as well as interim identifications. Written mostly in Bonpland's equally distinctive and illegible hand, it is systematically numbered chronologically (1–4,528 for plants, 1–33 for animals). Each entry starts with a number, followed by an interim identification, a description and the location where an object was found; accounts of the expedition are missing altogether. In its original binding in seven volumes, the *Journal Botanique* is stored in the central library of the Muséum National d'Histoire Naturelle in Paris. It later formed the basis on which the botanical results were published. Plants quickly lose their colour and scent when they are dried, but Bonpland's descriptions

routinely contain such details, so he must have written his texts in the field. Traces of water and ink spots (fig. 11) are further indications to support this. As a record of fieldwork, *Journal Botanique* is an exemplary document conforming to contemporary requirements.

Interspersed among the plant descriptions is the odd additional note by Humboldt, some of which at least were added during the expedition (fig. 12). One comment in his hand, for instance, starts with the words: "Nous savons aujourd'hui (Oct 1801) ..." [We know today [October 1801]...]. In addition, Humboldt wrote a few plant descriptions by himself (fig. 13), while Bonpland expanded some of his descriptions. What is important, however, is the ratio: in the first notebook covering the period from their arrival on Gran Canaria in June 1799 to Caracas in January 1800, there are, for instance, nine field descriptions by Humboldt compared with 682 by Bonpland. On 12 July 1851, almost forty-seven years after the expedition ended and both travellers had returned to Paris, Humboldt recalled the field notebooks and wrote:

Quoiqu'une partie de ces documents soit de ma main ... je dois regarder le tout comme propriété de Monsieur Bonpland [Although a part of these documents was written by me ... I must regard them in their entirety as the property of M. Bonpland].

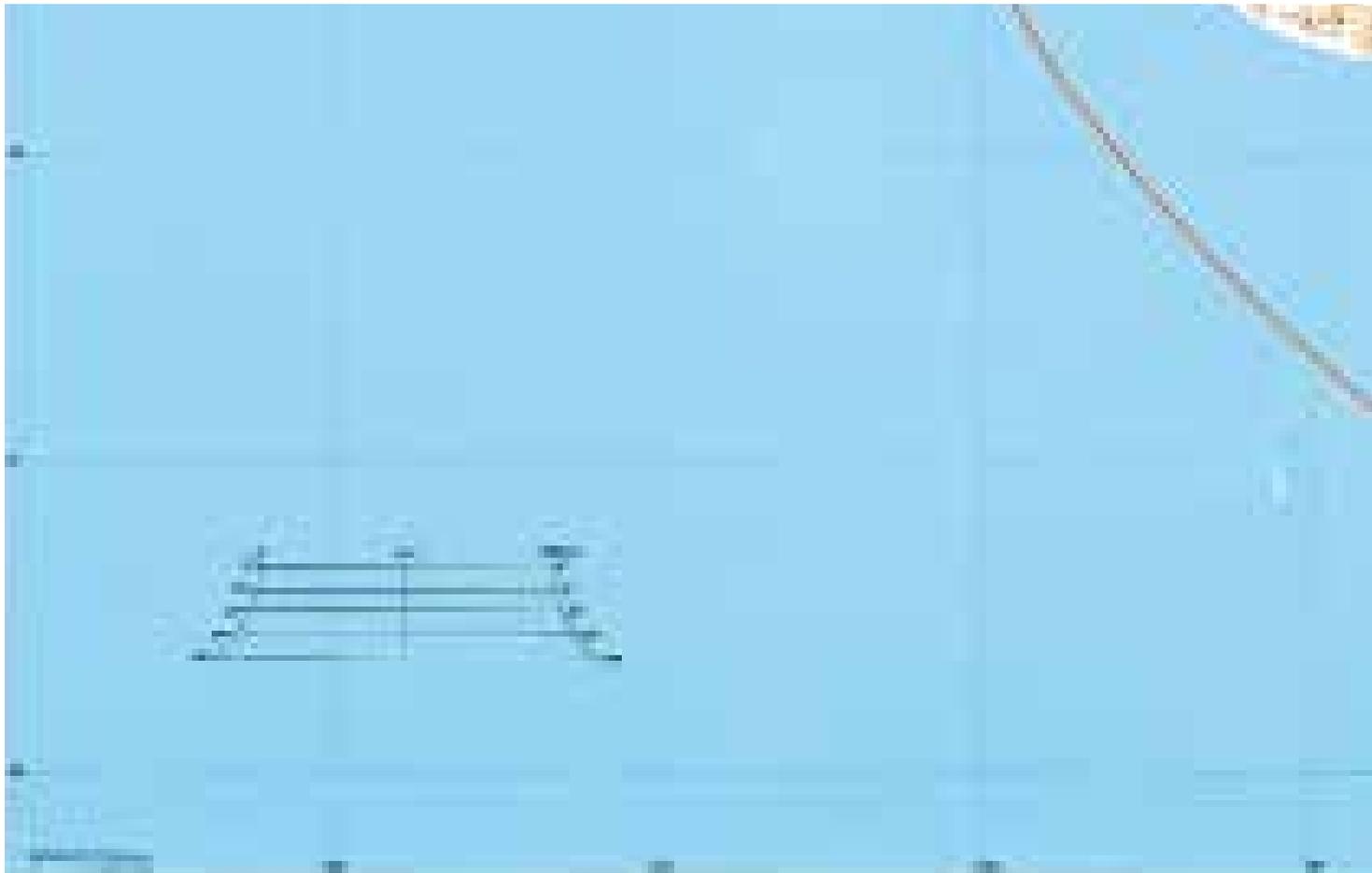
As can only be expected with a field notebook there are wide variations in the detail and accuracy of descriptions, but only rarely — in the case of several cryptogams — are they missing altogether. The same applies to the identifications. Apart from scientific names like the generic names '...' is found not infrequently; it indicates that a plant's identity

9 | J.-T. Thiebaut, *Chimborazo viewed from the Tapia Plain*, 1811

**Gulf of
Mexico**

P A C I F I C

O C E A N



O C E A N

Caribbean Sea



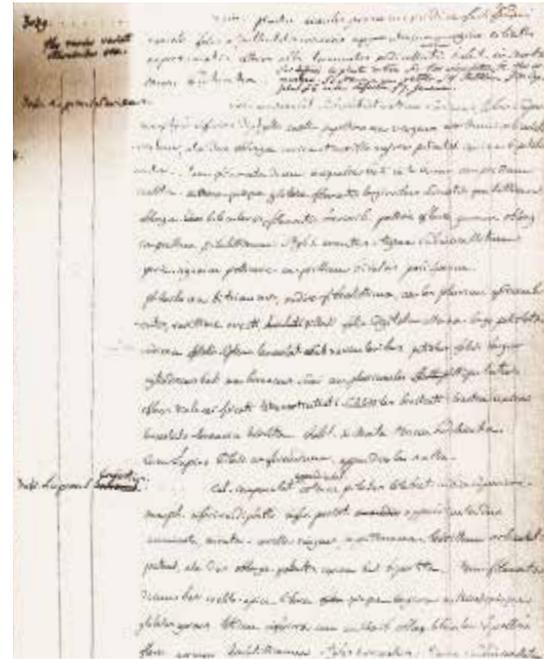


11

was totally unknown to Bonpland and Humboldt. Classifications in accordance with the Linnaean orders and in the form of Latin abbreviations are to be found in several places and attest to the use of this practical method of classification in the field. The collection data is limited to location, month and year, but can be missing. Significantly, until February 1801, Bonpland consistently adopts the new names of the Revolutionary calendar and has calculated time from the year of the Revolution; Humboldt, on the other hand, always uses the conventional French names of the months derived from Latin and calculates time from the birth of Christ. There is the odd gap in their reckoning and duplications also occur. Not infrequently there are cross-references: from one entry to another, from one entry to a nature print, from one entry to a drawing.

Committed to paper in a mixture of Latin and French with supplementary notes in Spanish, the plant descriptions are complemented by some small drawings executed mostly in pen, but also in pencil (fig. 14) or, very rarely, monochrome watercolour. Chiefly attributable to Bonpland, less often to Humboldt, they usually show details of flowers and fruit, but partly also of fragments of flowers split open or cross-sections of fruit. That they are integrated into the text suggests that they, too, were produced during the expedition. The *Journal Botanique* thus conveys a vivid picture of the botanical duties in the field that Bonpland quite clearly took largely upon himself.

The consistent numbering of the descriptions and their chronological order merit special attention. No similar system is known from any other expedition — not only to Latin America. No field notebook was structured



12

so consistently even on the Matthew Flinders expedition to Australia that was under way at much the same time. It is not known whether credit for the system of indexed numbers is due to Humboldt or Bonpland. Remarkably, Bonpland still modelled his own field notebooks on the *Journal Botanique* even decades later.

Unlike the expeditions to Latin America backed by the Spanish crown, no botanical illustrators accompanied Humboldt and Bonpland on their private expedition. This circumstance gave rise to the simple and small sketches in the *Journal Botanique* and, much less often, in the American diaries. Moreover, both Humboldt and Bonpland must have drawn large numbers of plants, but only one single drawing has survived and is reproduced here (fig. 15). The existence of these sheets — now largely missing — is attested by the repeated mention in the *Journal Botanique* of the phrase “j’ai dessiné cette plante” [I drew this plant] both in Humboldt’s and Bonpland’s hand. Humboldt, for instance, notes:

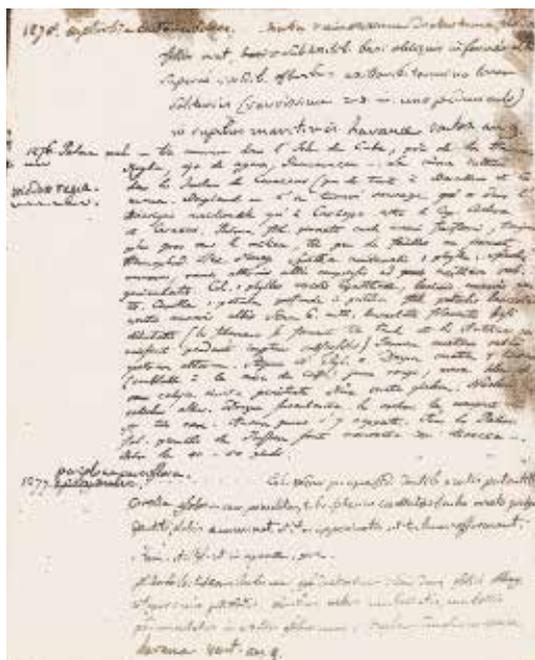
J’ai dessiné toute la plante f 1 Stamen vu par devant
2 Une anthere vu de coté [I drew the whole plant f 1.
stamen from the front 2 An anther from the side ...].

Bonpland confirms the existence of these drawings by adding ‘h.d.’ [Humboldt delineavit; Humboldt drew this] in several places. These drawings are missing from the *Journal Botanique* and must have been completed separately because Humboldt writes elsewhere: “j’ai dessiné dans le livre” [I drew in the book]. Humboldt occasionally mentions his drawings in his letters from America, too. On 18 October 1800, for instance, he writes from Cumaná to Antoine François Comte de Foucroy in Paris: “J’ai dessiné

11 | First page of the *Journal Botanique III*

Plant descriptions by A. Bonpland, 1801, with a short index by A. v. Humboldt, c. 1851

12 | Three plant descriptions by A. Bonpland with additional annotations by A. v. Humboldt, 1802



13

nombre des ces objects" [I have drawn a number of these objects], meaning plants and animals. On 22 April 1803, he sent what was probably an exaggerated letter from Mexico City to Antonio José Cavanilles in Madrid:

... de todos [plantas] hemos hecho la debida descripción, y de muchísimas los dibuxos a vista de sus orginales vivos [We have made the necessary descriptions of all the plants and made drawings of most of them from living specimens].

Decades later, on 12 July 1851, Humboldt recalled that "près de quatre cents dessins avaient été faits par moi au crayon et à la plume sur les lieux mêmes" [about four hundred drawings, using graphite pencil or pen, were completed by me on the spot].

It would not come as a surprise to learn that Humboldt and Bonpland had also produced watercolours of plants in the field: the *Journal* contains the occasional note 'h. pinx.' [Humboldt pinxit, Humboldt painted this]. According to current knowledge, however, no such material has survived.

Just how meticulously Humboldt and Bonpland co-operated in the field can be demonstrated by a drawing (fig. 15) that has survived with the serial number 'n. 3280' from the *Journal Botanique* and 'Cuenca' with both entries in Humboldt's hand, which can be positively identified through Bonpland's entry in the field notebook. Another note this time in Bonpland's hand in the *Journal Botanique* indicates how wide-ranging the two wayfarers were in their interests:

Les feuilles [de *Erythroxylum coca* Lam.] quand on les manchent sont légèrement aromatique[s] et



14

augmentent considérablement la salivation. [When chewed, the leaves [of *Erythroxylum coca* Lam., the coca bush] are slightly aromatic and considerably increase salivation].

Humboldt notes in the *Journal Botanique*:

L'oracle dans le Temple du Soleil institué par Bochica à Sogamozo macha des graines de *Datura*, tel que l'oracle de *Delphe*. [The oracle in the sun temple constructed by Bochica at Sagamozo chewed *Datura* [thorn apple] seeds just like the oracle at Delphi].

It is incorrect to claim this, however, because the genus *Datura* occurs naturally only in the Tropics of the New World and reached Europe only after Columbus.

Of yet greater significance for science than the *Journal Botanique* are the dried plants and parts of plants collected, pressed and dried between sheets of paper during the expedition. Their exact number is not known. On 21 February 1801, Humboldt wrote from Havana to Willdenow in Berlin:

I am extremely satisfied with my travelling companion Alexandre [sic] Bonpland. He is a worthy pupil of Jussieu's, Desfontaine's and particularly of eccentric old [Achille] Richard's (probably the best botanist in Paris). He is very active and diligent. He arranges himself readily with foreign customs and people, speaks Spanish very well, is very plucky and courageous. He possesses splendid qualities for a travelling naturalist. He has dried the plants — including more than 12,000 duplicates — on his own ...

Just how many of them were lost in the course of the expedition is as much unknown as the proportion of the

13 | Description of *Roystonea regia* (Kunth) O. F. Cook, description by A. v. Humboldt, 1801

14 | Part of the description of *Oreocallis grandiflora* (Lam.) R. Br. with Humboldt's drawing of a leaf and sections of the flower, 1802