HUMBOLDT'S INTRODUCTION

Twelve years have elapsed since I left Europe to explore the interior of the New Continent. From my earliest days I was excited by studying nature, and was sensitive to the wild beauty of a landscape bristling with mountains and covered in forests. I found that travelling out there compensated for a hard and often agitated life. But pleasure was not the only fruit of my decision to contribute to the progress of the physical sciences. For a long time I had prepared myself for the observations that were the main object of my journey to the torrid zone. I was equipped with instruments that were easy and convenient to use, made by the ablest artists, and I enjoyed the protection of a government that, far from blocking my way, constantly honoured me with its confidence. I was supported by a brave and learned friend whose keenness and equanimity never let me down, despite the exhaustion and dangers we faced.

Under such favourable circumstances, and crossing regions long unknown to most European nations, including Spain itself, Bonpland and I collected a considerable number of materials, which when published may throw light on the history of nations, and on our knowledge about nature. Our research developed in so many unpredictable directions that we could not include everything in the form of a travel journal, and have therefore placed our observations in a series of separate works.

Two main aims guided my travels, published as the *Relation historique*.[1] I wanted to make known the countries I visited, and to collect those facts that helped elucidate the new science vaguely named the Natural History of the World, Theory of the Earth or Physical Geography. Of these two aims, the second seemed the more important. I was passionately keen on botany and certain aspects of zoology, and flattered myself that our researches might add some

new species to those already known. However, rather than discovering new, isolated facts I preferred linking already known ones together. The discovery of a new genus seemed to me far less interesting than an observation on the geographical relations of plants, or the migration of social plants, and the heights that different plants reach on the peaks of the cordilleras.

The natural sciences are connected by the same ties that link all natural phenomena together. The classification of species, which we should consider as fundamental to botany, and whose study has been facilitated by introducing natural methods, is to plant geography what descriptive mineralogy is to the rocks that form the outer crust of the earth. To understand the laws observed in the rocks, and to determine the age of successive formations and identify them from the most distant regions, a geologist should know the simple fossils that make up the mass of mountains. The same goes for the natural history that deals with how plants are related to each other, and with the soil and air. The advancement of plant geography depends greatly on descriptive botany; it would hinder the advancement of the sciences to postulate general ideas by neglecting particular facts.

Such considerations have guided my researches, and were always present in my mind as I prepared for the journey. When I began to read the many travel books, which form such an interesting branch of modern literature, I regretted that previous learned travellers seldom possessed a wide enough knowledge to avail themselves of what they saw. It seemed to me that what had been obtained had not kept up with the immense progress of several sciences in the late eighteenth century, especially geology, the history and modifications of the atmosphere, and the physiology of plants and animals. Despite new and accurate instruments I was disappointed, and most scientists would agree with me, that while the number of precise instruments multiplied we were still ignorant of the height of so many mountains and plains; of the periodical oscillations of the aerial oceans; the limit of perpetual snow under the polar caps and on the borders of the torrid zones; the variable intensity of magnetic forces; and many equally important phenomena.

Maritime expeditions and voyages round the world have rightly conferred fame on naturalists and astronomers appointed by their

governments, but while these distinguished men have given precise notions of the coasts of countries, of the natural history of the ocean and islands, their expeditions have advanced neither geology nor general physics as travels into the interior of a continent should have. Interest in the natural sciences has trailed behind geography and nautical astronomy. During long sea-voyages, a traveller hardly ever sees land; and when land is seen after a long wait it is often stripped of its most beautiful products. Sometimes, beyond a sterile coast, a ridge of high mountains covered in forests is glimpsed, but its distance only frustrates the traveller.

Land journeys are made very tiresome by having to transport instruments and collections, but these difficulties are compensated by real advantages. It is not by sailing along a coast that the direction, geology and climate of a chain of mountains can be discovered. The wider a continent is the greater the range of its soil and the richness of its animal and vegetable products, and the further the central chain of mountains lies from the ocean coast the greater the variety of stony strata that can be seen, which reveal the history of the earth. Just as every individual can be seen as particular, so can we recognize individuality in the arrangement of brute matter in rocks, in the distribution and relationships of plants and animals. The great problem of the physical description of the planet is how to determine the laws that relate the phenomena of life with inanimate nature.

In trying to explain the motives that led me to travel into the interior of a continent I can only outline what my ideas were at an age when we do not have a fair estimate of our faculties. What I had planned in my youth has not been completely carried out. I did not travel as far as I had intended when I sailed for South America; nor did it give me the number of results I expected. The Madrid Court had given me permission in 1799 to sail on the Acapulco galleon and visit the Philippine Islands after crossing its New World colonies. I had hoped to return to Europe across Asia, the Persian Gulf and Baghdad. With respect to the works that Bonpland and I have published, we hope that their imperfections, obvious to both of us, will not be attributed to a lack of keenness, nor to publishing too quickly. A determined will and an active perseverance are not always sufficient to overcome every obstacle.

Having outlined the general aim, I will now briefly glance at the collections and observations we made. The maritime war during our stay in America made communications with Europe very uncertain and, in order for us to avoid losses, forced us to make three different collections. The first we sent to Spain and France, the second to the United States and England, and the third, the most considerable, remained constantly with us. Towards the end of our journey this last collection formed forty-two boxes containing a herbal of 6,000 equinoctial plants, seeds, shells and insects, and geological specimens from Chimborazo, New Granada and the banks of the Amazon, never seen in Europe before. After our journey up the Orinoco, we left a part of this collection in Cuba in order to pick it up on our return from Peru and Mexico. The rest followed us for five years along the Andes chain, across New Spain, from the Pacific shores to the West Indian seas. The carrying of these objects, and the minute care they required, created unbelievable difficulties, quite unknown in the wildest parts of Europe. Our progress was often held up by having to drag after us for five and six months at a time from twelve to twenty loaded mules, change these mules every eight to ten days, and oversee the Indians employed on these caravans. Often, to add new geological specimens to our collections, we had to throw away others collected long before. Such sacrifices were no less painful than what we lost through accidents. We learned too late that the warm humidity and the frequent falls of our mules prevented us from preserving our hastily prepared animal skins and the fish and reptiles in alcohol. I note these banal details to show that we had no means of bringing back many of the objects of zoological and comparative anatomical interest whose descriptions and drawings we have published. Despite these obstacles, and the expenses entailed, I was pleased that I had decided before leaving to send duplicates of all we had collected to Europe. It is worth repeating that in seas infested with pirates a traveller can only be sure of what he takes with him. Only a few duplicates that we sent from America were saved, most fell into the hands of people ignorant of the sciences. When a ship is held in a foreign port, boxes containing dried plants or stones are merely forgotten, and not sent on as indicated to scientific men. Our geological collections taken in the Pacific had a happier fate. We are indebted

for their safety to the generous work of Sir Joseph Banks, President of the Royal Society of London, who, in the middle of Europe's political turmoils, has struggled ceaselessly to consolidate the ties that unite scientific men of all nations.

The same reasons that slowed our communications also delayed the publication of our work, which has to be accompanied by a number of engravings and maps. If such difficulties are met when governments are paying, how much worse they are when paid by private individuals. It would have been impossible to overcome these difficulties if the enthusiasm of the editors had not been matched by public reaction. More than two thirds of our work has now been published. The maps of the Orinoco, the Casiquiare and the Magdalena rivers, based on my astronomical observations, together with several hundred plants, have been engraved and are ready to appear. I shall not leave Europe on my Asian journey before I have finished publishing my travels to the New World.

In our publications Bonpland and I have considered every phenomenon under different aspects, and classed our observations according to the relations they each have with one another. To convey an idea of the method followed, I will outline what we used in order to describe the volcanoes of Antisana and Pichincha, as well as Jorullo, which on the night of the 20th of September 1759 rose 1,578 feet up from the plains of Mexico. We fixed the position of these remarkable mountains in longitude and latitude by astronomical observations. We took the heights of different parts with a barometer, and determined the dip of the needle and magnetic forces. We collected plants that grew on the slopes of these volcanoes, and specimens of different rocks. We found out the exact height above sea-level at which we made each collection. We noted down the humidity, the temperature, the electricity and the transparency of the air on the brinks of Pichincha and Jorullo; we drew the topographical plans and geological profiles of these volcanoes by measuring vertical bases and altitude angles. In order to judge the correctness of our calculations we have preserved all the details of our field notes.

We could have included all these details in a work devoted solely to volcanoes in Peru and New Spain. Had I written the physical description of a single province I could have incorporated separate

chapters on geography, mineralogy and botany, but how could I break the narrative of our travels, or an essay on customs and the great phenomena of general physics, by tiresomely enumerating the produce of the land, or describing new species and making dry astronomical observations? Had I decided to write a book that included in the same chapter everything observed from the same spot, it would have been excessively long, quite lacking in the clarity that comes from a methodical distribution of subject matter. Despite the efforts made to avoid these errors in this narration of my journey, I am aware that I have not always succeeded in separating the observations of detail from the general results that interest all educated minds. These results should bring together the influence of climate on organized beings, the look of the landscape, the variety of soils and plants, the mountains and rivers that separate tribes as much as plants. I do not regret lingering on these interesting objects for modern civilization can be characterized by how it broadens our ideas, making us perceive the connections between the physical and the intellectual worlds. It is likely that my travel journal will interest many more readers than my purely scientific researches into the population, commerce and mines in New Spain.

After dividing all that belongs to astronomy, botany, zoology, the political description of New Spain, and the history of the ancient civilizations of certain New World nations into separate works, many general results and local descriptions remained left over, which I could still collect into separate treatises. I had prepared several during my journey; on races in South America; on the Orinoco missions; on what hinders civilization in the torrid zone, from the climate to the vegetation; the landscape of the Andes compared to the Swiss Alps; analogies between the rocks of the two continents; the air in the equinoctial regions, etc. I had left Europe with the firm decision not to write what is usually called the historical narrative of a journey, but just to publish the results of my researches. I had arranged the facts not as they presented themselves individually but in their relationships to each other. Surrounded by such powerful nature, and all the things seen every day, the traveller feels no inclination to record in a journal all the ordinary details of life that happen to him.

During my navigation up the South American rivers, and over

land, I had written a very brief itinerary where I described on the spot what I saw when I climbed the summit of a volcano or any other mountain, but I did not continue my notes in the towns, or when busy with something else. When I did take notes my only motive was to preserve those fugitive ideas that occur to a naturalist, to make a temporary collection of facts and first impressions. But I did not think at the time that these jotted-down notes would form the basis of a work offered to the public. I thought that my journey might add something to science, but would not include those colourful details that are the main interest in journeys.

Since my return the difficulties I experienced trying to write a number of treatises and make certain phenomena known have overcome my reluctance to write the narrative of my journey. In doing this I have been guided by a number of respectable people. I realized that even scientific men, after presenting their researches, feel that they have not satisfied their public if they do not also write up their journal.

A historical narrative covers two quite different aims: whatever happens to the traveller; and the observations he makes during his journey. Unity of composition, which distinguishes good work from bad, can be sought only when the traveller describes what he has seen with his own eyes, and when he has concentrated on the different customs of people, and the great phenomena of nature, rather than on scientific observations. The most accurate picture of customs is one that deals with man's relationships with other men. What characterizes savage and civilized life is captured either through the difficulties encountered by a traveller or by the sensations he feels. It is the man himself we wish to see in contact with the objects around him. His narration interests us far more if a local colouring informs the descriptions of the country and its people. This is what excites us in the narrations of the early navigators who were driven more by guts than by scientific curiosity and struggled against the elements as they sought a new world in unknown seas.

The more travellers research into natural history, geography or political economy, the more their journey loses that unity and simplicity of composition typical of the earlier travellers. It is now virtually impossible to link so many different fields of research in a

narrative so that what we may call the dramatic events give way to descriptive passages. Most readers, who prefer to be agreeably amused to being solidly instructed, gain nothing from expeditions loaded with instruments and collections.

To give some variety to my work I have often interrupted the historical narrative with straightforward descriptions. I begin by describing the phenomena as they appeared to me, then I consider their individual relations to the whole.

I have included details about our everyday life that might be useful to any who follow us in the same countries. I have retained only a few of those personal incidents that offer no interest to readers, and amuse us only when well written.

Concerning the country I have travelled through, I am fully aware of the great advantages enjoyed by those who travel to Greece, Egypt, the banks of the Euphrates, and the Pacific Islands over those who travel to America. In the Old World the nuances and differences between nations form the main focus of the picture. In the New World, man and his productions disappear, so to speak, in the midst of a wild and outsize nature. In the New World the human race has been preserved by a few scarcely civilized tribes, or by the uniform customs and institutions transplanted on to foreign shores by European colonists. Facts about the history of our species, different kinds of government and monuments of art affect us far more than descriptions of vast emptinesses destined for plants and wild animals.

If America does not occupy an important place in the history of mankind, and in the revolutions that have shattered the world, it does offer a wide field for a naturalist. Nowhere else does nature so vividly suggest general ideas on the cause of events, and their mutual interrelationships. I do not mean by this solely the overpowering vegetation and freshness of organic life, the different climates we experience as we climb the cordilleras and navigate those immense rivers, but also the geology and natural history of an unknown continent. A traveller can count himself lucky if he has taken advantage of his travels by adding new facts to the mass of those previously discovered!

Connected by the most intimate bonds of friendship over the five years of our travels (and since then), Bonpland and I have jointly

published the whole of our work.[2] I have tried to explain what we both observed but, as this work has been written from my notes on the spot, all errors that might arise are solely mine. In this introduction I would also like to thank Gay-Lussac and Arago, my colleagues at the Institute, who have added their names to important work done, and who possess that high-mindedness which all who share a passion for science should have. Living in intimate friendship I have consulted them daily on matters of chemistry, natural history and mathematics.

Since I have returned from America one of those revolutions that shake the human race has broken out in the Spanish colonies, and promises a new future for the 14 million inhabitants spread out from La Plata to the remotest areas in Mexico. Deep resentments, exacerbated by colonial laws and maintained by suspicious policies, have stained with bloodshed areas that for three centuries once enjoyed not happiness but at least uninterrupted peace. Already in Quito the most educated citizens have been killed fighting for their country. While writing about certain areas I remembered the loss of dear friends.[3]

When we reflect on the great political upheavals in the New World we note that Spanish Americans are in a less fortunate position than the inhabitants of the United States, who were more prepared for independence by constitutional liberty. Internal feuds are inevitable in regions where civilization has not taken root and where, thanks to the climate, forests soon cover all cleared land if agriculture is abandoned. I fear that for many years no foreign traveller will be able to cross those countries I visited. This circumstance may increase the interest of a work that portrays the state of the greater part of the Spanish colonies at the turn of the nineteenth century. I also venture to hope, once peace has been established, that this work may contribute to a new social order. If some of these pages are rescued from oblivion, those who live on the banks of the Orinoco or Atabapo may see cities enriched by commerce and fertile fields cultived by free men on the very spot where during my travels I saw impenetrable jungle and flooded lands.

Paris, February 1812.

CHAPTER I

Preparations – Departure from Spain – Landing at the Canary Islands

From my earliest days I felt the urge to travel to distant lands seldom visited by Europeans. This urge characterizes a moment when our life seems to open before us like a limitless horizon in which nothing attracts us more than intense mental thrills and images of positive danger. I was brought up in a country that has no relations with either of the Indies, and I lived in mountains far from the sea and famous for their working mines, yet I felt an increasing passion for the sea and a yearning to travel far overseas. What we glean from travellers' vivid descriptions has a special charm; whatever is far off and suggestive excites our imagination; such pleasures tempt us far more than anything we may daily experience in the narrow circle of sedentary life. My taste for botanizing and the study of geology, with the chance of a trip to Holland, England and France accompanied by Georg Forster, who was lucky enough to travel with Captain Cook on his second world tour, helped determine the travel plans I had been hatching since I was eighteen years old. What attracted me about the torrid zone was no longer the promise of a wandering life full of adventures, but a desire to see with my own eyes a grand, wild nature rich in every conceivable natural product, and the prospect of collecting facts that might contribute to the progress of science. Personal circumstances prevented me from carrying out these absorbing plans, and for six years I had the leisure to prepare myself for the observations I would make in the New World by travelling through several European countries and exploring the Alps, whose structure I would later compare with the Andes between Quito and Peru.

During that time a voyage to explore the Pacific was being planned in France, under the direction of Captain Baudin.[4] The early plan was daring and grand, and would have been better entrusted to a more enlightened man. The idea was to travel across the Spanish

colonies in South America from the mouth of the River Plate to the kingdom of Quito and the Panama isthmus. The two corvettes would then proceed to New Holland through the Pacific archipelagoes, stopping at Madagascar and returning home round the Cape of Good Hope. I had arrived in Paris when the preparations for the voyage had just begun. I had little faith in Captain Baudin's character as he had given me cause to be suspicious in the Viennese Court when charged to accompany one of my friends to Brazil, but as I could never with my own resources have afforded such a far-reaching expedition, nor visited such a beautiful part of the earth, I decided to risk taking part in the expedition. I got permission to embark with my instruments on one of the corvettes destined for the Pacific, and I did this on the agreement that I could leave Captain Baudin whenever it suited me. Michaux, who had visited Persia and parts of North America, and Bonpland, who became and remained a close friend, were also to accompany this expedition as naturalists.

I met the Swedish Consul Skiöldebrand, who passed through Paris on his way to embark in Marseille on a mission to bring gifts to the Dey of Algiers. That respectable gentleman had lived for a long time on the African coast and, as he was well known in the Algerian Court, could get me authorization to visit the Atlas mountains. Every year he despatched a ship to Tunis, which brought pilgrims to Mecca, and he promised to let me go to Egypt that way. I did not hesitate to seize that chance and was convinced I could carry out the plan I had hatched before my arrival in France. Up until then no geologist had ever explored the high mountain ranges that in Morocco reach the perpetual snows. I quickly completed my collection of instruments and obtained books that dealt with the countries I was to visit. I said goodbye to my brother, whose example and advice had helped guide my thinking. He approved of my motives for wanting to abandon Europe; a secret voice told me we would see each other again. I left Paris eager to embark for Algeria and Egypt, and chance – so often playing a decisive role in human lives – had it that I would see my brother again after returning from the Amazon and Peru, without putting a foot on African soil.

The Swedish frigate that was to convey Skiöldebrand to Algeria was expected at Marseille towards the end of October. Bonpland and

I rushed there in case we arrived late and missed the boat. We did not predict the new set-backs that were soon to crop up.

Skiöldebrand was as impatient as we were to reach his destination. Several times a day we would climb the Notre-Dame de la Garde mountain, which dominated a wide stretch of the Mediterranean. Every sail that appeared on the horizon excited us. But after two months of waiting we heard through the newspapers that the Swedish frigate had been badly damaged in a storm off Portugal, and had put into Cádiz to refit. Private letters then confirmed this news; the *Jaramas* (as it was called) would not reach Marseille before the spring.

We did not feel like prolonging our stay in Provence until the spring. The countryside, and especially the climate, were a delight, but the sight of the sea continuously reminded us of the failure of our plans. During a trip we made to Hyères and Toulon we came across the frigate *La Boudeuse*, bound for Corsica, which had been under the command of Bougainville[5] during his world voyage. This famous navigator had been particularly kind to me during my stay in Paris while I prepared to join Captain Baudin. I cannot describe the impression that this ship, which had carried Commerson to the Pacific, had on me. There are moments in our lives when painful feelings mingle with our experiences.

We resolved to spend the winter in Spain, hoping to embark from Cartagena or Cádiz in the spring, if the political situation in the east permitted this. We crossed the kingdoms of Catalonia and Valencia to reach Madrid. On the way we visited the ruins of Tarragona and ancient Saguntum. From Barcelona we made an excursion to Montserrat, whose elevated peaks are inhabited by hermits. The contrast between luxuriant vegetation and desolate, bare rocks forms a peculiar scenery.

Arriving at Madrid I soon congratulated myself on my decision to visit the peninsula. Baron de Forell, Saxon Ambassador to the Spanish Court, received me in a friendly way that greatly favoured my project. To his knowledge of mineralogy he added a great interest in the progress of science. He let me know that under the patronage of an enlightened minister, Don Mariano Luis de Urquijo, I might be permitted to make a journey to the interior of Spanish America, at my own expense. After all the set-backs I had suffered I did not hesitate to take up this suggestion.

In March 1799 I was presented at the Court of Aranjuez and the King received me graciously. I explained the motives that prompted me to undertake a journey to the New World and the Philippines, and presented a memoir of my plans to the Secretary of State. Señor de Urquijo supported my petition and overcame every obstacle in my path, proceeding with commendable generosity given I had no personal relationship with him. The zeal with which he helped me can be due only to his love for science.

I obtained two passports; one from the Secretary of State, the other from the Council of the Indies. Never before had such concessions been granted to a traveller, and never had the Spanish Government shown such confidence in a foreigner. To waylay all the possible reservations that the viceroys and captain-generals might raise concerning the nature and finality of my work, it said in my safe conduct from the First Secretary of State that 'I was authorized to freely use my physical and geodesical instruments, that in all the Spanish possessions I could make astronomical observations, measure the height of mountains, collect whatever grew on the ground, and carry out any task that might advance the Sciences.'[6]

For the past year so many obstacles had crossed my path that I could hardly believe that at last my innermost desires would be fulfilled. We left Madrid in the middle of May and crossed Old Castile and the kingdoms of León and Galicia to La Coruña, where we were to embark for the island of Cuba. The winter had been long and hard but now, during our journey, we enjoyed the mild temperatures of spring that in the south usually begin in March or April. Snow still covered the tall granitic peaks of the Guadarrama but in the deep Galician valleys, which reminded me of the picturesque scenery of Switzerland and the Tyrol, the rocks were covered in flowering cistus and arborescent heaths. The traveller is happy to quit the Castilian plains devoid of vegetation and their intense winter cold and summers of oppressive heat.

The First Secretary of State had particularly recommended Brigadier Rafael Clavijo, recently appointed Inspector General of Maritime Couriers. This officer advised us to board the corvette *Pizarro*, bound for Havana and Mexico. This light frigate was not famed for its sailing speed, although during its long journey from the River Plate

it had luckily just escaped English men-of-war. Clavijo sent instructions to the *Pizarro* to authorize the loading of our instruments, and to allow us to carry out atmospheric tests during the sea-voyage. The captain was ordered to stop at Tenerife and remain there as long as was needed for us to visit the port of Orotava and climb the Pico de Teide.

The harbours of Ferrol and La Coruña both communicate with the same bay, so a ship driven by foul weather towards the coast may anchor in either, according to the wind. Such an advantage is invaluable where the sea is almost always rough, as it is between Capes Ortegal and Finisterre, the promontories Trileucum and Artabrum of ancient geography. A narrow passage, flanked by perpendicular granite rocks, leads to the extensive bay of Ferrol. No port in Europe offers such an extraordinary anchorage, from its very inland position. The narrow and tortuous passage by which vessels enter this port has been opened, either by the pounding of waves or the reiterated shocks of very violent earthquakes. In the New World, on the coasts of New Andalusia, the Laguna del Obispo is formed exactly like the port of Ferrol. The most curious geological phenomena are often repeated at immense distances on the surface of different continents; and naturalists who have examined different parts of the globe are struck by the extreme resemblances observed in the fracturing of coasts, in the sinuosities of the valleys, in the appearance of mountains, and in their distribution by groups. The accidental concurrence of the same causes must everywhere have produced the same effects; and amidst the variety of nature an analogy of structure and form is observed in the arrangement of inanimate matter, as well as in the internal organization of plants and animals.

The moment of leaving Europe for the first time is impressive. We vainly recall the frequency of communications between the two worlds; we vainly reflect how, thanks to the improved state of navigation, we may now cross the Atlantic, which compared to the Pacific is but a shortish arm of the sea; yet what we feel when we begin our first long-distance voyage is none the less accompanied by a deep emotion, unlike any we may have felt in our youth. Separated from the objects of our dearest affections, and entering into a new life, we are forced to fall back on ourselves, and we feel more isolated than we have ever felt before.

A thick fog that hid the horizon warned us at last – to our delight – that the weather was changing. On the evening of the 4th of June the north-east wind, so constant on the Galician coast at this time of year, began blowing. On the 5th the *Pizarro* set sail, despite the news, which had reached the watch-tower at Sisarga a few hours previously, that an English squadron was bound for the Tagus river mouth. Those who came to watch our corvette weigh anchor warned us by shouting that within three days we would be captured and would have to follow our ship into Lisbon. This forecast worried us.

By two in the afternoon the *Pizarro* was under sail. The channel that ships follow to leave the port of La Coruña is long and narrow. As it opens towards the north, and as the wind blew against us, we had to tack eight times, three of which were useless. We manoeuvred very clumsily, and once dangerously, as the current dragged us close to some reefs against which waves noisily broke. We stared at the San Antonio castle where the luckless Malaspina[8] fretted in a State prison. At this moment of leaving Europe to visit those countries this illustrious traveller had so fruitfully visited, I would rather have thought about something less sad.

At half past six we passed the Tower of Hercules, which acts as the La Coruña lighthouse, at the top of which a coal light has been kept burning from remote times to guide ships. At around nine we spotted the light of a fisherman's hut at Sisarga, the last we would see on the European coast. Soon distance weakened that feeble light, which we began to confuse with stars on the horizon, but our eyes refused to stop staring at it. These impressions are never forgotten by those who begin a long ocean journey at an age when their feelings remain vivid and profound. So many memories are awoken in our imagination by a dot of light in a dark night, flickering on and off above the rough waves, signalling our home land!

At sunset on the 8th of June the look-out sighted from his crow's-nest a British convoy sailing along the coast towards the south-east. To avoid it we altered our course during the night. We were also given orders not to put our lights on in the great cabin so that we would not be seen from afar. We constantly had to use dark-lanterns to make our observations of the sea's temperature, or read the markings on our astronomical instruments. In the torrid zone, where

twilight lasts a few minutes, we were condemned to inaction, in similar circumstances, from six in the evening. For me this was particularly irritating as I have never suffered from seasickness and no sooner am I on board than I feel the urge to work more than ever.[9]

From La Coruña to the 36th degree of latitude we had scarcely seen any living creature apart from sea swallows and a few dolphins. We searched in vain for seaweed and molluscs. On the 11th of June we were struck by a curious sight that later we would see often in the Pacific. We reached a zone where the sea seemed covered with an enormous amount of jellyfish. The boat could hardly move, though the jellyfish floated towards the south-east four times faster than the current. This procession lasted some forty-five minutes; then we saw a few scattered and exhausted ones struggling to follow the main bunch, as if tired of their journey.

Between Madeira and the African coast we were almost becalmed, which suited me perfectly as I could carry out my magnetic experiments. We never tired of admiring the magnificent nights; nothing approaches the clarity and serenity of the African sky. We were struck by the extraordinary number of shooting stars that crossed the night sky. The further south we advanced, the more we saw, especially near the Canary Islands. When we were about 40 leagues east of Madeira, a common swallow (*Hirundo rustica*) landed on the topmast. It was so exhausted we easily caught it. What drives a bird so far off its course at such a calm time of year?

The *Pizarro* had orders to anchor off the island of Lanzarote, one of the seven large Canary Islands, to find out if the English were still blockading the Santa Cruz bay. From the 15th we were dubious about which route to follow. Finally, on the 16th, at two in the afternoon, we sighted land, which looked like a little cloud stuck on the horizon. At five, with the sun very low, we could clearly see the island of Lanzarote before us.

The current dragged us towards the coast with more force than was safe. As we advanced we saw first the island of Fuerteventura, famous for the many camels that live there, and then later the small island of Lobos, in the channel that separates Fuerteventura from Lanzarote. We spent the night on deck; the moon illumined the island's volcanic peaks, whose slopes, covered in ash, shone like silver.

The night was beautifully serene and fresh; although we were only a short distance from the African coast and the limit of the torrid zone, the thermometer recorded only 18 °C. It seemed as if the phosphorescence of the sea heightened the mass of light diffused in the air. After midnight great black clouds rose behind the volcano and intermittently covered the moon and the beautiful Scorpion constellation. On the shore we saw lights move in all directions; probably fishermen getting ready for work. During the voyage we had been reading the ancient Spanish navigators, and those moving lights reminded us of Pedro Gutiérrez,[10] Queen Isabel's page, who saw similar lights on Guanahani Island on the memorable night the New World was discovered.

The island of Lanzarote used to be called Titeroigotra. When the Spaniards arrived its inhabitants differed from those on the other islands by their superior culture. They built their houses with cut stones while the Guanches of Tenerife lived in caves like troglodytes. At that time a strange custom – repeated only in Tibet – prevailed. A woman had several husbands, who each took it in turn to exercise the rights of the head of the family. Each husband was known as such during a lunar month; then another took his place while he returned to being a servant in the house. In the fifteenth century the island of Lanzarote consisted of two states separated by a wall; a kind of monument, which outlives national enmities, found also in Scotland, Peru and China.

Guessing from some signs on an old Portuguese map, the captain of the *Pizarro* thought we were opposite a small fort built north of Teguise, the capital of Lanzarote. Mistaking some basaltic crags for a castle he saluted it properly by hoisting the Spanish flag and sending a boat with an officer to the supposed fort to find out if the English were lurking in these waters. We were not a little surprised to discover that the land we took for the coast of Lanzarote was the small island of Graciosa, and that for several leagues around there was not a sound of life.

We took the opportunity to use the boat to survey the land around the large bay. No words can evoke the feelings of a naturalist who first steps on soil outside Europe. So many objects call for his attention that it is hard to order his impressions. At each step he

thinks he is coming across something new, and in his excitement he does not recognize things that commonly feature in botanical gardens and natural history collections. Two hundred yards off the coast we saw a man fishing with a rod. We turned the boat towards him but he fled and hid behind a rock. It took our sailors some effort to capture him. The sight of the corvette, the thunder of our cannons in such a solitary place – possibly visited only by pirates – the launching of our boat, all this terrified the poor fisherman. He informed us that the island of Graciosa on which we had landed was separated from Lanzarote by a small channel called El Río. He offered to guide us to Los Colorados harbour to find out about the blockade at Tenerife but, when the man assured us that for weeks he had not seen any ships out at sea, the captain decided to set sail for Santa Cruz.

We re-embarked at sunset and set sail, but the breeze was too weak to enable us to follow our route to Tenerife. The sea was calm; a reddish haze covered the horizon, seeming to magnify everything. In such solitudes, surrounded by so many uninhabited islands, we savoured the view of such a grandiose and wild nature. The black mountains of Graciosa had perpendicular walls some 500 to 600 feet high. Their shadows, projected across the sea, made the scene gloomy. The basalt rocks stuck out of the water like the ruins of a vast building. Their existence reminded us of that bygone age when underwater volcanoes gave birth to new islands, or destroyed continents. Everything around us spoke of destruction and sterility; yet beyond this scene the coast of Lanzarote seemed more friendly. In a narrow gorge, between two hills crowned with scattered trees, you could see some cultivated land. The last rays of sun lit up the ripe corn, ready for harvesting. Even the desert is animated when you see some trace of man's work in it.

On the morning of the 18th the wind freshened a little and we managed to pass through the channel. We lost sight of the small islands of Alegranza, Montaña Clara and Graciosa, which appear to have been inhabited by the Guanches. People visit them now only to gather archil,[11] but this is less sought after since so many north European lichens yield better dyes. Montaña Clara is noted for its beautiful canary-birds. There are also goats, proof that the interior of the island is not as desolate as the coast we had seen.[12]

CHAPTER 2

Stay at Tenerife – Journey from Santa Cruz to Orotava – Excursion to the top of the Pico de Teide

From the time we left Graciosa the sky remained so consistently hazy that despite the height of the mountains of Gran Canaria we did not make out the island until the evening of the 18th. It is the granary of the archipelago of the Fortunate Islands and, remarkably for an area outside the Tropics, there are two wheat harvests a year, one in February, the other in June. Gran Canaria has never been visited before by a geologist, yet it is worth observing because its mountains differ entirely from those of Lanzarote and Tenerife.

On the morning of the 19th of June we caught sight of the point of Naga, but the Pico de Teide remained invisible. Land stood out vaguely because a thick fog effaced the details. As we approached the natural bay of Santa Cruz we watched the mist, driven by wind, draw near. The sea was very rough, as it usually is in this place. After much sounding we anchored. The fog was so thick that visibility was limited to a few cables' length. Just as we were about to fire the customary salute the fog suddenly dissipated and the Pico de Teide appeared in a clearing above the clouds, illuminated by the first rays of sun, which had not reached us yet. We rushed to the bow of the corvette not to miss this marvellous spectacle, but at that very same moment we saw four English warships hove to near our stern, not far out in the open sea. We had passed them closely by in the thick fog that had prevented us from seeing the peak, and had thus been saved from the danger of being sent back to Europe. It would have been distressing for naturalists to have seen the Tenerife coasts from far off and not to have been able to land on soil crushed by volcanoes. We quickly weighed anchor and the *Pizarro* approached the fort as closely as possible to be under its protection. Here, two years before in an attempted landing, Admiral Nelson lost his arm to a cannon-ball. The English ships left the bay; a few days earlier they had chased the

packet-boat *Alcudia*, which had left La Coruña just before we did. It had been forced into Las Palmas harbour; and several passengers were captured while being transferred to Santa Cruz in a launch.

The location of the town of Santa Cruz is similar to La Guaira, the busiest port in the province of Caracas. The heat is excessive in both places, but Santa Cruz is sadder. On a deserted sandy beach, houses of a dazzling white with flat roofs and windows without panes lie close to a rocky cliff stripped of vegetation. A fine stone quay and public walk planted with poplars are the only attraction in that monotonous picture. From Santa Cruz the peak seems far less picturesque than it does from the port of Orotava. There a smiling and richly cultivated plain contrasts with the wild appearance of the volcano. From the groves of palm and banana trees on the shore to the region of strawberry trees, laurels and pine the volcanic rock is covered with luxuriant vegetation. It is easy to see why the inhabitants of the beautiful climates of Greece and Italy thought they had discovered one of the Fortunate Isles on the western part of Tenerife. The eastern Santa Cruz side is everywhere marked with sterility.

After answering tiresome questions about political events from those who came on board, we landed. The boat was straightaway sent back to the ship in case the surf, which in this bay is dangerous, should crush it against the wharf. Our attention was first caught by a tall woman, of a brownish complexion and badly dressed, called the *capitana*. She was followed by several other women, equally badly dressed. They tried to board the *Pizarro* but were refused. In this harbour, frequented by Europeans, licentiousness seems to be quite ordered. The *capitana* is chosen by her companions, she ensures that no injuries are done to sailors, and then sends them back on board at the right time. Officers seek her out if they think one of their crew might be hiding on land to desert later.

When we stepped into the streets of Santa Cruz the heat was suffocating, though the thermometer recorded only 25 °C. After breathing sea air for such a long time one suffers on land, not because the air contains more oxygen at sea but because it is less charged with the gases emanating from rotting animal and vegetable substances.

Santa Cruz, the Añaza of the Guanches, is a pretty town of some 8,000 people. I was not struck by the vast number of monks that

travellers always find in the Spanish possessions, nor shall I bother to describe the churches, the Dominican library with its meagre 200 tomes; nor the quay where people meet in the evening to enjoy the fresh air, nor the famous 30-foot-high monument in Cararra marble dedicated to Our Lady of Candelaria in memory of the virgin's miraculous appearance in 1392 in Chimisay, near Güimar. The port of Santa Cruz is in fact a great caravanserai on the route to America and India. Every traveller who writes his adventures begins by describing Madeira and Tenerife, though the natural history of these islands remains quite unknown.

The recommendations from the Madrid Court assured us that we were always well received in all the Spanish possessions. The Captain-General immediately gave us permission to visit the island. Colonel Armiaga, in command of an infantry regiment, warmly welcomed us to his house. We did not tire of admiring the banana trees, the papaw trees, the *Poinciana pulcherrima* and other plants usually seen only in greenhouses.

Although the captain of the *Pizarro* had orders to remain long enough at Tenerife to allow us to climb the peak, snow permitting, he let us know that the English ships' blockade meant that we could not count on a stay of more than four or five days. So we hurried to the port of Orotova on the western slope of the volcano where we hoped to find guides. Nobody in Santa Cruz had ever climbed to the summit of the mountain.

On the 20th of June, before sunrise, we set off for the Villa de Laguna, some 350 toises[13] above Santa Cruz harbour. The narrow and tortuous path leading to La Laguna climbs along a torrent, which in the rainy season turns into fine cascades. Near the town we met some white camels, barely laden. These animals are mainly used to transport goods from the customs house to the merchants. Camels are not numerous in Tenerife, while in Lanzarote and Fuerteventura there are thousands.

As we approached La Laguna the air cooled. This sensation delighted us as we found the air in Santa Cruz asphyxiating. As we tend to feel disagreeable sensations more strongly, we felt the change in temperature more as we returned from La Laguna to the port, as if we were approaching the mouth of a furnace.

The perpetual cool that prevails in La Laguna makes the city the favourite home for the inhabitants of the Canaries. The residential capital of Tenerife is magnificently placed in a small plain surrounded by gardens at the foot of a hill crowned with laurel, myrtle and strawberry trees. It would be a mistake to rely on some travellers who believe the town lies by a lake. The rain sometimes forms an enormous sheet of water, and a geologist who sees the past rather than the present state of nature in everything would not doubt that the whole plain was once a great lake, now dried up. La Laguna has fallen from its opulence since the erupting volcano destroyed the port of Garachico and Santa Cruz became the trading centre of the island. It has no more than 9,000 inhabitants, with nearly 400 monks distributed in six convents, though some travellers insist half the population wear cassocks. Numerous windmills surround the city, a sign that wheat is cultivated in this high country. The Guanches called wheat at Tenerife *tano*, at Lanzarote *triffa*; barley in Gran Canaria was called *aramotanoque*, and at Lanzarote *tamosen*. The flour of roasted barley (*gofio*) and goat's milk constituted the main food of these people about whose origins so many systematic fables have been written.

Many chapels, called *ermitas* by the Spaniards, surround La Laguna. Built on hillocks among evergreen trees, these chapels add a picturesque effect to the countryside. The interior of the town does not correspond at all to its outskirts. The houses are solid, but very ancient, and the streets sad. A botanist should not complain of the age of these houses for the roofs and walls are covered with *Sempervivum canariensis* and the pretty trichomanes, mentioned by every traveller. The plants are watered by the abundant mists.

The ground of the island rises to form an amphitheatre and, as in Peru and Mexico, contains in miniature all the possible climates, from African heat to alpine cold.[14] The mean temperatures of Santa Cruz, the port of Orotava, Orotava itself and La Laguna form a descending series. In southern Europe the change of seasons is too strongly felt to offer the same advantages. Tenerife on the other hand, on the threshold of the Tropics and a few days' journey from Spain, benefits from a good part of what nature has lavished in the Tropics. Its flora include the beautiful and imposing bananas and palms. He who is able

to feel nature's beauty finds in this precious island a far more effective remedy than the climate. Nowhere else in the world seems more appropriate to dissipate melancholy and restore peace to troubled minds than Tenerife and Madeira. These effects are due not only to the magnificent situation and to the purity of air, but above all to the absence of slavery, which so deeply revolts us in all those places where Europeans have brought what they call their 'enlightenment' and their 'commerce' to their colonies.

The valley of Tacoronte leads one into a delicious country glowingly spoken of by all travellers. In the Tropics I found places where nature is more grand and richer in its varieties; but after crossing the Orinoco, the Peruvian cordilleras and the valleys of Mexico I admit that I have never seen a more attractive, more harmonious view in the distribution of greenery and rocks than the western coast of Tenerife.

The sea coast is fringed with date and coconut palms; above them groups of banana trees stand out from the dragon trees whose trunks are often rightly compared to snakes' bodies. The hills are covered in vines, which grow over high stakes. Orange trees loaded with blossom, myrtle and cypress surround chapels raised devotedly by the islanders on cleared hilltops. Land is divided by hedges made of agave and cactus. Innumerable cryptogamous plants, predominantly fern, cover the walls moistened by small clear-water springs. In winter when the volcano is covered with snow and ice this place enjoys an eternal spring. In summer, as the evening falls, a sea breeze freshens the air. The coastal population is very dense and appears to be even greater because the houses and gardens are scattered, increasing the picturesque aspect. Unhappily, the wealth of the inhabitants does not correspond with hard work or with nature's richness. Those who work the land are not its owners; the fruit of their labour belongs to the nobility and the feudal system that for so long was the shame of Europe and still prevents the people's progress here.

On our way to the port of Orotava we passed through the pretty villages of Matanza and Victoria. These names are found together in all the Spanish colonies and contrast in an ugly way with the peaceful feelings those countries inspire. Matanza signifies slaughter, and the word alone recalls the price at which victory was won. In the New

World it generally indicates the defeat of the Indians; at Tenerife the village of Matanza was built in a place where the Spaniards were defeated by the Guanches, who were soon sold as slaves in Europe.[15]

By the morning of the 21st of June we were on our way to the volcano's summit. The day was not fine and the peak's summit, generally visible from Orotava from sunrise to ten at night, was covered in cloud. What links an excursion to the peak with similar ones to Chamonix or Etna is that one is obliged to follow guides, and sees only what has already been seen and described by previous travellers.

From a distance Villa de la Orotava pleases because of the many streams running down the main streets. The Agua Mansa spring, trapped in two large reservoirs, turns several mills and is then released in the nearby vineyards. The climate in the town is even more refreshing than in the port as a strong wind always blows from ten in the morning onwards. Because of the altitude water evaporates in the air and frequently precipitates to make the climate misty. The town lies 160 toises above sea-level; which is 200 toises lower than La Laguna; it was noted that plants flower a month later here.

Orotava, the ancient Taoro of the Guanches, lies on an abrupt slope of a hill. The streets seemed deserted; the houses solidly built but melancholic; they nearly all belong to a nobility accused of being too proud, presumptuously calling itself the Twelve Houses. We passed along a high aqueduct lined with luxuriant fern, and visited many gardens where northern European fruit trees grow along with orange, pomegranate and date trees. Even though we knew about Franqui's dragon tree[16] from previous travellers, its enormous thickness amazed us. We were told that this tree, mentioned in several ancient documents, served as a boundary mark and already in the fifteenth century was as enormous as it is today. We calculated its height to be about 50 to 60 feet; its circumference a little above its roots measured 45 feet. The trunk is divided into many branches, which rise up in the form of a chandelier and end in tufts of leaves similar to the Mexican yucca.

This tree, which grows only in cultivated areas in the Canaries, Madeira and Porto Santo, presents a curious phenomenon in plant migration. In Africa it has never been found in a wild state, and its

country of origin is East India. How has this tree become acclimatized in Tenerife? Did the Guanches have contact with nations originally from Asia?

From Orotava, along a narrow and stony path through a beautiful chestnut forest (*el monte de castaños*), we reached an area covered with brambles, laurels and arboreal heaths. The trunks of the latter grow to an extraordinary size and their mass of flowers contrasts agreeably with the abundant *Hypericum canariensis*. We stopped under a solitary pine to fill up with water. This place commanded a magnificent panorama over the sea and the western part of the island.

We continued to climb from this pine to the crater of the volcano without crossing one valley, for the ravines do not merit this name. To the eyes of a geologist the whole of the island is one mountain whose oval base is prolonged to the north-east and in which several systems of volcanic rock, formed in different periods, may be distinguished.

Above the region of arborescent heaths, called Monte Verde, lies the region of ferns. Nowhere else have I seen such a profusion of pteris, blechnum and asplenium. The roots of the *Pteris aquilina* serve as food for the inhabitants of Palma and Gomera; they grate it to a powder and mix in a bit of barley flour, which when boiled is called *gofio*. The use of such a primitive food is proof of the misery of the peasants of the Canary Islands. Monte Verde is scored by several small and arid ravines. Above the zone of ferns we reached a juniper and pine wood, severely punished by storms.

We spent nearly two and a half hours crossing this plain, which is nothing but an immense sea of sand. Despite the altitude the thermometer indicated 13.8 °C in the evening, 3.7 °C higher than at noon. We suffered continuously from the pumice-stone dust. In the midst of this plain are tufts of broom, *Spartium nubigenum*. This beautiful shrub grows to a height of some 9 feet and is covered with aromatic flowers with which the goat-hunters we met in our path decorated their hats. The dark, chestnut-coloured goats of the peak are supposed to be very tasty as they eat the leaves of this plant, and have run wild in these wastes from time immemorial.

As far as the rock of Gayta, that is, up to the beginning of the great retama plain, the Tenerife peak is covered in beautiful vegetation,

with no traces of recent devastations. But hardly have you entered the plain littered with pumice-stone than the countryside changes dramatically; at every step you trip over enormous obsidian blocks thrown down by the volcano. Everything here betrays a deep solitude. A few goats and rabbits are the only signs of life in this high plain. From up here the island becomes an immense heap of burned matter surrounded by a narrow fringe of vegetation.

Above the region of *Spartium nubigenum* we passed through narrow defiles and small, old ravines cut by rainwater to a higher plateau and then on to the place where we intended to spend the night, some 1,530 toises above the coast. This place is called Estancia de los Ingleses (English Halt) because most of the travellers who have scaled the peak have been English. Two protruding rocks form a kind of cave, which offers shelter from the wind. This point, higher than the summit of Canigou, can be reached on mule: many a curious traveller hoping to reach the crater's edge from Orotava have had to wait here. Despite it being summer and there being a blue African sky above us that night we froze; the thermometer dropped to 5 °C. Our guides lit a bonfire with dried retama branches. Without a tent or coats, we had to lie down on calcinated scree, and the flames and smoke that the wind drove ceaselessly towards us made it an extremely uncomfortable night. We had never spent a night so high up and I had no idea that we would soon live in cities higher than the summit of this volcano. The further the temperature plummeted, the thicker the clouds round the peak grew. A strong north wind dissipated them; at intervals the moon appeared, its white disk shining against a blue backdrop. With the volcano in sight, that night scene was truly majestic. Suddenly the peak would disappear completely in the mist, then it would reappear worryingly close, casting its shadow over the clouds below us like some monstrous pyramid.

Around three in the morning, lit by the dismal light of a few pine torches, we set off for the summit of the Piton. We began the ascent from the northern side, which is extremely steep. After two hours we reached a small plateau, named Alta Vista because of its height. The *neveros*, those natives who collect ice and snow to sell in the nearby towns, reach as far as this point. Their mules, better trained to climb than those hired by travellers, reach Alta Vista. The *neveros* then have

to carry the collected snow on their shoulders as they go down. Beyond this point the *malpaís* begins. This term, in use in Mexico, Peru and all places where there are volcanoes, refers to regions stripped of vegetation and covered in lava fragments.

We turned to the right to visit the ice cave situated at 1,728 toises, just under the perpetual snow altitude limit. During winter the grotto fills with ice and snow and, as the sun's rays do not penetrate its interior, summer heat is unable to melt the frozen water.

Day was breaking when we left the ice cave. A layer of white fleecy cloud blocked out the lower regions of the surrounding islands. The clouds were spread out so uniformly and in such a flat way that they looked like an immense plain covered in snow. The colossal pyramid of the peak, the volcanic summits of Lanzarote, Fuerteventura and La Palma stuck up like reefs above a sea of fog. Their dark colour contrasted vividly with the whiteness of the clouds.

We were forced to cut our own track across the *malpaís*. The slope is very steep, and the volcanic blocks slipped under our feet. The rubble on the peak's summit has sharp edges and leaves gaps into which explorers risk falling up to their waists. Unfortunately the laziness and bad temper of our guides made this ascent more difficult. They were despairingly phlegmatic. The night before they had tried to convince us not to pass beyond the limit of the rocks. Every ten minutes they would sit down to rest; they threw away pieces of obsidian and pumice-stone that we had carefully collected. Finally we realized that none of them had ever visited the volcano's summit before.

After three hours' walking we reached a small plain called La Rambleta at the far end of the *malpaís*; from its centre rises the Piton or Sugar Loaf. From the Orotava side this mountain resembles those pyramids with steps found in Féjoun or Mexico. Here we found the air holes that locals call the Nostrils of the Peak (Narices del Pico). Hot watery vapours seep out at regular intervals from cracks in the rock, and the thermometer marked 43.2 °C. I cannot, however, accept the daring hypothesis which states that the Nostrils of the Peak are vents of an immense apparatus of distillation whose lower part is situated below sea-level. Since we have been studying volcanoes with more care, and since innate love for all that is marvellous is less

common in geological books, doubts have been expressed about these constant and direct links between sea water and volcanic fire. There is a far simpler explanation of this phenomenon. The peak is covered with snow part of the year; we found snow still around on the Rambleta plain. This led us to conclude that the Tenerife peak, like the Andes and Manila islands' volcanoes, are filled with filtered water. The watery vapours emitted by the Nostrils and cracks of the crater are those same waters heated.

We had yet to climb the steepest part of the mountain, the Piton, which forms the summit. The slope of this small cone, covered with volcanic ashes and fragments of pumice-stone, is so steep that it would have been impossible to reach the top had we not been able to follow an old lava current that seemed to have flowed down from the crater and whose remains have defied the ravages of time. The debris forms a wall of scoria, which reaches into the loose ash. We climbed to the Piton by clinging to this sharp-edged scoria, which, worn down by the weather, often broke off in our hands. It took us half an hour to reach the top, though it was only some 90 toises above us.

When we reached the Piton's summit we were surprised to find that there was barely enough room to sit down comfortably. We faced a small circular wall of porphyritic lava, with a base of pitch-stone, which prevented us from seeing the interior of the crater called La Caldera or the Cauldron. The wind blew so hard from the west that we could scarcely stand on our feet. It was eight in the morning and we were frozen though the temperature was just above freezing-point. We had become accustomed to heat, and the dry wind increased the sensation of cold.

The brink of the crater does not resemble any of the other volcanoes I have visited, such as Vesuvius, Jorullo or Pichincha. On the peak the wall, which surrounds the crater like a parapet, is so high that it would not let you reach La Caldera were it not for a breach on the eastern side caused by a very ancient lava overflow. We climbed down through this gap to the bottom of the elliptical funnel.

The external edges of La Caldera are almost perpendicular, rather like the Somma seen from the Atrio del Cavallo. We got to the bottom of the crater following a trail of broken lava from the eastern breach of the wall. We only felt the heat above the crevices, which

exhaled watery vapours with a strange buzzing sound. Some of these crevices can be found on the outside of the crater, on the external parapet that surrounds it. A thermometer placed inside one of them rose suddenly from 68 °C to 75 °C. This would have risen higher, but we had to pull the thermometer out to prevent our hands from being burned. It might be thought that these vapours, which escape in puffs of air, contain muriatic or sulphuric acids, but when condensed they had no particular taste. Experiments showed that these chimneys exhale pure water only.

While on the spot I sketched a view[17] of the crater's interior edge as it is seen on the descent through the eastern wall's breach. Nothing is more striking than the superimposition of these lava strata, which reveals similar sinuosities to the calcareous rock of the Alps. These enormous ledges, sometimes horizontal and sometimes sloping or undulating, reminded us that long ago the entire mass had flowed, and that a combination of disruptive causes determined a particular flow. The crest of the wall exhibits the same strange ramifications we find in coke. The northern edge is the highest. Towards the south-west the wall has considerably subsided and an enormous amount of scoria seems glued to the outer edge. On the west the rock is perforated, and through a wide opening you can see the sea and horizon. Perhaps the force of the steam broke through here just when the lava overflowed from the crater.

The bottom of the crater is reached with danger. In a volcano such as Vesuvius, whose main activity is directed towards the summit, the depth of the crater varies with each eruption, but at the Tenerife peak the depth appears to have remained unchanged for a long time. Judging from what I could see, the actual site of the crater is properly speaking a solfatara; an area for interesting but not striking observations. The majesty of the site is due more to its height above sea-level, to the profound silence of these elevated regions, and to the immense space over which the eye ranges from the mountain's summit.

A journey to the Tenerife volcano's summit is not solely interesting for the amount of phenomena available for scientific research but far more for the picturesque beauties offered to those who keenly feel the splendours of nature. It is a hard task to describe these sensations for

they work on us so much more powerfully the more they are vague. When a traveller must describe the highest peaks, the river cataracts, the tortuous Andes valleys, he risks tiring his readers with the monotonous expression of his admiration. It seems better suited to my intentions in this narrative of my journey to evoke the particular character of each zone. We get to know the features of each region better the more we indicate its varying characteristics by comparing it with others. This method enables us to discover the sources of the pleasures conferred by the great picture of nature.

Travellers know by experience that views from the summits of high mountains are neither as beautiful, picturesque, nor as varied as those from the heights of Vesuvius, Righi or the Puy-de-Dôme. Colossal mountains such as Chimborazo, Antisana or Monte Rosa compose such a huge mass that the richly cultivated plains are seen only at a great distance where a bluish and watery tint spreads over the landscape. The Tenerife peak, due to its narrow shape and local position, combines the advantages of the less high summits with those of the very high. From its top we can see not only the sea to the horizon, but also the forests of Tenerife and the inhabited coastal strips, which seem so close that their shapes and tones stand out in beautiful contrasts. It could be said that the volcano crushes the little island that serves as its base, and that it shoots up from the depths of the seas to a height three times higher than cloud level in summer.

Seated on the crater's external edge we turned our eyes towards the north-east where the coasts are decorated with villages and hamlets. At our feet masses of mist, continually tossed about by the winds, changed shape all the time. A uniform layer of cloud between us and the lower regions of the island had been pierced here and there by wind currents sent up from the heated earth. The Orotava bay, its vessels at anchor, the gardens and vineyards round the town, appeared in an opening that seemed to enlarge all the time. From these solitary regions our eyes dived down to the inhabited world below; we enjoyed the striking contrasts between the peak's arid slopes, its steep sides covered with scoriae, its elevated plains devoid of vegetation, and the smiling spectacle of the cultivated land below. We saw how plants were distributed according to the decreasing temperatures of altitudes. Below the peak lichens begin to cover the scorious and

polished lava; a violet (*Viola cheiranthifolia*) similar to the *Viola decumbens* climbs the volcano's slopes up to 1,740 toises above all other herbaceous plants. Tufts of flowering broom decorate the valleys hollowed out by the torrents and blocked by the effects of lateral eruptions. Below the retama lies the region of ferns, and then the arborescent heaths. Laurel, rhamnus and strawberry-tree woods grow between the scrub and the rising ground planted with vines and fruit trees. A rich green carpet extends from the plain of brooms and the zone of alpine plants to groups of date palms and banana trees whose feet are bathed by the ocean.

The apparent proximity of the hamlets, vineyards and coastal gardens from the summit is increased by the surprising transparency of the air. Despite the great distance we could not only pick out the houses, the tree trunks and the sails on the vessels, but also the vivid colouring of the plain's rich vegetation. The Pico de Teide is not situated in the Tropics, but the dryness of the air, which rises continuously above the neighbouring African plains and is rapidly blown over by the eastern winds, gives the atmosphere of the Canary Islands a transparency which not only surpasses that of the air around Naples and Sicily, but also of the air around Quito and Peru. This transparency may be one of the main reasons for the beauty of tropical scenery; it heightens the splendours of the vegetation's colouring, and contributes to the magical effects of its harmonies and contrasts. If the light tires the eyes during part of the day, the inhabitant of these southern regions has his compensation in a moral enjoyment, for a lucid clarity of mind corresponds to the surrounding transparency of the air.

Despite the heat the traveller feels under his feet on the brink of the crater, the cone of ashes remains covered with snow for several months. The cold, angry wind, which had been blowing since dawn, forced us to seek shelter at the foot of the Piton. Our hands and feet were frozen, while our boots were burned by the ground we walked on. In a few minutes we reached the foot of the Sugar Loaf, which we had so laboriously climbed; our speed of descent was in part involuntary as we slipped down on the ashes. We reluctantly abandoned that solitary place where nature had magnificently displayed herself before us. We deluded ourselves that we might again visit the Canary

Islands, but this, like many other plans, has never been carried out.

We crossed the *malpaís* slowly; for it is hard to walk securely on lava fragments. Nearer the Station of the Rocks the path down was extremely difficult; the short thick grass was so slippery that we were constantly forced to lean our bodies backwards in order not to fall. In the sandy plain of retama the thermometer rose to 22.5 °C; this heat seemed suffocating after the cold we had suffered on the summit. We had no more water; our guides had not only secretly drunk our small supply of malmsey wine but had also broken our water jugs.

In the beautiful region of the arborescent erica and fern we at last enjoyed some cool breezes, and we were wrapped in thick clouds, stationary at some 600 toises above sea-level.

Near the town of Orotava we came across great flocks of canaries. These birds, well known in Europe, were in general uniformly green; some had a yellowish tinge on their backs; their song was the same as that of the domesticated canary. It has been noted that those canaries captured in the island of Gran Canaria, and in the islet of Monte Clara, near Lanzarote, have a louder, more harmonious call. In every zone, among birds of the same species, each flock has its peculiar call. The yellow canaries are a variety now breeding in Europe; those we saw in cages had been bought at Cádiz and other Spanish ports. But the bird from the Canary Islands that has the most agreeable song is unknown in Europe. It is the *capirote*, which has never been tamed, so much does he love his freedom. I have enjoyed his sweet and melodious warbling in a garden in Orotava, but have never seen him close enough to judge what family he belongs to. As for the parrots supposedly seen during Captain Cook's stay at Tenerife, they never existed but in the narratives of some travellers who have copied from each other.

Towards sunset we reached the port of Orotava where we received the unexpected news that the *Pizarro* was not to sail until the 24th or 25th. Had we been warned of this delay we would have prolonged our stay on the peak, or made another journey to the volcano of Chahorra. The following day we visited the outskirts of Orotava and enjoyed the pleasant company that Cologan's house offered. We noticed that Tenerife had attractions not only for those who busy themselves with natural history; we found in Orotava several people who had a taste for literature and music, bringing their European

sophistication with them to these distant islands. In this respect, with the exception of Havana, the Canary Islands bore no resemblance to any other Spanish colonies.

On the eve of Saint John's Day we were present at a country party in Little's garden. This gentleman, who greatly helped the Canarians during the last wheat famine, has cultivated a hill covered with volcanic debris. In this delicious place he has installed an English garden from which there is a magnificent view of the peak, of the villages along the coast, and of the island of Las Palmas on the edge of the great ocean. That view can only be compared to the views of Genoa and Naples bays; but Orotava is far superior to both in terms of the grandeur of its masses and the richness of its vegetation. As night fell the volcano's slopes presented us with a wonderful spectacle. Following a custom introduced by the Spaniards, though it dates back to remotest times, the shepherds lit the fires of Saint John. The scattered masses of fire and columns of smoke driven by the wind stood out from the deep green of the forests lining the peak. The shepherds' distant yells of joy were the only sounds that broke the silence of that night in those solitary places.[18]

Before we leave the Old World to cross over into the New there is a subject I must speak about because it belongs to the history of man, and to those fatal revolutions that have made whole tribes disappear from the earth. We ask in Cuba, in Santo Domingo and in Jamaica, where are the primitive inhabitants of these countries? We ask at Tenerife, what has become of the Guanches whose mummies alone, buried in caves, have escaped destruction? In the fifteenth century almost all the mercantile nations, especially the Spaniards and the Portuguese, sought slaves on the Canary Islands, as later they did on the Guinea coast. Christianity, which originally favoured the freedom of mankind, served later as a pretext for European cupidity.

A short time after the discovery of America, when Spain was at the zenith of her glory, the gentle character of the Guanches was the fashionable topic, just as in our times we praise the Arcadian innocence of the Tahitians. In both these pictures the colouring is more vivid than true. When nations are mentally exhausted and see the seeds of depravity in their refinements, the idea that in some distant region infant societies enjoy pure and perpetual happiness pleases them.

CHAPTER 3

Crossing from Tenerife to the coasts of South America – Sighting of Tobago – Arrival at Cumaná

On the evening of the 25th of June we left Santa Cruz and set our course for South America. A strong north-westerly was blowing and tight, sharp waves were caused by strong currents. We soon lost sight of the Canary Islands above whose high peaks a reddish mist appeared; only the Pico de Teide reappeared briefly from time to time as the wind dispersed the clouds surrounding the peak. For the first time we realized how deeply we are stirred by the sight of land situated on the limits of the torrid zone, where nature appears so opulent, grandiose and marvellous. We had stayed at Tenerife for a few days only, yet we left the island feeling we had lived there for a long time.

The sea-crossing from Santa Cruz to Cumaná, the most eastern part of the New Continent, was indescribably beautiful. We cut the Tropic of Cancer on the 27th and, despite the *Pizarro* not being a fast sailer, took only twenty days to cover the 900 leagues that separate the African coast from the New World. Some land birds, blown out to sea by the strong wind, followed us for a few days.

We followed the same route as Columbus had taken on his first voyage out to the Antilles. It is well known that during the crossing from Santa Cruz to Cumaná, or from Acapulco to the Philippines, sailors barely have to worry about working the sails. We crossed the ocean as if descending a river, and would have been in no greater danger if we had made the voyage in an open boat.

The further we left the African coast behind the weaker the wind became: it was often completely calm for hours, followed regularly by electrical phenomena. Thick black perfectly shaped clouds formed in the east; it seemed as if a squall might force us to fasten the topsail; then the wind would rise again, a few large raindrops would fall, and the storm would vanish without a single clap of thunder. It is thanks to these squalls alternating with dead calms that you are able to cross