THE MALASPINA EXPEDITION 1789–1794

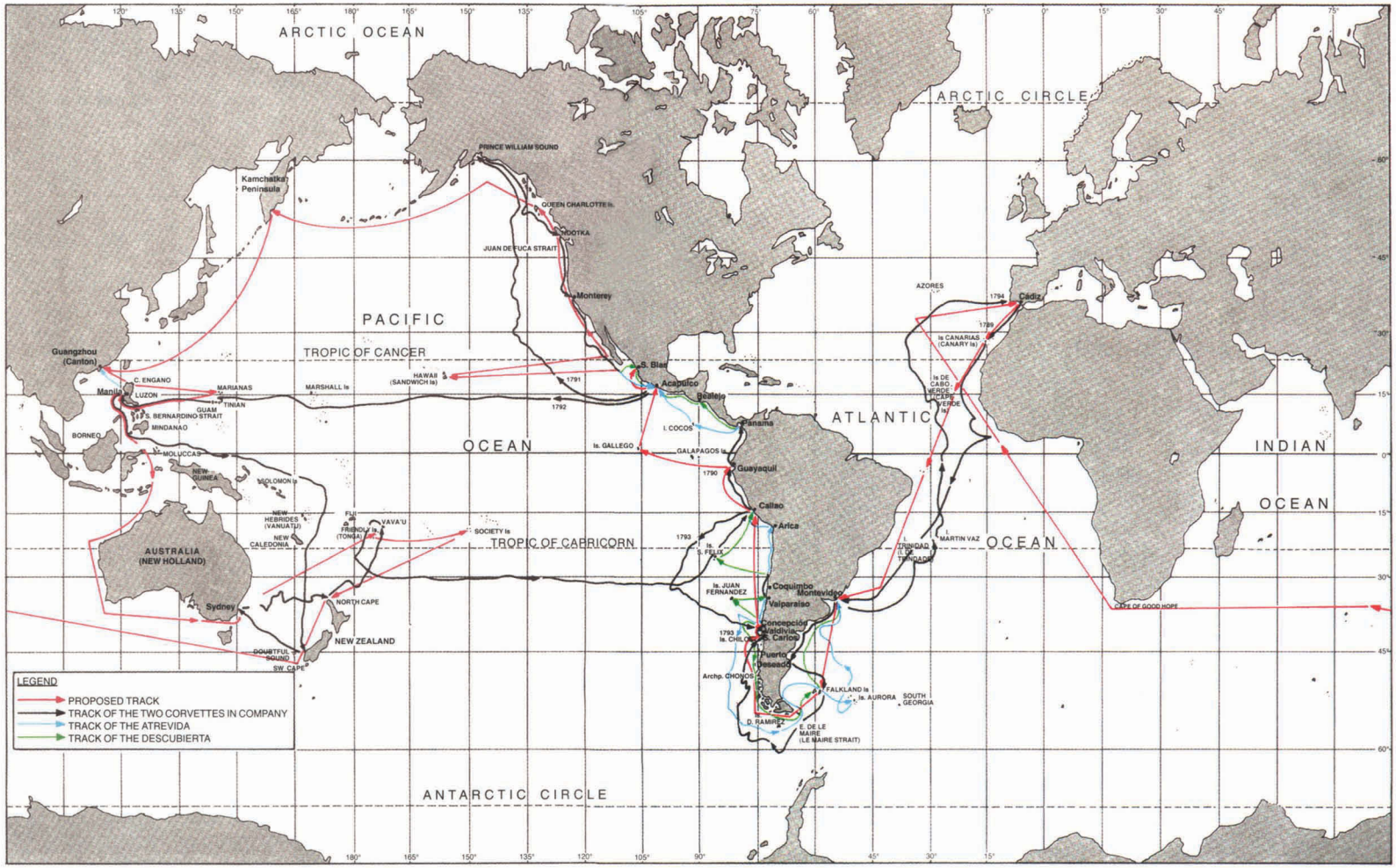
VOLUME II

PANAMA TO THE PHILIPPINES

Edited by

ANDREW DAVID, FELIPE FERNANDEZ-ARMESTO,
CARLOS NOVI, GLYNDWR WILLIAMS

TRACKS OF THE MALASPINA EXPEDITION – PROPOSED AND ACTUAL 1789–1794



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1789-1794

VOLUME II
PANAMA TO THE PHILIPPINES

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Plate 1. José Bustamante y Guerra in naval uniform. Anon. Museo Naval, Madrid

THE MALASPINA EXPEDITION

1789–1794

Journal of the Voyage by Alejandro Malaspina

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CONTRIBUTING EDITORS

W. R. P. Bourne
J. S. Cummins
Laurio Destéfani
Iris Engstrand
†Eduardo Estrella
Phyllis Herda
María Dolores Higueras Rodríguez
Robin Inglis
John Kendrick
Robert J. King
Manuel Lucena Giraldo
Jorge Ortiz Sotelo
Juan Pimentel Igea
Blanca Sáiz

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PREFACE

This second volume of Alejandro Malaspina's journal covers the middle part of the voyage from 15 December 1790 to 15 November 1792. During the first months of this period Malaspina in the *Descubierta* and José Bustamante in the *Atrevida* continued to survey and investigate Spain's American territories as they sailed from Panama north along the Pacific coast of Central America. For the third time on the voyage they operated independently of each other, for Bustamante sailed ahead of Malaspina to San Blas, Spain's main naval base on the Mexican coast, while Malaspina called at Acapulco. From there he travelled to Mexico City to report to the Viceroy of New Spain, the Conde de Revillagigedo. This marked the end of the first stage of the voyage, in which the corvettes sailed along coasts ruled and settled by Spain. From the Mexican coast onwards the expedition would be venturing into little-known waters.

The original plan of the voyage (see Volume I of this edition, pp. 312–15) had rather optimistically envisaged the vessels sailing west from Acapulco across the Pacific to the Hawaiian Islands before exploring the Northwest Coast of America. After going as far as conditions would allow in those ice-bound waters, the corvettes would make for Kamchatka, and then call at Guangzhou [Canton] before turning south to the Philippines. All this was to be accomplished in nine months. By the time he reached Callao in September 1790, Malaspina had proposed a more realistic timetable in which the visit to Hawaii was to be postponed in favour of a voyage north to Alaska from San Blas, which the ships would leave in February 1791 (see Volume I of this edition, pp. 320–21). This, it was hoped, would determine whether the Strait of Anian allegedly found by Lorenzo Ferrer Maldonado in 1588, and described in a memorial of 1609 which was given to Malaspina shortly before his departure from Cádiz, actually existed. The order of events had been left to Malaspina's discretion, and the lateness of the *Descubierta*'s arrival at Acapulco in March, and the necessity of visiting the Viceroy in Mexico City, prompted yet another change of plan when Malaspina decided that his survey of the Hawaiian Islands should take precedence over exploration along the Alaskan coast. It was at this point that matters were taken out of his hands. On 22 December 1790 Antonio Valdés, Ministro de Marina, sent orders to Malaspina for the expedition to sail north to 'verify' the existence of the strait reported by Ferrer Maldonado. Enclosed with his letter was a copy of a memoir by the French geographer, Buache de la Neuville, in support of the supposed discovery of 1588 that had taken Ferrer Maldonado from the Atlantic to the Pacific, and back again.

There was a considerably irony in the fact that an expedition which consciously sought to represent Enlightenment science and scepticism should be sent on a wild-goose chase based on Ferrer Maldonado's preposterous claims. Malaspina's journal entries describing his unsuccessful search along the Alaskan coast for a passage, and the expedition's encounters with native peoples virtually unknown to Europeans, are supplemented by a series of documents printed in Appendix I and Appendix II. Appendix I contains the correspondence between Valdés and Malaspina about Ferrer Maldonado's alleged discovery. Appendix II contains the text of Ferrer Maldonado's 'Relation' of 1609, Buache de la Neuville's supportive memoir of 1790, and the critical responses of Bustamante, Malaspina and Juan Bautista Muñoz. Some of these documents appear here in print for the first time; none except the text of the 'Relation' of 1609 has been published in English before. Together they form the concluding chapter in the long Spanish search for the rumoured strait north of New Spain, and will be of particular interest to readers familiar with the British quest for a strait between the Atlantic and Pacific oceans, the Northwest Passage.

From Alaska the corvettes sailed south to Nootka Sound, flashpoint of the diplomatic crisis the previous year that had almost led to war between Spain and Britain, and from there to Monterey, San Blas and Acapulco. In late December 1791 the vessels left Acapulco and headed out into the Pacific for the long oceanic crossing to the Philippines by way of Guam. Malaspina spent nine months in the Philippines, while Bustamante in the *Atrevida* visited Macau to carry out gravitational observations. Malaspina's time was spent in making coastal surveys, while his naturalists – Pineda, Haenke, and Neé – left on inland excursions to make observations and collect specimens. Malaspina incorporated their reports into his journal, and they are printed here. Tova Arredondo also journeyed into the interior of Luzon, and although Malaspina did not include his report in his journal, its interest is such that we have printed it as Appendix III. The expedition's stay at Mindanao, its track across the South Pacific, with visits to Port Jackson and Vava'u, and the return voyage along the coasts of South America, will be covered in the final volume of this edition. That will also contain a full bibliography and a cumulative index.

Our debt, financial and otherwise, to those who helped us both with this edition in general and with Volume I in particular was acknowledged in the Foreword and Preface to that volume (pp. xvi, xviii–xix). Here we would both like to repeat our thanks to the individuals and institutions listed there, and to mention those who have given us special assistance with Volume II. We are grateful for a generous donation from Elizabeth Crownhart-Vaughan and Thomas Vaughan CBE, which they have made in memory of Helen Wallis OBE and Admiral Sir Charles Madden Bt, GCB. The translation of Malaspina's text was undertaken by Sylvia Jamieson, with Philip Grundy's help. As in the first volume of this edition the translation has been of Malaspina's holograph journal, published under the editorship of Ricardo Cerezo Martínez, *La expedición Malaspina 1789–1794*. Tomo II: *Diario general del viaje por Alejandro Malaspina*, Madrid, 1990, although the printed text has again been checked against the manuscript originals in the Museo Naval, Madrid: AMN MS 610, 423, 92. For the difficulties involved in translating Malaspina, which have not lessened as this edition has progressed, we would refer new readers to Carlos Novi's essay in Volume I of this

edition, pp. xxiii–xxviii. Our Contributing Editors have continued to lend assistance both with the annotations and in other ways, but among them we should like to pay particular tribute to Robin Inglis, who, with help from Iris Engstrand and Donald C. Cutter (who wrote the Introduction to this edition in Volume I, pp. xxix–lxxvii), provided many of the annotations to the Northwest Coast section; and to J. S. Cummins, who undertook many of the annotations for the long section on the Philippines. The Oregon Historical Society kindly supplied a print of the crew list drawn up and signed by Malaspina at Acapulco in April 1791. We are grateful to Sir James Watt for solving problems concerning the fevers encountered in Acapulco, and to Adrian Webb and Sharon Nichol of the United Kingdom Hydrographic Office for help with charts. As before, the many annotations on hydrography and astronomy have been the responsibility of Andrew David.

In Spain archivists and librarians have continued to help us at every stage. The Real Academia de la Historia, Madrid, through its Librarian, María Victoria Alberola, gave permission to use two important documents, included here in translation as Documents 1 and 5 of Appendix II. The staff of the Biblioteca del Palacio Real (Director María Luisa López Vidriero), helped our searches for documents in the Ayala Colleción. Francisco Gallo at the Sección Nobleza of the Archivo Histórico Nacional, Toledo, where the archives of the Casa Ducal del Infantado are now kept, confirmed that the original manuscript of Ferrer Maldonado's account was no longer in the ducal library when its holdings were purchased by the Spanish state. At the Archivo General de Indias, Seville, the Deputy Director, María Antonia Colomar Albajar, and the Head of Reference, Pilar Lázaro, gave much personal guidance on the puzzling matter of the location of the ministerial archives of the Indies Department at the time of the Malaspina expedition, and on the creation of the Archivo General de Indias. At the Museo de América, Madrid (Director Paz Cabello), we are indebted to Luisa Ferrer Garcés for supplying reproductions of paintings and drawings from the museum's superb collection. Finally, we should like once more to express our appreciation of the collaboration of the Museo Naval, Madrid (Director Almirante Fernando Riaño Lozano), where María Dolores Higueras Rodríguez (Directora Técnica), and her staff have responded generously to our many demands on their time and patience. We are especially grateful for reproductions of the many paintings, drawings and charts held at the Museo Naval which appear in this volume. Together with those from the Museo de América, they have enabled us once again to illustrate the work of the fine artists who sailed on the Malaspina expedition.

Andrew David
Felipe Fernández-Armesto
Carlos Novi
Glyndwr Williams

EQUIVALENTS AND ABBREVIATIONS

SPANISH NAVAL RANKS

Ranks in the *Real Armada* correspond with those in the eighteenth-century British Royal Navy as follows:

Capitán General	Admiral
Teniente General	Vice Admiral
Jefe de Escuadra	Rear Admiral
Brigadier de Real Armada	Commodore
Capitán de navío	Post Captain
Capitán de fragata	Commander
Teniente de navío	Senior Lieutenant
Teniente de fragata	Junior Lieutenant
Alférez de navío	No exact equivalent
Alférez de fragata	No exact equivalent
Contador de fragata	Junior Paymaster and Purser
Capellán	Chaplain
Cirujano	Surgeon
Guardiamarina	Midshipman
Práctico	Pilot
Cartógrafo	Cartographer
Piloto	Master
Segundo piloto	Second master
Pilotín	Master's mate
Director de historia natural	Director of natural history
Botánico	Botanist
Pintor	Artist
Dibujante	Draughtsman
Guardián	Quartermaster

ABBREVIATIONS

AGI	Archivo General de Indias, Sevilla
AMN	Archivo del Museo Naval, Madrid
AMNCN	Archivo del Museo Nacional de Ciencias Naturales, Madrid
ARJB	Archivo del Real Jardín Botánico, Madrid
UKHO	United Kingdom Hydrographic Office, Taunton

WEIGHTS AND MEASURES

Spanish terms which have a direct English equivalent have been translated into English; terms for which there does not appear to be a direct equivalent have not been translated.

Spanish terms which have been translated into English

braza	5·48 feet = one fathom
cable	one-tenth of a sea mile = one cable
cuartillo	0·9 pints = one pint
legua	three sea miles = one league
milla	the internationally accepted unit of distance at sea, one-sixtieth of a degree of latitude = one [sea or nautical] mile
nudo	the internationally accepted unit of speed at sea of one sea mile an hour = one knot
pie	0·91 feet = one foot
pulgada	0·91 of an inch = one inch
línea	one-twelfth of a *pulgada* = one line (an obsolete English term for one-twelfth of an inch)

Spanish terms which have not been translated

arroba	approximately 25 lbs
codo	18 to 22 inches
toesa	approximately 6·4 feet – the French *toise*
quintal	approximately 102 lbs
vara	approximately 3 feet

18TH-CENTURY SPANISH COMPASS DIRECTIONS AND ENGLISH EQUIVALENTS

Spanish	*English*	*Spanish*	*English*
N¼NE	NbyE	S¼SW	SbyW
NE¼N	NEbyN	SW¼S	SWbyS
NE¼E	NEbyE	SW¼W	SWbyW
E¼NE	EbyN	W¼SW	WbyS
E¼SE	EbyS	W¼NW	WbyN
SE¼E	SEbyE	NW¼W	NWbyW
SE¼S	SEbyS	NW¼N	NWbyN
S¼SE	SbyE	N¼NW	NbyW

SPANISH-ENGLISH GLOSSARY OF GEOGRAPHICAL TERMS USED IN THIS WORK

Spanish word	*English meaning*	*Spanish word*	*English meaning*
alto(s)	height/heights	*golfo*	gulf
archipiélago	archipelago	*isla*	island
arena	sand	*islote/islita*	small island, islet
arrecife	reef	*lengua*	tongue
arroyo	stream	*monte*	mountain
bahía	bay	*morro*	headland, bluff
bajo	shoal	*morrito*	small headland
banco	bank	*pájaro*	bird
batería	battery	*nuevo/a*	new
boca	mouth	*pan de azúcar*	sugar loaf
bodega	warehouse	*piedra*	rock, stone
cabo	cape	*playa*	beach
caleta	cove	*península*	peninsula
camino	road	*promontorio*	promontory, headland
canal	channel	*pueblo*	town, village
casa	house	*puerto*	port
castillo	castle	*punta*	point
cerro	hill	*quebrada*	gorge, ravine
cerrillo, cerrito	small hill, hillock	*río*	river
cordillera	mountain range, especially the Andes	*roca*	rock
		sierra	mountain range
ciudad	city	*silla*	saddle
ciudadela	citadel	*teta*	nipple, pap, breast
ensenada	bay	*tierra*	land
estrecho	strait	*torre*	tower
estero	creek, inlet	*vigía*	lookout
farallón	small needle-shaped rock	*volcán*	volcano

BOOK FIVE

From Callao to Acapulco

continued

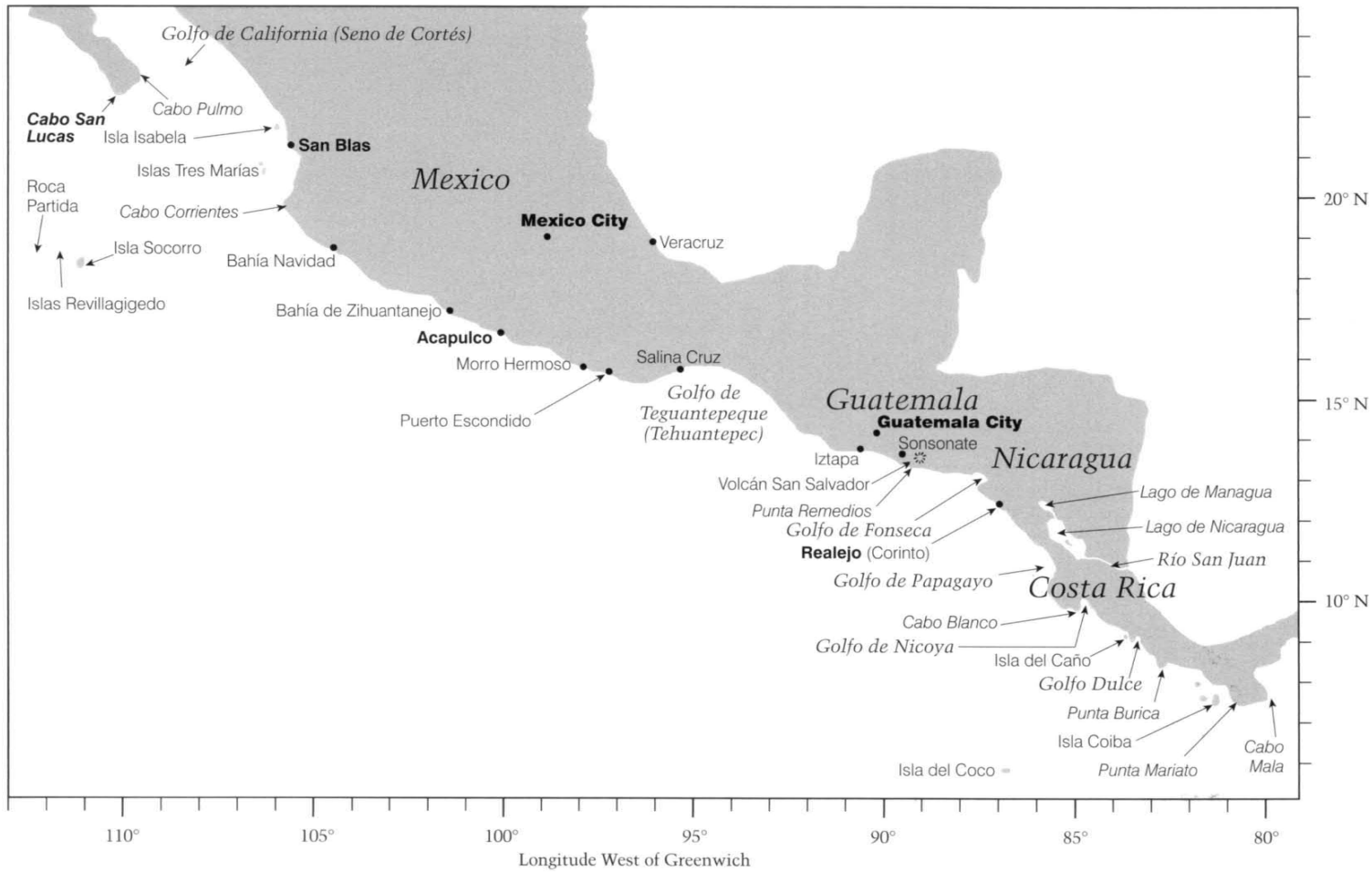

Fig. 1. Panamá to Cabo San Lucas, December 1790 to May 1791, and Cabo San Lucas to Acapulco, October 1791

CHAPTER 5

From Panamá to Realejo

15 December 1790

At dawn, the following day, we set to work with a will to hoist the boats, a task prolonged by the considerable weight of the launch. Finally, towards seven o'clock, we set sail for Islas Otoque[1] under topsails and topgallants and later under full sail. At first we sounded twenty and twenty-five fathoms, ooze, but we soon obtained greater depths of forty fathoms when, with the aim of avoiding the shoal surveyed on the previous days, we set a course to pass three cables off the [eastern] extremity of Isla Urava.[2] Our observed longitude at ten-thirty, on the meridian of Islote de Otoque,[3] was [blank] and the latitude by meridian altitudes of the Sun was [blank].[4]

As the weather remained very clear with a fresh breeze from NW and WNW, we were assured of good progress in our survey, which would enable us to extend it from Punta Chamé,[5] by way of the inner part of the bay[6] to the vicinity of Punta [Cabo] Mala. At sunset this point bore approximately SW[7] and our soundings, some two or three leagues offshore, having remained all afternoon at eighteen to twenty fathoms, black sand, had increased to twenty-nine and thirty-five fathoms. At the end of the day, having finished our work, we steered ESE so as to give ourselves more sea room for our run the following day. Twice during this afternoon we had taken the precaution of observing longitudes at suitable places and intervals.

The bay, lying between Punta Chamé and Punta Mala, is named Parita on our national charts, but it extends much further inland than these indicate. On the other hand, it is considerably less deeply indented than shown on Jefferys's English chart under the name Golfo de Natá.[8] Its coastline is undulating rather than flat and there are several lofty ranges inland of which the westernmost is easily distinguished by four

[1] A group of islands consisting of Isla Otoque, Isla Estiva, Isla Boná and Roca Redonda.
[2] A small island close SE of Isla Taboga.
[3] Possibly Isla Boná, the southern island of the group.
[4] For Malaspina's survey methods see Vol. 1 of this edition, pp. 325–7.
[5] Situated 6 miles WNW of Isla de Otoque.
[6] Bahía Parita on the western side of Golfo de Panamá.
[7] SE in the MS journal, which is clearly in error.
[8] Thomas Jefferys (d. 1771) publisher of numerous charts and maps. The chart was possibly 'An Accurate Map of North America ... by Eman Bowen Geog^r to His Majesty and John Gibson Engraver' in 2 sheets. Printed for Robert Sayer ... 2^d June 1775, in Robert Sayer and John Bennett, *The American Atlas ... by the Late Thomas Jefferys*, London, 1776, on which Bahía Parita is named Nata Bay.

fairly high peaks. Islote de Chirú is in the middle of the bay[1] and, if our soundings and what we could see are to be believed, there is no danger extending far enough offshore to be feared.

But when we examined the above mentioned charts we were unable to reconcile them with the extremities we had in sight. We were therefore apprehensive of a considerable discrepancy both in our survey the following day and in our run that night. Accordingly we thought it wiser to sail only as far east as was necessary to give ourselves sea room and then to close the coast the following day to examine it in safety. Therefore, at ten o'clock at night, in a depth of thirty-five fathoms, we hove-to on the port tack under topsails, with the breeze continuing strong from NNW and with a fairly choppy sea.

16 December

As dawn approached the wind began to drop and at first light we could see Isla Iguana[2] and Punta Mala very close. We made a short tack to the east and then immediately bore away under full sail to make as much use as possible of the breeze, which was still fresh from the north, first passing Isla Iguana at a distance of one-and-a-half leagues, and then passing two leagues off Punta Mala. At that distance it was not easy to identify those dreaded shoals said to extend two or three leagues offshore in our sailing directions, apart from what we could see extending three or four cables either side of the point.

As the Sun rose above the horizon the breeze became still more favourable and, in depths of thirty and thirty-five fathoms, black sand, we continued surveying Punta de la Higuera[3] and the two islets commonly known as Los Frailes.[4] These islets are treeless, and lie some three leagues offshore. The coast, everywhere thickly forested, rises considerably towards Punta de la Higuera, terminating at a much greater height at Morro Puercos[5] and its adjacent coast to the west, which finally joins the moderately elevated Punta Mariato, near the much praised Islas Quibo.[6]

At noon Morro Puercos, probably the southernmost point that we would encounter on our passage to Realejo, bore WbyN by compass distant four leagues, when our latitude was 7°9′21″. Morro Puercos, or Punta de la Higuera, may be considered the western extremity of the great bight of Panamá, the eastern extremity

[1] Farallón de Chirú, about 1 mile offshore, on the north side of Bahía Parita.

[2] Situated 9 miles north of Punta Mala.

[3] Not identified.

[4] Frailes del Norte and Frailes del Sur, 10 miles SW of Punta Mala.

[5] About midway between Punta Mala and Punta Mariato.

[6] An alternative name for Isla Coiba, 46 miles WNW of Punta Mariato; Malaspina uses both names indiscriminately. It is not certain whose praise Malaspina had in mind. It was a favoured wooding and watering place of the buccaneers. Dampier, who visited the island in June and July 1685, described it as being 'all over plentifully stored with great tall flourishing Trees of many sorts; and there is good Water on the East and North East sides of the Island.': John Masefield, ed., *The Voyages of Captain William Dampier*, 2 vols, New York, 1906, I, p. 232. Anson (who is mentioned by Malaspina in his next day's journal entry), spent nine days at Quibo in December 1741. The official account of his voyage described it as 'extremely convenient for wooding and watering ... the soil to be extremely rich ... [with] prodigious quantity of turtle.': Glyndwr Williams, *A Voyage round the World in the Years MDCCXL, I, II, II, IV by George Anson*, Oxford, 1974, pp. 201–5.

being Cabo Corrientes, whose shores and face had appeared to be as steep as those now in view. At a distance of two or three leagues we obtained no bottom on either side [of the headland] with one hundred fathoms of line.

At three in the afternoon, when we were just abreast of Morro Puercos, the favourable northerly breeze abandoned us and was followed by light, variable airs from west and WSW, obliging us to haul our wind on the starboard tack. At nightfall these gave way to such a complete calm that we lost all steerage way for many hours.

17 December

The following morning in particular we had several fairly strong gusts from north and NE, but each time our hopes were immediately dashed, so that noon found us in almost the same position as at nightfall on the previous day. We did, however, make use of the extremely clear and pleasant weather to repeat our observations to determine variation, which usually gave a result of 7° or 8°NE by both azimuths and amplitudes.

During this day we compared our chronometers with those of the *Atrevida* by means of pistol shots. The only discrepancy was of 5″ in number 10, our chronometers having already been corrected by the daily equations.

It was not until nightfall that the strong northerly breeze set in again, when we immediately altered course to WNW, close hauled, to close Punta Mariato and the nearby islands, the survey of which had to be considered of the greatest importance. Having been a stopping place for many freebooters and later for Commodore Anson,[1] they had become the subject of constant plans for settlement by rival nations and the cause of a certain apprehension in our own when war or private interests brought other nations to the Pacific Ocean.

With this in mind, and with the breeze freshening still further towards eight in the evening, we furled the small sails. At eleven we also had to strike the topsails, with the object of making as little leeway as possible from our present position, which seemed the most suitable spot from which to begin our survey the following day. The sacrifice of so clear a night and of a favourable and splendid strong breeze after a fairly lengthy calm could not but cause a certain surprise and perhaps gratitude in those who, knowing the sailor's lot and the fact that our circumstances did not allow for any delay, were also aware of the frequency of calms and the scarcity of favourable winds.

18 December

At dawn the next day – as clear and pleasant as the previous ones – a truly pleasing prospect was spread before our gaze. In the distance, to the west, we could see the high sierras near Morro Puercos. Puntas Mariato and Las Filipinas[2] showed as well, as

[1] Anson passed Punta Mariato, without stopping, two days before anchoring off Quibo. George Anson (1697–1762) led a British expedition to the Pacific Ocean, 1740–44, during the war of Jenkins's Ear to harry Spanish shipping and ports on the west coasts of South America and in the Philippines, where he successfully intercepted a galleon from Acapulco. Although his voyage was ravaged by scurvy and resulted in no new geographical discoveries, it did suggest that Spain could be successfully challenged in the Pacific and that in this ocean lay the enticing prospect of future expansion for Britain's imperial and commercial interests.

[2] Punta Jabalí, the eastern entrance point of Bahía Honda, 48 miles NW of Punta Mariato.

did Ensenada del Montijo[1] and some islands lying half way across its mouth.[2] Islas Coiba and Quicara,[3] stretching out to the NW and WSW, added to the beauty of the scene and, lastly, the breeze, still steady and strong, promised a rapid and accurate performance of this day's work.

We immediately hoisted all sail and steering NWbyW, close hauled, began to measure bases, which we later linked to our longitude observations when the Sun was higher. We set a course for the southern[4] extremity of Coiba and, at about nine o'clock, when very close to the anchorage off the island, we bore away to examine it closely, altering course to SSW to pass barely a league from the SE extremity of the island, where we sounded thirty-five fathoms, fine sand, observing that the shoal indicated by Anson[5] is much closer to the coast than previous accounts appeared to indicate.

At first sight it seemed better to take the channel between the mainland and the NW extremity of Quibo [Coiba], both because it would make the survey of the following stretch of coast much easier and because the weather and our position seemed to encourage us to take that passage, which, furthermore, appeared clear and free of dangers. However, considering that Islas Coiba and Quicara had been, and would be again, a lure for those who might visit these waters under flags other than ours, and somewhat apprehensive of the calms that might leave us at the mercy of the currents, setting us onto the coast and adjacent islets, we chose, in the end, to coast Isla Quicara and the nearby islet[6] at close range and pass to the south of all the islands.

The breeze continued fair throughout the morning as we steered SSW with the wind astern. Very soon, having passed the SE point of Quibo [Coiba], we found ourselves out of soundings, obtaining no bottom with sixty fathoms of line. At noon the southernmost islet bore N74°W, two miles distant, in latitude 7°10′, when we obtained no bottom with one hundred fathoms of line.

Soon after the Sun had passed the meridian the breeze fell, causing us some anxiety just when we were only a mile south of the islet. We tried to make use of a few light airs, seeing fortunately, while we were losing steerage way, the swell was setting us somewhat to the SE. This, however, was also bringing the *Atrevida* too close to us, so at half past four we had to resort to taking a tow from the pinnaces to separate us a little. At sunset [Isla] Montuosa[7] was in sight bearing N58°W, six leagues distant. At the same time we were about a league off the southern islet, while the extremities of Quicara and Quibo [Coiba] bore NbyW to NNE.

19 December

The night was calm, and as clear as the previous ones. We steered west to make use of a few light puffs of air from the east, and at dawn Montuosa bore N40°W, three or

[1] Bahía Montijo.
[2] The largest being Isla Cebaco, 24 miles NW of Punta Mariato.
[3] Isla Jicarón, 3½ miles SW of Isla Coiba.
[4] N in the MS journal, which is clearly in error.
[5] 'a shoal which stretches off about two miles from the South point of the Island': Williams, *Anson's Voyage round the World*, p. 199.
[6] Isla Jicarita off the southern extremity of Isla Jicarón.
[7] Situated 21 miles west of Isla Coiba.

four leagues distant. Even under full sail to make use of the light airs from the NE, we made very little progress during the morning, and by noon we had hardly made more than two-and-a-half leagues towards the island. At two o'clock in the afternoon, however, a moderate sea breeze set in from south, with which we did not hesitate to alter course to the north, passing east of Montuosa with the intention of examining that stretch of the mainland coast and making better use of the land breeze which we were almost sure of having during the coming night.

At eight o'clock that night Montuosa bore west, one league distant, and as the wind had dropped considerably we attempted to steer a westerly[1] course to make use of the land breeze, but we were thwarted by a flat calm, in which we were set to the east by the current. Dawn found us scarcely two leagues from the NW tip of Quibo [Coiba], [20th] from which the corvettes managed to get clear, using every breath of air, although hardly perceptible and generally very variable. Nonetheless, we could not consider our time entirely wasted, because the great clarity of the horizon gave us a background view of more features of the mainland coast, which seemed to be low and scattered with hummocks and a few islands. We were also able to make a more detailed survey of the western coast of Quibo [Coiba] and observe a meridian altitude precisely on the parallel of Montuosa, obtaining a latitude of 7°27′.

The light sea breeze was not noticeable until two in the afternoon, when we immediately altered course to WNW, passing to the north of Montuosa again. As we approached it (the sea breeze towards the late afternoon giving us a speed of three knots), we saw that it was luxuriantly forested. A league NNE of its centre we obtained no bottom with seventy fathoms of line. In approximately this position the breeze dropped and the current began to set us towards the east, but fortunately at eleven at night a fresh land breeze set in from the north and, close hauled under the courses and topsails, making five or six knots, we finally got well clear of the island.

At half past three in the morning we saw, by the brilliant light of the Moon, the two Islas Ladrones[2] to the north, three leagues distant. These gave us a mark for the accurate plotting of the islets adjacent to Punta Burica which were too important for us to consider passing. Accordingly, although the breeze continued fair and fresh, we lay to on the NW tack with the courses and topsails lowered, waiting eagerly for the dawn to reveal to us a most interesting scene.

21 December

Indeed, our hopes were not in vain, as apart from the two islets mentioned above, we saw other islands further inshore, Punta Burica, the entrance points of Golfo Dulce, Isla del Caño[3] and Volcán Barú,[4] not usually to be seen clearly because of thick cloud cover (according to the pilots). At the same time we could see the summits of Montuosa, Quibo[Coiba] and Burica, and hence it was easy to link together with some certainty all of this somewhat complicated stretch of coast.

However, as if to ensure that we were to suffer the same vexations today as on

[1] E = east in the MS journal, which is clearly an error for O = west.
[2] Situated 26 miles ESE of Punta Burica.
[3] A steep-to wooded island, 10 miles offshore and 70 miles NW of Punta Burica.
[4] Situated about 50 miles NE of Punta Burica.

previous ones, the wind dropped almost as soon as the Sun rose and once again we were left to the mercy of the calms and currents. Our latitude at noon was 7°45′.

Towards two in the afternoon light airs from SW began to get up and with these we steered WNW, close hauled. By sunset, as we had the advantage at the time of a fairly strong current setting NW, we were only some five leagues from Isla del Caño, whose southern extremity bore N70°W.

In order to make some way against the current during the following night we thought it best to alter course to the south at nightfall, particularly as the heavy cloud cover we could see inshore and the proximity of the full Moon led us to hope for a land breeze during the night, even though it could bring squalls.

This proved to be correct. At ten o'clock that night, during a heavy downpour, the wind shifted to the NW with a few gusts, which, while obliging us to shorten sail, seemed to promise better conditions in the coming hours. Despite this, and the fact that it continued drizzling until midnight, this hope was to be thwarted. We had to continue close hauled to the SW and SSW with very light airs from west and WNW and, with the current setting so hard against us, we found ourselves at dawn much closer to Montuosa, bearing east four leagues distant. Isla del Caño was only just visible to the NW and the Ladrones to the north, and it was not easy to make out the land behind Golfo Dulce and Punta Burica.

22 December

From this day until the 24th it might be said that we were in a state of continuous inactivity, although we worked ceaselessly, day and night, to profit from any breath of wind in the third or fourth quadrant. Dusk and dawn found us still within sight of Montuosa, a few hours of calm and a contrary SE current, especially at night, being enough to undo all that we had gained in as many hours. The extremely clear and beautiful skies by day and by night, and the delightful brilliance of the Moon itself, seemed almost to mock our eagerness to make too early use of the season. Variation remained constant at 8°NE and our latitude was 7°21′.

To some extent, however, to offset the considerable delays caused by this inactivity, new and curious objects of interest to our natural history research were found among the almost countless schools of fish that surrounded the corvette. These at times presented an agreeable spectacle with the fish suddenly leaping, startled, from the sea, which appeared to be boiling. Various dorado,[1] tuna and bonito were caught, either with fizgigs or hooks. We also saw a manta ray with three fish,[2] each a *codo* in length, clinging to it. A fight between a blue shark and a turtle and the instant destruction by two blue sharks of a bonito wounded by our fizgigs, offered new and interesting sights. Finally we managed to catch a striped fish which our naturalists found to be of an amphibious class of the Balistes,[3] similar to the Guapervas of Brazil described by Linnaeus.

[1] Also known as the dolphin, a strong, speedy and predatory fish, with a marked preference for flying fish.

[2] Presumably remoras or sucking fish.

[3] Generally known as file-fish on account of the strong first spine of the dorsal fin, which is roughed in front like a file.

The different and multiple combinations of the molluscs had also been an object worthy of new and repeated study for Don Antonio Pineda, and among the birds we caught alive two boobies and a species of tern or sea-swallow.[1]

24 December

At last, on the morning of the 24th with a few hours of a gentle NE breeze we lost sight of Montuosa and in the afternoon, despite our low latitude, we sighted Isla del Caño again and the nearby coast leading to Ensenada [Golfo] de Nicoya. The lack of breeze prevented us from getting to within five leagues of it [the coast] during the rest of the day's run. [25th] At noon the following day the island bore N18°[W] and the extremities of the land in sight from N15°[W] to N30°[E] by compass, distant six or eight leagues, our latitude at the time being 7°38′ and our longitude 3°26′ west of Panamá by the chronometers.

At noon we compared these for the third time with those of the *Atrevida* and it was with great satisfaction that we saw the differences to be scarcely perceptible. In consequence the longitudes of various points on the coast, which we assigned each day, were all the more certain.

For a proper celebration of Christmas for our officers, seamen and marines, we did not forget that it was usually marked ashore with some extra provisions at table. So we took care not only to include some pickled cabbage and a pint and a half of wine to the daily rations, but also to add some flour, sugar and fresh meat from our stores to give some semblance of tradition and provide variety and pleasure to the palate and, of course, to raise their spirits and encourage their affection for the Service.

We now considered our passage along this stretch of the coast as to be almost complete, expecting to have either a few hours of moderate sea breeze or the land breeze with us for a time early the next morning. In the afternoon we had, as well, some recompense for our recent delays with the sight of Isla del Caño at closer range and the next stretch of mainland coast running westward, which was generally quite high in the middle and ending further on in a fairly low, wooded point, which appeared to extend towards Farallones de Quipo.[2] Before nightfall, however, we were left in no doubt that our hopes were not to be fulfilled so soon, although they had seemed to be founded on a high degree of probability. As the breeze slackened still further and shifted to the west, bearings taken to the coast and the comparison of longitude by the chronometers with that of the morning indicated a current setting east at about one-and-a-half knots. We immediately altered course to the south to see if we might overcome its effects, entirely or partially, by standing offshore.[3] A calm during the night rendered this precaution almost useless, so that at dawn on the following day Isla del Caño and the adjacent coast could hardly be seen from the

[1] Brown Boobies (*Sula leucogaster*), Masked Boobies (*Sula dactylatra*), Red-footed Boobies (*Sula sula*), Sooty Terns (*Sterna fuscata*) and Brown-winged Terns (*Sterna anaethetus*) are encountered in these waters.

[2] Charted 19 miles NNW of Isla del Caño on 'Carta esférica desde el Golfo Dulce ... hasta S^{n} Blas ... construida con las observaciones executadas en las corvetas Descubierta y Atrevida', Madrid, 1822.

[3] Between Punta Mariato and Punta Burica an easterly set will usually be experienced within 20 miles of the coast due to the influence of the Equatorial Counter-Current.

masthead, while not far off, bearing EbyN by compass, was the all too familiar sight of Isla Montuosa.

26 December

Once again we set to work to overcome the almost imperceptible and continually varying airs, or rather, to use them to struggle against the contrary current. At times we made progress and at others we lost much ground, but every day at dawn the first and usually the only object in sight was Isla Montuosa, which we saw from NE to the ENE according to the southerly set of the current. Fortunately the fish did not abandon us and at times their numbers, either as hunters or prey, or their usefulness for food or their novelty to natural history, soothed or distracted the natural irritation at finding ourselves in the same position for so many days.

The dorado and sharks were easily taken by hook. We had to lie in wait with the fizgigs to catch the bonito, one of which Don Antonio Pineda examined in great anatomical detail. We also saw some turtles, a few whales and flying fish, a swordfish and an infinite number of small fish which followed the corvette at a short distance.

28 December

Only at dawn on the 28th, helped by a SE squall with fairly heavy rain, were we able to lose sight of Montuosa and approach Isla del Caño, which at noon bore N20°W, eight leagues distant. We would now have preferred to steer a more westerly course so as to stand further offshore and lessen the effect of the adverse currents. The calms and the very light sea breezes at noon did not allow us to make any progress on this day or the following one, so that at dawn on the 30th we thought Montuosa would be in sight for the third time, as, due to a flat calm throughout the previous night, we were without steerage way and entirely at the mercy of the currents.

30 December

However, we had not lost as much ground as we had feared, even though a point on the coast which bore NNW at nightfall now bore N30°W and we had lost some three or four leagues to the south. When a moderate breeze set in at nine o'clock from NW and WNW, enabling us to steer close hauled under full sail in the third quadrant in company with the *Atrevida*, these losses seemed of little importance and easily to be made up, should we enjoy the alternating land and sea breezes that this favourable change seemed to promise.

During this period we had taken care to protect the crews of both corvettes from the direct and very harmful Sun, spreading awnings above the deck from sunrise to sunset, washing the decks with vinegar and allowing nobody to stand still in the Sun, even for fishing, and adding half a pint of wine to the daily rations. With these precautions, particularly the good fortune that the calms were not accompanied by frequent downpours, as often happens, we were able not only to prevent the spread of fevers, already affecting both crews because of the excessive heat of Panamá, but even to eradicate them entirely. The number of sick had reached thirteen on board one corvette and fourteen on board the other. One of the seamen on board the *Atrevida*, suffering from complications to this illness with a rupture of blood vessels caused

by the violent recoil of a musket onto his chest, which he had concealed from the surgeon until the last moment, was unfortunately beyond reach of our remedies and on the afternoon of the 28th he made the final sacrifice to Nature.

Don Francisco Flores knew from the start that the illness from which various men on board the *Descubierta* (and among others Alferez de Fragata Don Felipe Bauzá) were suffering were synochal fevers,[1] either simple or putrid, all marked by an excess of blood and a bilious humour, the former no doubt arising from the effects of the Sun and the latter from eating too much, particularly bananas and other unripe fruit. In some cases this was complicated by malignancy, but, when treated with quinine and, usually, with bleeding, antimonials and vegetable acids, these were soon completely eliminated, although followed by a considerable weakness during convalescence, which was difficult to treat at sea. Particular mention should be made here of the antimonial mixture to bring on vomiting and the expulsion of bilious matter, and the use of rosella[2] for the convalescents, both proposed by Doctor Masdevall[3] and now used with great success by Dr Francisco Flores. The Fahrenheit thermometer, which was now set up on deck in the shade, frequently reached 90°.

31 December

Although the calm continued throughout the next day, we did not lose ground according to the bearings taken on Isla del Caño and the westernmost part of the coast. As the set of the current was at this time to the south rather than to the east, we did, however, lose much of the estimated latitude that we had been able to gain by dint of constant work, and thus we found ourselves once again in latitude 7°28′.

The last day of the year finally saw an end to the greater part, at least, of the trials of a fortnight's calm, which doubtless would have deserved a description by the eloquent narrator of Lord Anson's voyage, who had most vividly depicted the difficulties of a successful passage to Acapulco with a delay of just five days in sight of Isla del Coco.

At nightfall light airs from ESE and ENE began to set in, with a fairly heavy sea from the same quarter, and as the currents were now in our favour rather than against us, steering WNW we could make use of the favourable short swell. In the morning, at last, Punta Burica bore N20°E and we were in sight of the new stretch of the coast that we had so long desired to see.

1 January 1791

This was, to the best of our knowledge (given that it seemed impossible to reconcile what we saw with [what was depicted on] the charts with any probability), the stretch of coast on Jefferys' chart that runs from Isla del Caño and Punta Mala[4] towards

[1] Unremitting fevers.

[2] The Red or Indian Sorell (*Hibiscus sabdariffa*), the seeds of which are used medicinally; also the Catalan name for a species of poppy (*Papaver rhoeas*), from which Masdevall, as a Catalan, may have derived a medicine.

[3] See Vol. I of this edition, p. 25, n. 1.

[4] Charted 20 miles NW of the western entrance to Golfo Dulce on 'Carta esférica desde el Golfo Dulce ... hasta S^{n} Blas ...', probably Punta Llorona, charted 28 miles WNW of the same point on British Admiralty chart 2145.

Puerto del Inglés.[1] The land was generally quite high and opened into a bay of considerable size, the extremities of which were barely visible, not so much because of the distance that it receded,[2] but because it was surrounded by low ground, with higher land behind that was hard to make out.

To these sights, most delightful in themselves, and to the very calm and sunny day was added a new and pleasing spectacle with the capture of a large number of excellent dorado. Lured by the flesh of some tuna caught beforehand and remaining gathered around the stern with a constancy uncommon in this species, they fell easily to one or another of the many hooks before them. Being so easily caught, there was a risk of their very weight breaking the hook, as frequently happened, or of them freeing themselves by their violent struggles before they could be landed on deck, so this struggle sometimes ended in escape, making the fishing more entertaining and interesting.

We continued to make progress during the afternoon and night, although very slowly. The wind was light from SW, giving us hope of soon approaching Golfo de Nicoya. However, at one in the morning, fairly close to the coast and suspecting that the current might turn against us, we altered course to the south with a light breeze from WSW accompanied by a few passing showers.

2 January

The following morning, although we did not have a land breeze, we were able to come about onto the port tack once again and continue our survey, when not prevented by the flat calm still prevailing. We were some five leagues offshore, but as there were considerable differences between what we now saw and its appearance the previous afternoon, we began to fear that the *Atrevida* had been right when she called over to us last night, that this coast appeared to be the part running from Punta Burica around Golfo Dulce towards Punta Mala and Isla del Caño.

From the low ground that we had always thought to be Isla del Caño, and the higher ground nearby that during the recent days of calms we had plotted as the westernmost point of the mainland, the coast begins to descend gradually, finishing in a low point which is the eastern extremity of Golfo Dulce.[3] The western entrance point[4] is also low, but the coast soon rises steeply and continues in this fashion for some four or five leagues to the WNW, before turning north and descending again to Punta Mala, which is about this distance from the former point. Far off, beyond the head of the gulf, we could see various irregular ranges, and the entire coast appeared to be uniformly bold and thickly forested.

At noon Punta Gorda[5] bore true north, some five leagues distant, and at the same time the two entrance points of Golfo Dulce bore N59°[E] and [N]57°E and Punta

[1] Charted 25 miles NNW of the western entrance to Golfo Dulce on 'Carta esférica desde el Golfo Dulce ... hasta S[n] Blas', probably Bahía Guajamal, charted 33 miles NNW of the same point on British Admiralty chart 2145.

[2] Golfo Dulce.

[3] Punta Banco.

[4] Punta Matapalo.

[5] Not charted on 'Carta esférica desde el Golfo Dulce ... hasta S[n] Blas', but probably Punta Salsipuedes, 18 miles WNW of Punta Matapalo.

Mala N30°W by compass. Our latitude was then 8°15′ and our longitude, by the chronometers, 4°16′ west of the Panamá observatory.

The breeze, which had been very light and contrary all morning, dropped still more in the afternoon. At half past two, as we were threatened with an imminent calm and the swell and current were setting us onto the coast, we thought it best to go about onto the starboard tack and steer to the south. We were indeed becalmed all night and at times hardly had steerage way, but we found in the morning that the current had carried us considerably to the south, so that at noon on the 3rd our latitude was 7°50′, while bearings taken to the same points as the previous day showed that we had also fallen off to the east.

From eleven o'clock, with the moderate SW breeze, we steered close hauled in the fourth quadrant. At half past ten [that night], now able to steer SW and SW5°W, we tacked offshore again. These small gains were, however, of no advantage to us, as once again they were cancelled out by the current and the lack of breeze. At noon on the 4th, in latitude 7°54′, we had hardly gained a compass point on the bearing of Punta Gorda, although from the masthead we could sight an island lying approximately NW which we believed to be Isla del Caño.

We could no longer ignore that our position since the 1st was little different from that which had kept us in sight of Isla Montuosa for so many days. In three days we had gained barely 16′ of longitude, our latitude had not changed, and the weather promised nothing but a flat calm, all the more to be feared in that the proximity of the new Moon confirmed rather than dispelled this suspicion. It would have been wrong, therefore, to waste precious time in persevering with our intention of keeping to the coast, when the passage of Lord Anson from Coiba to Acapulco, at about the same time of year, led us to believe that we would probably find more favourable winds in latitude 5°or 6°.

With these doubts we continued during the afternoon, close hauled on the starboard tack, with extremely light airs from WSW and SW, which veered to the west again at sunset. As the current continued to set to the south and the coast was somewhat hidden [by haze], the furthest extremities in sight were now limited to the arc between N5°W and N10°E. The island which still seemed to lie to the NW was now visible only from the masthead.

During this time the dorado and other species of fish remained with us. We continued the allowance of half a pint of wine and took the greatest care to keep the ship clean. To our great pleasure not only did our convalescents return rapidly to their original state of good health, but also no one else had fallen ill for some time, despite the constant labour and the temperature frequently reaching 90°, as measured by the Fahrenheit thermometer placed in the open air.

5 January

Although we had continued close hauled on the starboard tack, we found our position at noon the following day to be latitude 7°10′ and longitude 4°11′, due more to the current than the breeze. The weather remained very calm but squalls began to show on the horizon, particularly in the second and third quadrants, promising an imminent change in the weather which must surely be favourable.

6 January

There was no change in the weather conditions during the following day. A flat calm, or light airs from NW to WSW, reigned supreme and seemed to have established its dominance in these parts. At the same time the current cancelled out all the gains of our continuous labours; we lost the little ground we had made in longitude and increased our latitude, so that at noon that day we were in 6°46′, having gained nothing in longitude since the 4th. However, as the squally appearance of the horizon in all four quadrants continued and even increased, with a few flashes of lightning to the south and SE during the night, we had some relief from the excessive heat of so many days of unbroken sunshine, and the prospect of the long-awaited change in the weather seemed closer.

This expectation could in itself delay the execution of a new plan of operations adapted to these unfavourable circumstances, which I had been considering for some time, in order to prevent the present delay, already harmful enough, from affecting our programme for the whole of the year.

When the only indications of the much-desired change in the weather on the following night were a few heavy downpours and a freshening breeze from WNW with a fairly heavy sea and some indication that it might last, I did not hesitate for a moment at dawn the next day in sending orders to the commanding officer of the *Atrevida* regarding the new plan that I proposed. Before giving the details of this, it will be worth considering our original plan, and the present circumstances which made the alteration necessary.

At the time of our departure from Panamá the information in the sailing directions agreed unanimously with the pilots' reports on the prevailing winds after the end of November and assured us that the northerly winds were now fully established.[1] We set sail from Taboga on the morning of 15 December, and on this and the following day we were fortunate enough to complete the survey of the coast as far as Morro Puercos, which was as much as we had hoped to achieve. During the days of calm weather that followed until the 21st, we had two nights of the strong North-east Trade Wind, which, while generally confirming our first assumption, only led us to believe that it would not set in completely until the next new Moon, but it did continue favourably for our course, interrupted only by an occasional calm. In view of this it was not rash to hope that we might reach Realejo by the end of the year, surveying the coast and measuring bases as we had done so far, although without entering Golfos de Nicoya and Papagayo; then to complete our survey at the said port in a week, including a survey by land of Golfo de Fonseca or Amapala; finally, in the time remaining until mid-February, to continue along the coast as far as Acapulco either in company with the *Atrevida* or separately, as circumstances required, to rendezvous there or at San Blas[2] at a suitable season, according to the sovereign's orders, to sail to the north.

With the timber from Realejo and the workmen in San Blas, we could complete,

[1] The *papagayos*, north or NE winds which are frequent and persistent in January and February between Costa Rica and Guatemala.

[2] The principal Spanish 18th-century naval base in New Spain some 400 miles NW of Acapulco: see Michael E. Thurman, *The Naval Department of San Blas*, Glendale, Calif., 1967.

if necessary, the work of strengthening and reconstructing the *Atrevida*'s launch. The Acapulco galleon,[1] given the usual lack of manpower in San Blas, would provide the voluntary crew that we needed. Finally, before embarking upon new dangers, we would see the completion of an essential part of our mission, namely the hydrographic charts of our Pacific coasts. We could never have believed that, contrary to all the information we acquired, there would be a fairly strong and constant current setting to ESE.

One may imagine, therefore, my fears at the time of total failure of the plan described. From 18 December to 6 January, that is in twenty days' of sailing, we had made thirty leagues to the west and lost a little less than this to the south. During this period the currents had caused an error in our dead reckoning of ninety-seven leagues to the east and forty-five to the south, with an average set of sixteen and one-fifth miles to the ESE for each day's run, a distance which we were unable to make up in the flat calms or extremely light and variable breezes.

Although we had stood offshore from the 4th, following the route of Admiral Anson from Coiba to Acapulco, and now were more than forty leagues from the coast, our luck had not changed. The currents were now setting even more strongly against us and the westerlies had freshened with a heavy sea, which increased our leeway. In the last three days the only result of our manoeuvres was two degrees of latitude lost without having gained more than eight or ten minutes of longitude.

With these considerations in mind, and with the imminent change in the weather giving me no time to discuss them with the commanding officer of the *Atrevida*, whom I assumed in any case to share my opinion, I urged him, when sending him my orders for the rest of the passage, to use this corvette's pinnace and his own boats to transfer the baggage and family of the Regente de Guatemala [to the *Descubierta*], and that when we had compared our chronometers he should consider himself as independent of this corvette for the immediate future. The instructions principally directed the *Atrevida* to make for Acapulco with all possible dispatch, where her commanding officer was to inform himself, through the official letters of His Excellency the Ministro de Marina[2] or from any orders of the Viceroy of New Spain,[3] about the King's intentions regarding our northern cruise next summer.[4] If we were

[1] A reference to the *nao*, the galleon that regularly made the round trip between Acapulco and Manila, although by this time the trade was in decline. The Acapulco-Manila galleon route was established in 1565. The galleon left Acapulco in February-March to arrive in Manila in May. The more time consuming return voyage took advantage of the Kuro Shio and North Pacific Currents and, leaving in the summer, reached Acapulco in January.

[2] Antonio Valdés y Bazán.

[3] Juan Vicente de Güemes Pacheco de Padilla Horcasitas y Aguayo, Conde de Revillagigedo (1740-99) was born in Havana, but spent his early years in Mexico where his father was viceroy. In 1755 he moved to Spain where he joined the army. In 1766 he assumed the title of second Conde de Revillagigedo. In 1789 he was appointed viceroy of New Spain, an office he held until 1794, the most able person to do so. Officially Mexico was the area of jurisdiction of what is now central and northern Mexico, but the term was also used loosely to cover anything north of Istmo de Panamá. Virrey de Nueva España included everything north of the isthmus, while the phrase Virrey de Mexico was also used loosely to apply to the same area. But Malaspina also used the term 'Mexico' to apply to the capital of New Spain. In this case and elsewhere it has been rendered as Mexico City.

[4] A reference to Malaspina's request for instructions as to whether he should sail to Alaska to search for the strait of Ferrer Maldonado: see his letter of 15 September 1790 printed in Vol. 1 of this edition, pp. 319-23.

to carry it out, he was to leave the supplies of victuals or equipment considered useful or necessary in Acapulco for me, so that I could collect them on my way. He was then to set sail immediately for Puerto de San Blas, where, with the assistance of Capitán de Navío Juan de la Bodega y Quadra,[1] he was to begin the construction of a new launch fitted out for long independent passages. Meanwhile, if he found the Manila galleon in Acapulco, he was to recruit some twenty carefully chosen seamen, while avoiding any kind of trade. He was also to inform the Ministro de Marina of the unexpected reasons which had disrupted our original plan and prompted the present separation. If we had not rejoined him by the end of March or there was no word from us, he was to sail for whatever destination seemed wisest and best with regard to the King's orders, his present circumstances and, above all, the opinion of Capitán de Navío Bodega y Quadra. I suggested that he choose Anson's route, while paying attention to the effect of the currents, which would doubtless carry him towards Los Galapagos. I recommended that he should pass within sight of Isla del Coco, but without letting it delay his passage. Finally I was officially transmitting to His Excellency the Viceroy of New Spain[2] a summary of these measures and, above all, my insistent request that all the orders directed to me should be passed on to the commanding officer of the *Atrevida* and that I should receive in Acapulco the ten thousand *pesos* that I had requested in advance, with any other orders that His Excellency might have seen fit to convey to me.[3]

[7 January]

It was half past seven in the morning when the baggage and servants had been brought over, the chronometers compared and the pinnaces of both corvettes hoisted. The *Atrevida* took her departure, setting a course to the SW under full sail. We put about onto the port tack with the intention of closing the coast again to make, if possible, a landfall near Cabo Blanco, at the western entrance to Golfo de

[1] Juan Francisco de la Bodega y Quadra was born in Lima in 1744. He enrolled as a *guardiamarina* in Cádiz in 1762. In 1775 he commanded the *Sonora* during the Second Bucareli Expedition, under the overall command of Bruno de Hezeta (see p. 58, n.3 below) in the *Santiago*, to assert Spanish rights north of Alta California. When the two ships became separated, Bodega y Quadra continued to the north as far as Bucareli Sound in present day Alaska before returning to Monterey. In 1779 he commanded the *Favorita* during Ignacio de Arteaga's expedition to Alaska in a vain attempt to intercept Cook; Arteaga turning back in the vicinity of Kodiak Island. Bodega y Quadra served in the Naval Department in Cádiz in 1785–8 and on being promoted to *capitan de navío* in 1789 he returned to New Spain as Comandante del Departamento de San Blas. In April 1792 he arrived in Nootka Sound as the Spanish Commissioner to carry out the terms of the Nootka Convention, but finding it impossible to reach agreement with Captain George Vancouver, the British representative, returned to Monterey later that year. He died in Mexico City on 26 March 1794.

[2] Presumably to Revillagigedo via the *Atrevida*.

[3] In his journal entry of 10 January 1791 Bustamante confirms the receipt of these instructions, adding that one of the objectives was to test the accuracy of Anson's latitude of 5°20′N for Isla del Coco, which differed from those of other surveys of 5°43′ or 5°45′N, but which commanded respect as Anson had spent five days in the vicinity of the island. Between 12 and 14 January Bustamante obtained observations from which he concluded that the island should be assigned a latitude of 5°33′10″N and longitude 80°47′31″ west of Cádiz: María Dolores Higueras Rodríguez, ed., *La Expedición Malaspina 1789–1794*. Tomo IX: *Diario general del viaje corbeta Atrevida por José Bustamante y Guerra*, Madrid, 1999, pp. 188–92. Isla del Coco is in fact in latitude 5°32′N.

Nicoya. In so doing we [i.e. Malaspina and Bustamante] would be able to divide our fortunes in finding favourable winds as quickly as possible and give us more freedom and independence in our navigation.

Before noon we had lost sight of each other, although the wind was little more than a gentle breeze. We then altered course to NNW, with the weather still looking squally, and with the breeze and choppy sea from WNW to west. We were no longer surprised to find, when making our observations, that the current had caused us to lose much ground. Our latitude was 6°29′ and our longitude 4°26′ west of Panamá. With either no wind at all or a contrary one we did not have the least idea of the probable length of the passage or which measures to take for the best use of the weather, as was our desire.

The next night we believed that the weather had finally turned in our favour, when, having had a light NW breeze until midnight, with some rain, pitch darkness and lightning, there was a sudden easterly shift with a violent downpour which was certainly heavier than any we had seen so far on this passage. However, the wind soon backed to NW and WNW, very light with continuous rain, so that we found ourselves once more in the same situation and uncertainty as on the previous days.

8 January

Nonetheless, at noon on the 8th we believed that we had made some progress as the variable and sometimes fresh breezes during this day's run had allowed us, by tacking first in one direction and then another, to make good a more direct and faster course. Our surprise may be imagined when our observations showed that we had not made even a minute to the north or west, although our dead reckoning, carefully calculated, indicated that we had made twenty-two miles to the north and eighteen to the west.

Fortunately there had been no lack of fish during this period, with abundant daily catches of dorado and bonito, to which we could now add another entertainment in the form of the catch of small fish, which followed at the stern in vast numbers and were very easily hooked. According to Pineda and Haenke these were of the Gasterosteos species or pilot fish;[1] they were good eating and so numerous that from the ports of the gunroom we caught seventy or eighty within an hour.

As well as this species, interesting enough in itself, Don Antonio Pineda had many others on which to exercise his scientific curiosity in the variety found in a careful examination of the stomachs of the larger fish. Several balistes[2] were found, among them one of a copper colour, a new species of swordfish, some marlin and with the fizgig we were able to take a turtle of excellent flavour and some three *arrobas* in weight, no doubt the same species that was so useful to Admiral Anson. All these provided the natural historians with new subjects for consideration.

9 and 10 January

During the next two days the weather looked more promising, although the constant

[1] A striking fish with broad vertical bands of deep blue – the *Gasterosteus ductor* of Linnaeus, now *Naucrates ductor*.

[2] See page 8, n. 3 above.

rain and heavy cloud cover continued, making it impossible for us to take observations to calculate how long we might remain at the mercy of the currents. With the exception of a few hours of light breezes from north and NNE, the wind was fairly fresh from SW to south, enabling us to steer NWbyW by compass, under full sail, with the intention of sighting Cabo Blanco and putting ourselves in a better position to use the trade winds rather than the *vendavales*.[1] Indeed, we could no longer doubt that this year the trade winds were setting in a couple of months later than usual. However, as the season was now well advanced and the weather conditions and the frequent wind shifts to the north seemed to indicate that they [the trade winds] were now approaching, it seemed wiser to plan our course so as to encounter them, particularly as in this way we could continue with our essential hydrographic work.

The following night the south and SW breeze died down once more, being followed by several hours of calms and light airs, with the horizon so beautifully clear that at last we were able to take observations for latitude and longitude. [11th] At noon our latitude was 7°57′ and our longitude 5°15′, with Cabo Blanco therefore bearing N38°W and our position thirty-five leagues from Isla del Caño according to Jefferys's chart. We calculated that the currents had carried us some twenty leagues ESE since noon on the 8th.

With fairly clear skies in the afternoon we were able to observe thirty sets of lunar distances to the Sun. These were highly consistent and their mean was only 5′48″ east of number 72, the chronometer which we considered at the time as our standard one, the accuracy of its rate being used for the daily comparisons.

12 January

With little breeze, and under threat of new calms, we continued the next day steering towards Cabo Blanco, but as our latitude at noon was only 8°27′ and our longitude 5°30′, the coast was not in sight, despite the clarity of the horizon. During the afternoon, when we repeated the observations of the distance from the Moon to the Sun, the results, however, were almost the same as those of the previous day.

We now found, to our great pleasure, that the currents had entirely ceased, and accordingly we could flatter ourselves with the hope of an earlier arrival at Realejo, particularly as all the signs promised that we would soon have fresh land breezes from NE and north.

13 January

Indeed we finally sighted land at dawn the next day, when our position was even better than we had hoped. We were off Golfo de Nicoya, and we could clearly see at a great distance the entire coast from north to NE and from Punta Herradura[2] to Farallones de Quipo. We also had in sight what appeared to be an island bearing NWbyN, a sure sign that it was Cabo Blanco.[3]

Our progress was rather slow all day, with no more than light airs from SSW.

[1] I.e. the North-east Trade Wind rather than *vendavales*, which are from the SW.

[2] The eastern entrance point of Golfo de Nicoya.

[3] Isla Cabo Blanco, a high rocky island which has the appearance of a white sail at a distance, lies off Cabo Blanco.

Nevertheless, at sunset we could see, seven or eight leagues distant, the coast running westward from Cabo Blanco, looking like a string of islands or an irregular coastline.[1]

This chance confirmation of the positions determined by His Excellency Ulloa,[2] contrary to all the indications of Jefferys's English chart regarding the entrance points of Golfo de Nicoya, gave us unexpected confidence in our own chart. From Punta Herradura to Isla del Caño the coast, according to all the sailing directions, was fairly straight. So that once we had established the positions of both entrance points by bearings we had no fear of mistakes of any importance, unless we had made an error in the position given in the sailing directions for Farallones de Quipo, which we had not sighted, which in any case would be only a small one.

After nightfall the wind dropped to almost a flat calm, then gradually backed to west and WNW; from midnight we sailed close hauled on the starboard tack, with the weather continuing extremely clear and pleasant. At first light our situation improved even further when we had a pleasing view of the coast. At the same time the breeze set in fair and fresh, which the season and the appearance of the weather led us to believe was now settled in from NE and would remain so.

14 January

However contradictory were the various sailing directions and charts we had regarding both the latitudes, the trend of this coast and its distinguishing features, there seemed little doubt that the stretch of coast now in sight was that which runs from Cabo Blanco to Punta Guiones[3] and then to Morro Hermoso,[4] although we could not see, perhaps because of the distance, a few islets which might have allowed us a more reliable identification. We took two sets of hour angles and these, with the bearings and the sight of land the previous afternoon, confirmed the existence of a contrary current which, without having the least effect on our latitude, had set us back by some eighteen leagues in longitude on this and the previous day's run. At noon our longitude was 6°10′ and our latitude 9°3′. Variation remained 8½° to 9°NW. Later, when we had closed the coast again, we found ourselves among a shoal of excellent fish as large as those seen from both corvettes between Punta Burica and Isla Montuosa. While fleeing from the larger fish, an almost infinite number of jack mackerel came close to the ship, while the bonito and dorado supplied a new and more interesting sport, either for the hook or the fizgig.

The crew was served two meals of fresh fish every day. There was much left over to be salted, while we still had some agreeable variety supplied by a few turtles. These were of a new species, not noted by Admiral Anson, which Don Antonio Pineda found a subject for anatomical research.

The almost uninterrupted calm during the afternoon and following night made us fear that the bearings we would take at dawn on the 15th, would show a considerable loss of ground, given the many tide rips that we could see, in combination with

[1] The coast actually turns sharply NNW and then NW at Cabo Blanco.
[2] For Antonio de Ulloa see Vol. 1 of this edition, p. xciv, n. 1.
[3] Situated 38 miles NW of Cabo Blanco.
[4] Standing above Cabo Velas, 63 miles NW of Cabo Blanco.

the current setting to the east and south that had held us back in recent days. Fortunately, however, we found that our fears had been needless when we sighted Morro Hermoso bearing N11°E and the coast beyond it running towards Punta Santa Catalina.[1] At noon our position was further confirmed by our latitude and the sight of a current setting quite strongly to the north, which had already put us 17′ ahead of our dead reckoning.

With the very little time we had left, it would have been unwise to attempt a more detailed survey of the coast, which, being fairly high and having well marked points, already gave us the means of obtaining reliable latitudes and longitudes, particularly as the old sailing directions offered a clear and specific description of this stretch of the coast.

With this in mind we set a course as closely as possible for our destination, making use of the light and variable breezes in the afternoon, which, after midnight, then settled in to NNW, north and NNE with some consistency, allowing us to steer a much better course, so that at dawn on the 16th, with the help of a clear horizon, we could see plainly the land near Punta Santa Catalina and even thought we could sight the islets, bearing NEbyN, which serve to identify that point. At noon our longitude was 7°24′ and our latitude 10°20′N, once again very different from our dead reckoning position.

This position, the fact that the coast was lost from sight beyond the point which we believed to be Punta Santa Catalina, the landmarks mentioned in the sailing directions, all combined to persuade us that we were off Golfo de Papagayo, from where the communication with [Lago de] Nicaragua, and from there by Río San Juan to the Atlantic Ocean, has always been considered a point of major importance as much for the general geography of the globe as for Spanish interests. However, the charts of Jefferys and His Excellency Ulloa and the sailing directions for this coast differed among themselves as to the trend of the following stretch of coast as far as Realejo.

By happy chance we sighted land at sunset, bearing NbyW, which we immediately assumed to be Volcán de Santa Juana[2] at the northern end of the gulf, particularly as it stood out in the far distance, somewhat in the shape of a table – a landmark shown in the sailing directions for this coast. Not imagining that we would see it during the afternoon, since at four o'clock the land near Punta Santa Catalina was still in sight, we had neglected to take observations for longitude in the latter part of the day, which would have avoided any danger of an error in longitude since noon. Consequently, at about a quarter past seven in the evening, we ventured to obtain longitude by absolute altitudes of Sirius, in which we were promised more than average accuracy not only by the size and brilliance of the star and its rapid movement, but also by the wonderful clarity of the horizon, much assisted by the extraordinary radiance of the Moon. The results were most satisfactory, and to these we added, for greater accuracy, the meridian altitudes of Aldebaran and α Persei[3] in the early hours of the night

[1] Situated 110 miles NW of Cabo Blanco.
[2] Possibly Volcán Concepción on Isla de Ometepe in Lago de Nicaragua.
[3] Mirfak.

and those of β Centauri[1] in the half-light of dawn the next day, as we feared considerable errors in latitude.

During the night we had noticed the effects, admittedly very slight, of the proximity of Golfo de Papagayo on our navigation, with gusts of wind from north and NE, about which our sailing directions gave us dire warnings, although Dampier describes them as only of medium strength.[2] We continued for some time with an eye to the topgallants as it seemed that the gusts, now from NE, might indeed strengthen, but later we made use of them under full sail on a NNW tack, so that although the wind fell almost completely at dawn we had made good progress in latitude. [17th] A hill that we thought we had seen on the previous afternoon bore NEbyN and two prominent hills lay to the north and NNW, but because of the distance and, to a greater extent, the haze, these bearings had to be taken from the masthead as it was not possible to do so from on deck until noon, when our latitude was 11°30′ and our longitude 8°20′ west of Panamá.

We obtained no bottom with eighty-five fathoms of line. The wind, which had been very light all morning, now began to set in as a weak sea breeze, while the fish which had accompanied us in almost infinite numbers, particularly during the previous night, now appeared to have left us.

As the sea breeze remained light all afternoon, by sunset we had learnt nothing more of the sierras, still shrouded in haze, in sight from N5°W to NEbyN, although we no longer doubted that the coast continued its northerly trend after Punta Santa Catalina, despite indications to the contrary in the charts and sailing directions. The light breezes remained constant from NNW during the afternoon and night and therefore had to be used to make an easterly rather than a northerly course to close the coast, the survey of which, without fear of errors, was now very important to us. At three in the morning we could see all the coast clearly in the moonlight and as a fresh NE breeze had come up by then we altered course under full sail, close hauled on the starboard tack, so as to be as close inshore as possible by dawn.

At dawn the sight of the coast was very grand and impressive. From Volcán León to that of Telica and Viejo,[3] various mountains raise their sharp peaks, some higher, some lower. To the NW, after an area of fairly flat terrain, there follow the Sierras de Cosivina, the Mesa de Roldan and Montes de Peltacarpe, near [Volcán] Conchagua.[4] To give greater variety to the scene there was smoke, which we thought to be from the volcanoes, although we later found that it came from burning stubble. The pleasant day, indicating the arrival of the sea breeze, promised that soon our troubles would be over and we would reach our long-desired destination.

[1] Hadar.

[2] '... between Cape Blanco ... and Realeja ... there are Winds which blow only in the Months of May, June, and July, call'd by the Spaniards Popogalos. They blow Night and Day without intermission, sometimes 3 or 4 Days or a Week together. They are very brisk Winds, but not violent.': Masefield, *Dampier's Voyages*, II, p. 268.

[3] Volcán Viejo, the highest mountain in Nicaragua, now Volcán San Cristóbal, is situated 15 miles NW, Volcán Telica, 22 miles east and Volcán León, now Volcán Momotombo, 35 miles ESE, respectively of Realejo.

[4] A double-peaked summit, 7 miles north of Punta de Amapala, the western entrance point of Golfo de Fonseca.

In truth, we had been under several misapprehensions earlier in the day regarding the true nature of this coast, largely arising from the highly confused information received so far and also from the considerable increase in latitude caused by the currents. Our doubts were soon dispelled, however, with the realization that it was Volcán Viejo which reached the greatest height and particularly when our noon latitude of 12°19′ agreed exactly with the observations made by Piloto Mestre[1] in these waters, which he had communicated to us in Lima with much other information concerning the anchorage as accurate as it was important to us.

The first puffs of the sea breeze did not come up until two in the afternoon, when we made use of them immediately, steering NE5°N under full sail, a course on which the Volcán Viejo was the only sure landmark for identifying the river or the entrance to the port. At five in the afternoon, although we were only a bare two leagues off the low shore at the foot of the volcano, we could not yet make out the smallest opening to indicate an entrance, even from the masthead, but finally at sunset we saw the false or blind entrance[2] and at seven o'clock, with the help of the Moon and a few light airs which had continued after sunset, we sighted the real entrance,[3] masked by the length of Isla del Cardón,[4] while the summit of Volcán Viejo bore NEbyN by compass.

After sunset, both because the wind had dropped almost entirely and because the reports I had of the anchorage were somewhat confused, I decided to anchor and wait for dawn. As the great clarity of the night invited an accurate examination of the river mouth and entrance, all the better in that it would not expose the crew to the dreadful Sun, Piloto Sánchez was ordered to make the examination in the pinnace. Finally, a little before eight, we anchored in fourteen fathoms, ooze, less than two miles from the entrance, the current having already set us considerably to the south. This current, which remained constant at one to one-and-a-half knots throughout the night, appears to set to the SSE by the island and towards the false entrance, independently of the tide which began to flood later, running ENE and east a short distance off the NW end of Isla del Cardón. The swell was still heavy from the west and broke with a roar on the coast, and so we paid out some cable to counteract it.

19 January

At daybreak we saw the pinnace returning. Piloto Sánchez reported to us that they had entered the false mouth, wandered about the blind channels to the east for a time and, having finally come upon the real channel, they made their way up it with the help of the tide. They saw a large vessel[5] which they approached, finding on board a local pilot who was willing to come to the corvette at first light (as their lookouts had sighted us the previous afternoon), so he took him on board and brought him back immediately in the pinnace, consequently omitting to sound the real river mouth by which we were to enter.

[1] Don Esteban Ventura Mestre, master of the merchant vessel *Galga:* see Vol. I of this edition, p. 228.

[2] Between Isla del Cardón and Peninsuls Castañones.

[3] Between Isla del Cardón and Isla de Aserradores, a narrow island which extends some distance along the coast north of the entrance.

[4] Fronting the entrance channel to Realejo.

[5] The *Belén:* see p. 23 below.

When the sea breeze began to blow lightly and favourably and the ebbing tide reached slack water, which was to last until half past nine, Cardero, the draughtsman,[1] occupied himself with a maritime view of the coastline and, having ascertained the names of the various points in sight with the help of the local pilot, we took detailed bearings of them, so that this port should serve, with two or three reliable bearings and the determination of longitude by means of the chronometers, as a new centre for our work if lack of time or some other obstacle should prevent us from repeating the bearings taken to high points in the distance. Meanwhile, Teniente de Navío Valdés, Señores Pineda and Haenke made their way to Realejo in the pinnace, the former for various naval purposes and the others to make up, to some degree, for the length of the last passage with new scientific excursions. The numbers of volcanoes in sight, a country not yet frequented by scientists, even our lack of time, were further incentives which increasingly stimulated their keen love of natural history.

We thought that the sea breeze would not set in until the early hours of the afternoon, as we had noticed the day before, but we had better luck on this occasion as the breeze started with the flood tide and, having lowered the boats beforehand, we set sail at ten o'clock for the mouth of the port. We sounded fourteen, ten and eight fathoms, ooze, giving a good berth to a reef which runs out for half a cable to the north from the end of Isla del Cardón, and then luffed up to the east to approach to within less than half a cable of the inshore side of the island so as to avoid the shoals which extend from the mainland and narrow the channel to little more than a cable's width. Here the depth increases suddenly from four to ten fathoms, sand and ooze, a depth which continued until the yardarms could almost touch the [nearby] point. When we had passed this point, the wind and current now becoming more favourable, we continued in mid-channel, leaving various dangers at a safe distance and generally in depths of eight, seven, six and five fathoms, until eleven o'clock when we reached the Xagués anchorage and, at high water, dropped an anchor in five fathoms astern of the merchant vessel *Belén* of Lima, the only other ship in port, with the summit of the volcano bearing N25°E and Punta Icacos[2] S10°W by compass. As this, evidently, was a very safe port, our moorings were, naturally, laid according to the set of the tide and consisted, for the sake of economy, of half of a very worn cable to the south and a fairly heavy hawser to the north.

[1] By this time José Cardero, who had joined the expedition as a cabin boy, had become a valued addition to the scientific corps as an artist: see Carmen Sotos Serrano, *Los pintores de la expedición de Alejandro Malaspina*, 2 vols, Madrid, 1982, I, pp. 40–46.

[2] An unidentified point inside the harbour.

Plate 2. View of Realejo and Volcán del Viejo, by José Cardero. Museo de América, Madrid

CHAPTER 6

At Realejo[1]

[19 January]

As it was my intention not to stay in this port beyond the last days of the month and as there was a great deal of work to be done in such a short period, we would have been very remiss to lose any time unless unavoidable. At first sight the land around the anchorage, being both thick with mangroves and most of it flooded, did not offer a convenient spot for setting up the observatory. Upon careful examination in the yawl, however, Don Dionisio Galiano and I found on the shore to the east, close enough to be within range of a speaking-trumpet, a small area of open ground which seemed to be above the level of the tide, where it would be easy to remove the surrounding trees which obscured the greater part of the horizon. By nightfall, therefore, the tent, the astronomical clock and quadrant had been mounted so as to be able to take equal altitudes the following day to rate the chronometers, while being ready for the many important observations to be made during succeeding days.[2]

Teniente de Navío Valdés returned before nightfall, having learnt about the possibility of gathering some timber and the distances to surrounding areas, so that our intended tasks could be adapted to fit the time fixed for our stay. Consequently I was very pleased to find that there would be enough time to achieve most of our purposes [20th] and accordingly Valdés set off without delay for León[3] to find out about the administration of the province, particularly in the field of construction, with regard to labour, costs and supplies. The chief carpenter saw to the collection of timber, particularly of pieces which were to be sawn. I undertook the geodetic work, while Galiano and Vernacci continued with an uninterrupted series of observations. The few remaining officers took charge of duties on board and the examination of the inner channels.

The fishing, led by Don Fernando Quintano, resulted in a good catch on the first afternoon, both in quantity and in the variety of species for new scientific research in natural history. A detachment of marines and marine gunners under the orders of the Sergeant of Marines was sent to cut firewood near the observatory. A well close to

[1] Founded in 1534 by Pedro de Alvarado at the mouth of Río Realejo; its original name has fallen into disuse; it is the present day Corinto.

[2] These included lunar distances, magnetic variation and inclination and tidal observations: for details see José Espinosa y Tello, *Memorias sobre las observaciones astronómicas, hechas por los navegantes españoles en distintos lugares del globo*, 2 vols, Madrid, 1809, 2nd memoir, pp. 103, 116, 123.

[3] Founded in 1523 by Francisco Hernández; at the time of Malaspina's visit it was the capital of the province of Nicaragua in the Kingdom of Guatemala.

Xagués[1] was cleaned out and the empty barrels were sent at once to be filled. While attending to these secondary tasks, we took heed of the lesson we had learnt at Panamá and worked only the hours from dawn to ten o'clock in the morning, renouncing work for the rest of the day until the late afternoon, because of the excessive risk of tertian fevers, from which a few seamen were already suffering.

21 January

The next morning, accompanied by Teniente de Navío Novales and Piloto Sánchez, I myself began our intended tasks, taking the pinnace and the *bombo*, with two men who had local knowledge of these estuaries. At Los Aserradores[2] chronometer 71 was to check the longitude as determined by the geodetic work, while a meridian altitude of the Sun was to do the same for latitude. A marine skilled in hunting and a great deal of fishing gear were to be usefully employed, whenever the occasion arose, in providing either for our sustenance or for the purposes of natural history. With these preparations it was my intention to reach Los Aserradores by way of the inner channels,[3] where I would measure a base and observe latitudes and longitudes. Afterwards I would return by the outer route taking soundings as far as [Isla del] Cardón, then examine the entrance channel, carefully sounding and taking bearings with two theodolites, and finally link all the above points to the observatory with good bearings by means of signal flags placed at appropriate places between the anchorage and [Isla del] Cardón.

The inner channel, which follows a fairly winding course, runs from Punta Icacos near the anchorage to the southern end of Los Aserradores, passing between an island of little width,[4] particularly at various points, and the adjacent coast to which it is joined by a sandy spit which is difficult to distinguish from a distance, contrary to appearances and what, up to now, was shown on charts. The channel, particularly in the vicinity of Los Aserradores, then joins many others leading to the cedar forests, enabling rafts carrying timber for construction or other purposes, with the aid of marks, to reach the port promptly and in safety. The tides enter at Los Aserradores and Xagués simultaneously, meet about halfway between them at a spot known as *las dos aguas*[5] and from there, united again, they flood rapidly towards Estero de [blank].[6] A very dense and almost impenetrable growth of mangroves lines all the inner channels. The icacos,[7] (a bush bearing a fruit of excellent taste and quality) produces the greenery along the seashore, which ends in a strip of sand very easily crossed at half tide. The jaguars may justly be considered the only inhabitants of this flood-prone terrain.

About three leagues distant a cordillera of volcanoes, running from WNW to ESE, rises majestically, among which Viejo[8] towers over the rest. The extremely clear skies

[1] The anchorage at the head of the harbour; see p. 23 above.

[2] An area depicted at the northern end of Isla de Aserradores [the island of sawmills] on Malaspina's MS survey: AMN; Sig. Borradores. Carp. IX. C-13 (48).

[3] The narrow channel between Isla de Aserradores and the coast.

[4] Isla de Aserradores.

[5] Literally 'the two waters'.

[6] Unidentified.

[7] Common local name for *Chrysobalanus icacos*.

[8] Volcán San Cristóbal: see p. 21, n. 3 above.

of the dry season of the North-east Trade Wind give added splendour to the prospect, already most pleasing in any case.

With the ebb and flood of the tide and the many bends we did not reach Los Aserradores until sunset. The pinnaces[1] were beached and a hut was set up on shore. While attempting to catch some of the turtles which came onto the beach we found, at about ten o'clock at night, that a most redoubtable band of rival hunters had preceded us by an hour. They were a large number of jaguars, one of which, although we shouted at it, would not abandon its prey and skillfully fled into the trees with the turtle. We could still see them on the beach at dawn the next day, within gunshot range of our hut, but our huntsman was out in pursuit of deer at the time and very soon they went back into the trees again.

As soon as dawn had broken Don Manuel Novales and I occupied ourselves measuring a base nearly a mile long on the beach, its western end being very close to Los Aserradores. We then observed for latitude and longitude, and when the Sun had passed the meridian all the implements and instruments were embarked and the same inner channel was chosen for our return, rather than the outer route, shortening the passage considerably without delaying our work and enabling us to sleep on board the corvette, which we reached at seven in the evening.

After an expedition of two days, which was both tiring and instructive, Pineda and Haenke had already returned from the summit of Volcán Viejo. The examination of a double crater at the summit, some deposits of sulphur, various other branches of lithology and, particularly, a magnificent view from the summit itself, had made up for the discomforts of excessive heat and exhaustion and the danger to Don Tadeo [Haenke], who narrowly escaped being bitten by a rattlesnake.

With the same efficiency and success the astronomers had observed the immersion of the second and third satellites of Jupiter on the nights of the 20th and 21st and had determined the latitude of the observatory. Meanwhile Don Juan Vernacci took the opportunity to measure the height of Volcán Viejo from the beach by the observatory. Those in charge of collecting water and firewood had also carried out their duties and had replenished at least half of both commodities, the good conduct and energy of the marines and seamen aiding our work considerably.

23 January

To complete our geodetic tasks we still had, on the one hand, to link the area around Isla del Cardón to the anchorage and the observatory and on the other to the bearings taken at Los Aserradores. We also thought it necessary to tie in the soundings at the entrance with bearings taken by theodolites. With these aims I went to the entrance to the port myself on Sunday the 23rd, with Don Manuel Novales. At the same time I sent a pinnace to sound the entrance on our bearings and another to examine the depths over the bar and then to go round to seaward of Isla Icacos. Bearings were taken on this island and on two places on Isla del Cardón. Finally, at the end of the day, we made use of the short time remaining to set out the nets, with which

[1] The pinnace and the *bombo*.

Plate 3. Women of Realejo, by Felipe Bauzá. Museo de América, Madrid

we made a fairly good catch, with a variety of species which were very useful and pleasing to Don Antonio Pineda.

This tireless naturalist and the surgeon, Don Francisco Flores, had accompanied me since early in the morning towards Isla del Cardón, where, taking advantage of low tide, they had made a large collection of shells. Among these the murex, the dye-yielding shellfish, so serviceable, beautiful, abundant and beneficial on these shores, deserved particular attention.

Despite the fact that we now had enough information to calculate the longitude of the observatory with the chronometers, we were obliged to defer this task as the first set of observations to obtain their rates indicated an unusual gain in all three chronometers. As a result we were able to obtain only a very approximate result while anxiously waiting observations of the first satellite of Jupiter. An immersion observed at dawn on the 25th by Galiano and Vernacci, in very good conditions, apart from the Sun being rather too close to the horizon, was confirmation enough of this gain, but we thought it wiser to wait for an observation of the same type, expected for midnight on the 27th, which would be all the more advantageous in that it could be compared with those of the European observatories.

27 January

It was indeed most successfully observed, and the following day at dawn, the astronomers and I also observed eighteen sets of lunar distances. The rates of the chronometers were adopted according to the results of the satellite observations, so as not to make too abrupt a change, and to agree with number 10 from the *Atrevida* until we could make comparisons with her results. Finally, the longitude of the observatory, or the anchorage, was determined as follows:

	Number 72	Number 61	Number 71
Difference west of Panamá	30 11 28	31 35 36	29 51 12
Equation to conform to number 10	+ 20 56	−1 6 00	+ 38 44
Distance expressed in time	30 37 24	30 29 36	30 29 56
Idem in degrees	7 39 21	7 37 24	7 37 29

Lunar Distances

	Day	Number of sets	Difference from chronometers	Resulting longitude
Under sail				
Referred to the chronometers	11	30	E 10′ 38″	7 48 27
	12	36	7′ 34″	
At the observatory	27	18	W 20′ 30″	7 19 21
Result		84		7° 33′ 54″

Leaving aside the still dubious observations of the second, third and fourth satellite, we could therefore bring together for this calculation the following information:

Chronometer 72, or the good set of longitudes (west of Panamá)	7° 39′ 21″
The first satellite at dawn on the 25th (somewhat dubious)	7 40 15
That of the night of the 27th (very reliable)	7 39 45

At this time we made two short excursions to measure another two bases to link still further the various intermediate points between Isla del Cardón and the observatory and, when the wooding and watering had been completed, we were able to grant a full day of rest and recreation for the greater part of the crew. Meanwhile, in order to combine work and pleasure as far as possible, Don Dionisio Galiano, Don Juan Vernacci and I, succeeded in determining the positions of Realejo, Chinandega[1] and El Viejo[2] by means of bearings taken during an excursion on horseback, made with the aim of inspecting these parts while taking leave of the Regente de Guatemala and Coronel Hodgson who, having set up camp at El Viejo on arrival, were preparing to make their way very soon to Guatemala [City] overland – I was unable to offer them a passage to Sonsonate[3] as I could not risk any delay to our arrival in Acapulco and San Blas.

29 January

By the 29th Pineda and Haenke had also rejoined us on board, bringing a vast amount of useful information and many specimens for the three branches of natural history. The intended collection of timber had been made. Teniente de Navío Valdés had also returned from León having, in the short space of seven days, informed himself of a great many matters relative to our mission and having also made an excursion to Volcán Telica, where he collected specimens and information of the greatest importance for our natural history collection. These were all the more to his credit for the considerable dangers and labour involved in obtaining them. From this volcano he had plotted accurately various points and from the city of León he had taken bearings to its summit and to that of Viejo, so that we could consider the geographical position of that city to be fairly precisely determined, as it resulted directly from our work in the port.

Volcán Telica can be considered far more active at present than Viejo. It is not as high, but its caldera is no smaller, neither being less than about a thousand *varas* in diameter. Don Cayetano Valdés remarked that there could be no more beautiful a sight than the inner coating or layer of the walls of the caldera, which were entirely of the very brilliant yellow of the sulphur which covers them. There was smoke almost everywhere, not only inside, but outside the volcano as well. The ground yielded underfoot as one approached the summit. A stone cast into the opening sent back after a long interval a distant murmur, proof of the depth to which it fell. The conversations of those at the peak could be heard at a considerable distance by those on the lower slopes. The vegetation was extremely sparse; in short, everything indicated a cavity of great depth, from which a thick moist vapour issued and in which the liquidation of a great deal of matter, particularly various small piles of stones which could be seen scattered about in the interior as if with deliberate uniformity, seemed a work of ceaseless occupation for the provident hand of Nature. It was not long since the last time this volcano caused destruction. In the year 1765 a hail of ash and sand covered the lower stretches of land as far as the town of El Viejo, some ten leagues away. The shaking, or tremors, lasted from fifteen to twenty days. At times it was accompanied by roaring from the mountain itself. Even in these convulsions the grandeur of nature

[1] A town about midway between Realejo and Volcán San Cristóbal.
[2] A town about 3 miles NW of Chinandega.
[3] A town 8 miles inland, 160 miles WNW of Realejo.

was displayed at the same time, and more powerfully, in Volcán de Rincón de la Vieja[1] near Golfo de Papagayo. The eruptions of Momotombo[2] had, by 1610, already forced the residents of León to move away and they had again become dangerous by 1636. The eruptions of Nindirí[3] on 16 March 1772 were even more fearsome, the molten lava that issued from it fortunately separated at the same time into four streams, one of which ran towards Laguna de Masaya,[4] another, two *cuadras*[5] wide and about six *varas* high towards the Nindirí highroad, a third to Sierra de Managua and the fourth towards the south coast. This range of maritime volcanoes appears to run approximately WNW to ESE. A strip of low land extends seaward from its foothills, watered partly by the rivers and partly by the tides. Words hardly suffice to describe its great fertility and the excellent timber which grows all along the shore encourages construction, particularly as it is quickly and cheaply transported and worked.

In a land where the admirable works of Nature are displayed with the greatest vitality and variety, the survey and detailed description of whose shores should be considered as of the highest importance for navigation and national prosperity, particularly as the inlets are of such vast extension and Golfos de Amapala and Papagayo of such interest, the former for its shipyards and the latter because of its vicinity to [Lago de] Nicaragua and the excellence of its marine products, one may imagine how much we felt the delay caused by the recent calms and the need to reach Acapulco as soon as possible. However, we could now no longer afford the loss of even a single day, since such an investigation would take several months.

Thus, having rated the chronometers by equal altitudes on the 29th and, having brought on board that afternoon the astronomical instruments and the forge, which had been set up ashore for various purposes, by nightfall we were entirely ready to set sail, only missing one marine from the men we had allowed to go to the town of Realejo during the past two days.

[1] Volcán Miravalles in Rincón de la Vieja National Park.

[2] Previously referred to by Malaspina as Volcán León: see p. 21, n. 3.

[3] Midway between Lago de Managua and Lago de Nicaragua.

[4] A small lake close NW of Lago de Nicaragua.

[5] A measure varying from about a quarter of a *milla* to 83·5 metres; the latter seems a much more likely width for a lava stream than the former.