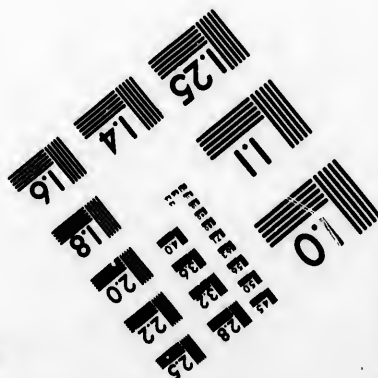
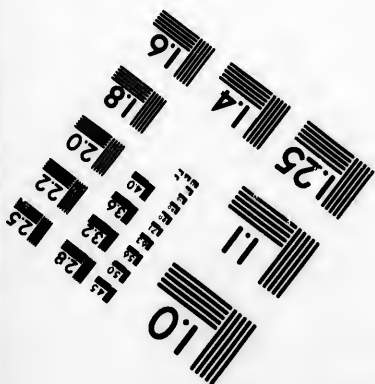
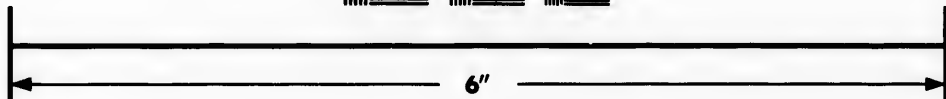
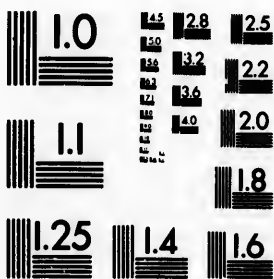


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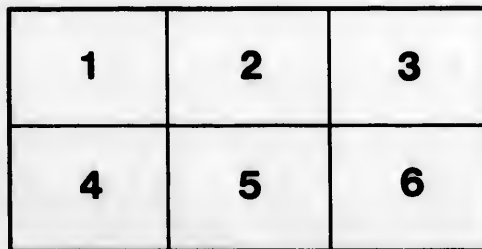
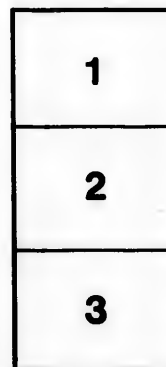
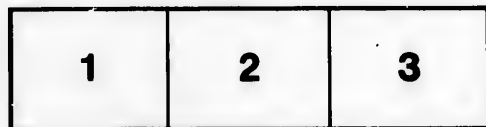
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VOYAGE  
ROUND THE WORLD,

PERFORMED

DURING THE YEARS 1790, 1791, AND 1792,

BY

ÉTIENNE MARCHAND,

PRECEDED

BY A HISTORICAL INTRODUCTION,

AND

Illustrated by Charts, etc.

---

TRANSLATED FROM THE FRENCH

OF

C. P. CLARET FLEURIEU,

OF THE NATIONAL INSTITUTE OF ARTS AND SCIENCES,  
AND OF THE BOARD OF LONGITUDE OF FRANCE.

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CHAPTER VII.

*PASSAGE from the North-west Coast of America to the Sandwich Islands. — Captain Marchand provides himself with refreshments there, without anchoring. — Inquiries concerning the question, To whom belongs the first discovery of these islands? — The perpendicular height of some of the mountains of these islands determined by approximation. — Run from the Sandwich Islands to Macao, through the Archipelago of the Mary-Anne Islands. — Occurrences at Macao. — The introduction of furs into China, by the southern ports, had just been prohibited. — General considerations respecting the present state of the fur-trade, and what may be expected from it in future.*

THE run from the coast of AMERICA to the SANDWICH Islands is equally destitute of interest and variety: Captain MARCHAND and Captain CHANAL made it their constant business to

ascertain by frequent observations of the moon's distance from the sun, and by the daily observation of the meridian altitude of this latter luminary, what was the gradual progress of the ship in longitude and latitude; and by this series of observations, they were confident of making a more direct course, and of precisely hitting the islands which it was intended to make. In this run, as well as in all those which had preceded it, they never neglected to determine the variation of the magnetic needle, as frequently as the weather would allow, either by azimuths, or by easterly or westerly amplitudes. The results of their different observations are to be found in the *NOTES* that accompany this narrative, and in the *JOURNAL OF THE ROUTE*, which presents the data of the calculation\*.

I shall content myself with mentioning two remarks, which might give rise to a presumption of the existence of some islands that have not yet been perceived, or rather met with again.

In the night between the 14th and 15th, there was taken with the hand, a small *land-bird*, spent with fatigue, which had settled on one of the yards. The latitude of the ship, at this period, was  $40^{\circ} 15'$ , and her longitude, correcting it by the observations made five days after, must have

\* See, towards the end of this Volume, Notes XLV to LI, and the *Journal of the Route* at the dates of the observations of which the Notes present the calculation and the results.

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been about  $133^{\circ} 45'$ . The nearest known lands, those which lie to the northward of Cape MENDOCINO, were distant from the ship about a hundred and twenty leagues to the eastward. This distance of a hundred and twenty leagues is very considerable for a small land-bird, unless it was of the species of those which, as is related of swallows, although belonging to the land, contrive to rest themselves on the water, when the length of the passage exceeds the strength of their wings. However, it would not be astonishing that, in latitudes hitherto little frequented, there should exist some small islands which, not being placed within reach of the tracks that have been followed by the known navigators of these latter times, might not have been perceived; yet such islands might have afforded a retreat to these little birds which, being granivorous, or living on terrestrial insects, could not subsist on the water, and are obliged to go and seek their food on the land. It might happen too that the Spaniards, in their ancient expeditions, had discovered in these latitudes, some islands with which they must have been acquainted before other nations; but it is probable that we shall have no knowledge of the existence of any, and that we shall not ascertain where they are situated, till chance shall have led some navigators, of a nation more communicative than that which made the first discoveries, to find them again.

The sequel of the SOLIDE's voyage furnishes us with a second remark of the same kind.

On the 18th of September, in the afternoon, the ship had reached the latitude of  $32^{\circ} 30'$  north, and the longitude of about  $139^{\circ}$  west: this position compared to that of the two nearest lands, placed her three hundred and seventy leagues from the SANDWICH Islands, and three hundred and thirty from DRAKE'S NEW ALBION.

It was at this distance from known lands, that a small land-bird, of the species of the canary, was seen to alight on one of the ship's yards. It could not be supposed that so small a bird could have come even from the nearest known land, that is to say, that it could have made, all at one flight, a passage of three hundred and thirty marine leagues: it was therefore presumed that, in the north-east quarter, whence the wind blew, there exists some island, still unknown to modern navigators, to which this little bird belonged.

I have looked whether some ancient navigator might not indicate to us in this latitude, some solitary island that had not yet been found again: I see on the MANILLA galleon's chart, constructed from the private memoirs of the Spaniards, which Commodore ANSON seized upon, in 1743, when he took possession of that ship, and which he has since published in the account of his voyage round the world; I say, I see a small island under the name of ISLA DE LOS PAXAROS (*Island of Birds*),  
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situated in about  $26^{\circ} 30'$  north latitude, and  $22^{\circ} 30'$  to the westward of SAN JOSEPH in CALIFORNIA, or about  $134^{\circ} 30'$  west from PARIS\*. This position is less to the northward by  $6^{\circ}$ , and  $4^{\circ} 30'$  less to the westward, than that of the ship which, consequently, was one hundred and forty-three leagues to the north-west by north of this point. A small bird could not have maintained its flight towards the north-west, in so long a passage, with the wind at north-east: which must lead us to conclude that, if the Island of LOS PAXAROS exists, as we may believe, and if the little bird came from it, this island is not properly laid down on the chart of the galleon.

The general chart of Captain COOK's third voyage, places it in the latitude of  $26^{\circ} 30'$ , like that of the galleon, and in the longitude of  $137^{\circ} 20'$ ; I know not on what authority. This situation would bring it nearer to that of the SOLIDE, which would be at no greater distance than one hundred and twenty-three leagues and a half to the north  $13^{\circ}$  or  $14^{\circ}$  west of it†. The passage will, no doubt,

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\* According to the observations of the Abbé Chappe, in 1769, *San Joseph* is  $112^{\circ} 2' 30''$  west from Paris (*Voyage en Californie, Paris, Jombert, 1772, 4to. page 85 to 88.*)

† In preserving to the latitude of the Island of *Los Paxaros* the latitude assigned to it by the galleon's chart, some geographical calculations had led me to place it in longitude  $139^{\circ} 40'$ , on the charts which were constructed in 1785, and added to the instructions given to *La Pérouse* to direct him in his voyage  
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appear still too long for a *Canary*-bird, especially when it is not wafted by a favourable wind which supports its flight, but, on the contrary, has to struggle against a strong resistance.

All that it is allowable to conclude from this discussion, is, that it is very probable that the Spaniards have formerly seen an island in a latitude which is not very remote from the situation occupied by the *SOLIDE* on the afternoon of the 18th of September; and that this island must have been distinguished by the multiplicity of its birds, since the navigator, who discovered it, imposed on it the name of *ISLA DE LOS PAXAROS*: but, at present, what is the true position of this island? This is a problem which I leave to be solved by navigators who, in the sequel, may frequent these seas: I could only point out to them the possibility of a discovery. We must, however, here recall to mind the story of the *golden tooth*\*; might it not really happen that this little bird, whose unexpected appearance leads the geographer into dissertations, was nothing more than a canary that had, perhaps, belonged to a ship pas-

round the world. If we give this position to the island, the *Solide*, on the 18th of September, was distant from it one hundred and fifteen leagues to the north 5° west.

\* After some of the greatest naturalists and philosophers in Europe had been long employed in endeavouring to account for the existence of a *golden tooth* in a living subject, they at length discovered, with wonderful sagacity, that the tooth was a false one.—*Translator's Note.*

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On the 21st of September, our voyagers began to see tropic-birds and *quebranta-bueffos* or giant-petrels\*.

On the 3rd of October, at half past two o'clock in the afternoon, the longitude of the ship, deduced from a mean between two sets of lunar observations, was  $155^{\circ} 17' 30''$ , and the latitude observed at noon, and reduced to the period of the observations for the longitude, was  $19^{\circ} 13' 30''$  north: according to this position, the east point of O-WHYHEE, the largest and the most eastern of the SANDWICH Islands, must have borne west by north, at the distance of thirty-six leagues; and Captain MARCHAND might promise himself to have sight of it the next day in the course of the forenoon.

He navigated during the night with the precautions required by the search of land, without granting to the result of the astronomical observations, a degree of precision above that which is admitted by the method employed for determining the longitude, and allowing something for the uncertainty which always remains respecting the estimate of the portion of the way that a navigator is obliged to introduce into the calculation, from the time of his last observation till he gets sight of the land.

\* *Procellaria gigantea*. Latham.—*Translator*.

The next day, the 4th, at ten o'clock in the morning, O-WHYHEE was discovered as Captain MARCHAND had expected: it bore from west by north to north-west by west; and he crowded sail in that direction.

At four o'clock in the afternoon, the ship was exactly under the meridian of the most eastern point of the island, which, according to the observations made on board the RESOLUTION and the DISCOVERY, in Captain COOK's third voyage\*, is situated in  $157^{\circ} 10' 15''$  west from Paris: the longitude of the ship deduced from the observations of the preceding day, was  $157^{\circ} 1'$ : thus, the error on making the land was only 9 minutes, or somewhat less than three leagues; and it is to be observed that these 9 minutes of error may belong to the portion of the way that our navigators were obliged to estimate, from noon of the 3rd, to which the lunar observation had been reduced, to the time of taking the bearing of the east point of the Island of O-WHYHEE †.

As for the longitude by account at the time of making the land, such as it was deduced from the dead reckoning from the SOLIDE's point of departure off BERKLEY SOUND, it was found to be

\* *The original astronomical Observations made in the course of a Voyage to the Northern Pacific Ocean, &c. By W. Bayly. London, 1782. 4to. page 350.*

† See Note LI.

in error  $1^{\circ} 32' 45''$  or twenty-nine leagues *abead*; but this error would have been greater by thirty-six minutes, or eleven leagues and one third, if the sum of the errors *astern* had not balanced part of the sum of the errors made in a contrary direction\*.

In the morning of the 5th, the Island of O-WHYHEE, being free from the clouds which, the day before, covered a part of it, shewed itself plainly; MOWNA-ROA and MOWNA-KAA, two most remarkable mountains, situated in the interior of the island, the former and the highest, towards the south, the latter, towards the north-east quarter, were distinctly seen: but no snow was perceived on any of the most elevated points that presented themselves to the view. This remark does not accord with what Captain KINO says in COOK'S third voyage, that the summits of these mountains *are constantly buried in snow* †: it appears that he was wrong to infer their habitual and constant state, from that in which he saw them in the month of March, that is to say, at the beginning of the spring; it is certain that the French who saw them not till the beginning of the autumn, perceived no snow on any part of them. But, doubtless, in the latitude of  $19^{\circ}$  north, the summer suns must produce a change, in the interval from the month of March to the month of October.

\* See Note LI.

† Vol. III. page 103.

When the mountains, disengaged from clouds, were distinctly discerned from the SOLIDE, she was at the distance of five leagues from the south-east coast. In this situation, MOWNA - ROA shews itself in a manner particularly remarkable, because its summit, which extends on an east and west line, forms a lengthened platform, in the shape of a long dining-table; and from this flat summit, its sides stretch by a gentle declivity till they meet the sea-shore.

At eleven o'clock, the ship doubled the south side of O-WHYHEE.

Towards noon, Captain MARCHAND shortened sail, in order to wait for a canoe that was steering for the ship: in it were three islanders; but they had only some fish, which was, much to their satisfaction, paid for with a nail.

The SANDWICH Islands are too well known by the voyages of COOK, PORTLOCK, DIXON, MEARES, DOUGLAS, and other English navigators who have frequented them; and LA PÉROUSE's journal will add too many details to those which we already possess, for me to think it necessary to dwell on what concerns their soil and inhabitants: the Island of O-WHYHEE, in particular, has acquired a deplorable celebrity; it bears a spot of blood which ages will not efface\*.

\* It is well known that Captain Cook was massacred in this island,

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These islands may be considered as a large *cara-vanary*, placed on the route of the ships which cross the GREAT OCEAN between the parts of ASIA and AMERICA situated to the northward of the line. Several of the navigators who have made them of late years, have, through the medium of canoes, without landing, and while under sail, procured the refreshments, and even the water and wood, with which they wished to be supplied. The danger incurred, a few years ago, by an English captain, who, through a concerted piece of treachery, had like to have lost there both his crew and his vessel, ought to render circumspect those that may be induced to present themselves with strength which would not be sufficient for awing the natives or repelling an attack. We can only recommend the Europeans who frequent the GREAT OCEAN, not to anchor at these islands, but to receive from the canoes, those provisions which the islanders will always be eager to bring to them on board. The health of the crews has every thing to lose, if they go on shore; and the natives have nothing to gain, for the preservation of their race, by a too immediate communication with the seamen of civilized nations.

Captain MARCHAND formed the prudent resolution of making all his purchases under sail, and confined himself to trading with the Island of O-WHYHEE alone, which was sufficient for all his wants. Thence he procured hogs, a small quantity

tity of poultry (fowls were scarce and dear), cocoa-nuts, plantains, sweet potatoes, yams, sugar-canes, and the other fruits and productions natural to these islands. It must have been an agreeable surprize, to see that, with the indigenous productions, were mixed pumpkins and water-melons, fruits of a species which, not belonging to the soil of the SANDWICH Islands, must have come from the seeds sown by the English or by LA PÉROUSE. More prudent, or less improvident than the inhabitants of the islands situated south of the line, those of the islands north of it have been sensible of what utility it would be to them to multiply this new mean of subsistence: and the Europeans, in making to the SANDWICH Islands this useful present have, by an act of beneficence, served their own interest for the future.

It was remarked that the canoes which came from O-WHYHEE to traffic with the ship, never failed to bring women intermingled with the hogs, and offered them, conjointly with the filthy animal, among the refreshments which the natives proposed to the strangers; however, the SOLIDE's crew were prudent enough to content themselves with the eatables.

Surgeon ROBLET observes that the hogs appeared to him to be of two species: the most numerous and the smallest is that described by Captain COOK, and by Captain KING, who continued his narrative; the only one, no doubt, with

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which they were acquainted: the other, less common, is of a large size; and the French observer is inclined to think that this is the former species, improved by a mixture with some European hogs. Without wishing precisely to combat this opinion, I shall only say that it seems to me by no means probable that the Europeans have ever thought of depositing hogs on islands where they have found them so numerous, and where they did not arrive till after long voyages which, doubtless, had not allowed them to make any savings out of their provisions. The same observer endeavours to destroy an opinion which the English voyagers appear to have established, that the hogs of the SANDWICH Islands cannot live on shipboard, and that, in order not to lose them, it is necessary to make haste to kill and salt them\*: on this subject, he relates that, out of fifty of these animals which were kept alive on board of the SOLIDE, not one refused to take nourishment: and those which were not killed till after having been several days at sea, had

\* Captain *King* has most minutely described the particular method, which Captain *Cook* first put in practice to succeed in salting pork in the countries situated between the tropics, where putrefaction makes its appearance so quickly, that vain would be the attempt to salt down provisions in employing only the ordinary process. Captain *Portlock* and Captain *Meares* have likewise explained the methods which they themselves have practised with success; these differ little from that of Captain *Cook*.—(See *Cook's Third Voyage*, Vol. III. pages 11 and 12—*Portlock's Voyage*, pages 88. to 90—*Meares's Voyages*, page 277.)



by no means waſted away, and appeared to be in full as good condition as when they had been taken on board.

Iron is almoſt the only article which the natives choſe to accept in exchange for their proviſions. They ſet a great value on large ſpikes; but it is difficult to paint the tranſports of their joy, when, in the room of three or four nails, a large joiner's plane was given them as the price of one of their largeſt hogs: they muſt already know for how many uſes this tool can be employed.

The paſſion of theſe people for iron is of no recent date; for it appears that on the firſt viſit which they received from the Europeans in 1778, they were already acquainted with the utility of this metal; and they expreſſed the greateſt eagereſs to acquire it. It might thence be conjectured that the hazards of navigation, the ſhipwreck of ſome veſſel coming from AMERICA and run aſhore on their iſlands, gave them in more ancient times a knowledge of iron; and that, having experienced, by uſe, the ſuperiority of this metal to hard ſtones, the fragments of ſhells, bones of animals, &c. for making tools and weapons, it is, of all European merchandiſe, become that which muſt have moſt excited their wiſhes. Surgeon ROBLET remarked, however, that, among a rather conſiderable number of iſlanders who came to traffic on board of the SOLIDE, and with whom our voyagers kept up a communication in their canoes, they ſaw

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saw not in the hands of any one of them, a single weapon, or implement made of iron. It would be a matter of curiosity to know for what use and how they employ those large spikes, those pieces of bar or sheet iron which they seek after with such avidity. It is not probable that they have already found out the manner of fashioning these; and although the first English ships that visited them may possibly have given them some idea of the labours of the forge, this simple notion falls far short of the employment of the means; a man is not a smith from having seen smith's work executed. If, in the sequel, European navigators should continue to perceive no weapon, no implement of iron in the possession of the natives who come on shipboard, would it be too bold a conjecture to suppose that the chiefs or *Earees* of each island, who appear to exercise the greatest authority, make it their business, either through policy, or through an effect of their cupidity, to get all the iron from the hands of the islanders, and form of it, as it were, hoards; as we see the Princes of ASIA bury the precious metals which commerce with Europeans annually introduces into their country?

Before we quit the SANDWICH Islands, I shall take the liberty of making a digression respecting the period of their discovery by the Europeans. Those who have read no other account than that of Cook's third voyage must believe that this disco-

very incontestably belongs to that celebrated navigator; but it can be proved that it belongs more anciently to the Spaniards, as well as several other discoveries in the GREAT OCEAN, which ignorance or policy had suffered to be lost, and which the interest and activity of the navigators of our days have led them to bring to light again.

I shall not adduce as one of the titles of the Spaniards to the first discovery of the SANDWICH Islands, that in 1568, MENDAÑA discovered in the latitude of  $19^{\circ} 20'$  north, and  $150^{\circ}$  west from the meridian of PARIS, according to the Spanish charts, an island by them named SAN FRANCISCO\*, situated in the parallel of these islands; to this, the obscurity of ancient narratives would justly be objected; besides, the knowledge of an island in the same latitude as the group of the SANDWICH Islands, proves not the knowledge of that very group; and it might thence merely be concluded that, in the parallel of those islands, more to the eastward or more to the westward, there exist some other islands.

But I examine the Spanish chart of the *Manilla galleon*†; there I see in the parallel of the SANDWICH Islands, about  $18^{\circ}$  to the eastward of

\* *Hechos de Don Garcia de Mendoça, &c. Por el. Dr. Suares de Figueroa*, p. 235.—*Herrera. Descrip. de las Indias Occid.* chap. 27.—*Lopes Vaz* and others.

† See the two groups drawn on one plan and on the same scale. *Plate V.*

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MENDAÑA'S Island of SAN FRANCISCO, a group composed of four principal islands, and of some others of smaller extent: the most southern is also the largest: the middle of this island is in the latitude of about  $19^{\circ} 20'$ ; it is called LA MESA: to the north-west of this, are seen two somewhat considerable islands, grouped with four others much smaller: the six together are designated by the collective word of LOS MONJES\* (the Monks): from the middle of LA MESA to the middle of the group, we may reckon about forty leagues.

Let us at present examine the eastern group of the SANDWICH Islands: for it is well known that these islands form two distinct groups; the *Western* group which was explored by COOK in January 1778, in his run from the SOCIETY Isles to the NORTH-WEST coast of AMERICA, and the *Eastern* group of which he had no knowledge till his return from that coast in the month of November following.

The eastern group is, like that of LA MESA of the Spaniards, composed of four principal islands and of a few others of less extent: the southernmost island, O-WHYHEE, is also the largest: the

\* On the copy of this map, published by Commodore Anson we read *los Mojas*, in lieu of *los Monjes*; this is a mistake; D. Tomas Lopez, on his *Mapa de America* 1772, writes *Los Monjes*, and it is well known that this denomination of *Los Monjes* (the Monks) is not rare on Spanish Maps for designating small islands assembled in a group.

most remarkable part of this island, the high mountain of ROA, is, like the middle of LA MESA of the Spaniards, situated nearly in the latitude of  $19^{\circ} 20'$ : to the north-west of O-WHYHEE, as well as to the north-west of LA MESA, are two somewhat considerable islands, grouped with three other smaller islands; only, the small islands are not here three in number; and we reckon four in the Spanish group: from the middle of O-WHYHEE to the middle of its group, as well as from the middle of LA MESA to the middle of the group to which it belongs, we reckon forty leagues: in short, both groups alike occupy from two to three degrees in latitude, and upwards of three degrees in longitude.

Thus, it is seen that, to describe the eastern group of the SANDWICH Islands, I have had only to repeat what I had said in describing the group of LA MESA: the same latitude, the same bearing of the islands with respect to each other, the same number, the same disposition, the same total extent: it is not possible to unite more characteristics of identity.

To these geographical, and, unquestionably, sufficient proofs, I shall add another which is not without some weight; but which, however, I should have offered as a probability rather than as a proof, were it not supported by the former.

First, I observe that the principal island of the group on the Spanish chart is called LA MESA, in

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in English the *Table*. I observe, in the second place, that this name of *Table* is an appellative name which navigators are accustomed to employ for the purpose of designating a mountain whose summit is flat: every one has heard of the *Table-mountain*, of the Cape of GOOD HOPE; on the coast of SPAIN, in the Mediterranean, we find ORLANDO'S TABLE, &c. Thus, it cannot be doubted that the Spaniards were determined to impose on their island the name of LA MESA, because it was remarkable from some great mountain terminated by a platform, by a *Table*. But the Island of O-WHYHEE which answers, in one group, to the Island of LA MESA in the other, is alike remarkable, as has been seen, from a great mountain whose flat summit represents a long *table*; the natives call it MOWNA-ROA, from the generic name MOWNA (mountain) and from the word ROA, extended, or of a great extent. May not this similitude of the two mountains, in a particularity, in a figure which is not very frequently met with, be admitted as a fresh proof of the identity of the two groups?

I am not disposed to believe that it is meant to consider the galleon's chart as not being authentic, and deserving of no confidence; for it is well known that this chart was intrusted only to the captain of the ship, and it was on this chart, that, with his pilot, he regulated his course; and, undoubt-

edly, it will not be supposed that the Spaniards there placed imaginary islands, especially when we see these islands designated by *significant* names: those who know the jealous uneasiness of the government of SPAIN in regard to her possessions in AMERICA, and her ancient discoveries in the GREAT OCEAN, will rather be inclined to believe that they have never allowed that all the lands which her navigators have discovered should be laid down on their charts. These lands would there be improperly placed, no doubt, especially in longitude; but at least it would be known that they exist: and more skilful navigators would one day contrive to find them again, and bring us acquainted with them.

To the proofs which I have given of the identity of the SANDWICH Islands and of the group of LA MESA, will be opposed:

1st. That COOK saw no island, twenty-five leagues to the north-east of O-WHYHEE, which can represent to us LA DESGRACIADA, an island situated on the galleon's chart, at that distance and in that bearing, in regard to LA MESA;

2nd. That COOK discovered to the west-north-west, and at the distance of twenty-five leagues from the westernmost of the eastern group of the SANDWICH Islands, a second group, composed of two islands and two islets; and that the Spanish chart does not indicate this group.

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To the first objection I answer, that, if LA DESGRACIADA was not perceived by Captain COOK, it is not a proof that it does not exist. When this navigator, in coming from the southward, fell in with the western group of the SANDWICH Islands, he did not even perceive the eastern group; still less could he have seen an island situated twenty-five leagues to the north-east of the latter: and when, ten months after, in returning from the northward, he looked for the group which he had visited the preceding year, he met with the eastern group about the middle of its extent from north-west to south-east; he then sailed very closely round the Island of O-WHYHEE; and it is not very astonishing that he should not have seen an island which, to judge of it from the name that has been imposed on it by the Spaniards, LA DESGRACIADIA, the island *unfavoured* by Nature, the *miserable* island, may be a land of no great appearance, and even a low island. If the reader cast his eye on the planisphere published by ARROWSMITH in 1794, and on which are marked the tracks of all the navigators in the vicinity of the SANDWICH Islands; he will see no one that does not pass too far from LA DESGRACIADA for this island to have possibly been perceived from the ships which have steered these tracks. But I shall add that it is not proved that LA DESGRACIADA was discovered by the same navigator who discovered LA



MESA; and he who met with the former, could not place it according to his difference of longitude in regard to a group which he did not see, which perhaps he did not even know of, but in the absolute longitude that he assigned to it according to his dead reckoning, since he had quitted the coast of AMERICA; and the galleon's chart must have placed it according to this absolute longitude: now, in this case, it might probably happen that there was a great error in the longitude of LA DESGRACIADA, and that this island which, on the galleon's chart, is seen to differ in longitude, in regard to LA MESA, only a degree towards the east, might differ from it, on the globe, several degrees in the same direction, and perhaps even in a contrary one. As much may be said of an island, called ULVA, which, in the galleon's chart, is laid down in the parallel of  $23^{\circ}$  north, half a degree to the eastward of the meridian of LA DESGRACIADA. It is a principle which must be admitted, that when two islands have not been discovered by the same navigator, and in the same voyage, in passing from the one to the other, we can depend only on the latitude assigned to each island, that is to say, depend on it within half a degree; but that, in this case, their absolute longitude is so uncertain that we cannot, if we wish to find them again, dispense with getting into their respective parallel, two or three hundred leagues  
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astern of the place where the chart fixes their position, and then navigating on this parallel till we succeed in meeting with the island\*.

To the second objection I answer, that the Spaniards who saw the group of LA MESA, the eastern group of the SANDWICH Islands, may very possibly not have seen the two islands and the two islots which form the western group; by the same reason that COOK, (which might appear more extraordinary,) when he saw for the first time the western group, did not perceive the eastern group, although some of the islands which compose it can be seen at the distance of forty or fifty leagues; by the same reason again, that this navigator saw not, thirty leagues to the north-west of his western group, BIRD Island and MONTAGU Island †, which, subsequently to his last voyage, some English navigators have discovered: and if, as may be presumed, the SANDWICH Islands are only the summits of a chain of subaqueous mountains, it might so happen that this chain might extend farther to the north-west, and form other islands,

\* Here we are speaking only of the discoveries of the ancient navigators who determined the longitudes nearly by chance; for the moderns can employ, for fixing the positions of the lands which they discover, means that give to those who know how to employ similar ones, the assurance of finding with facility the places where they wish to touch.

† These are laid down on the *General Chart of the World*, and on the *Planisphere*, published by *Arrowsmith*, the former in 1790, the latter in 1794.

beyond those which these recent navigators have discovered.

It seems to me then that the objections which, in order to do away, or at least to weaken the idea of the identity of the eastern group of the SANDWICH Islands, and of that which the galleon's chart places in the same latitude, in the same number of islands, occupying the same space, and disposed in the same manner, should be supported, on the one hand, on Captain COOK's not having perceived LA DESGRACIADA, on the other, on the Spaniards not having had a knowledge of the western group of the SANDWICH Islands, it seems to me, I say, that these objections are established on arguments which cannot bear a discussion.

Perhaps it will be objected to me, as a last resource, that the two groups differ too much in longitude, for it to be possible to take them for one and the same group; and, in fact, O-WHYHEE, taken at its middle, is, according to the observations of the English,  $158^{\circ}$  west from PARIS, and LA MESA, on the galleon's chart, is  $24^{\circ}$  west from the meridian of SAN JOSEPH in CALIFORNIA †, and, consequently,  $136^{\circ}$  west from that of PARIS. But this difference of  $22^{\circ}$  is far from being a proof against the identity of the two groups: who

† The longitude of *San Joseph*, according to the observations of the Abbé *Chappe*, is  $112^{\circ} 2' 30''$  west from the meridian of *Paris*. (See *Voyage en Californie*, page 85 to 88.)

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does not know that, when the question relates to the ancient discoveries in the GREAT OCEAN, we look only to the latitude which cannot be affected by a very great error; to the whole, and the general disposition of the two groups that we are comparing; to the number, to the distances and to the respective bearings of the islands which compose them; in short, to a union of remarkable particularities, which is not to be found the same in two different groups. The famous SOLOMON Islands, discovered by MENDANA in 1567, partly found again by BOUGAINVILLE in 1768, in a greater part still by SURVILLE, in 1769\*, visited twice, latterly, by DENTRECASTEAUX †, and whose geographical

\* See the *Découvertes des Français dans le Sud-est de la Nouvelle Guinée*.—Paris, Impr. Royale, 4to, 1790, page 85 to 100, 199 to 231.

† France has not, hitherto, been able to gather the fruits of the voyage which *Dentrecasteaux* undertook in order to go in search of *La Pérouse's* frigates: but this harvest is still entire; and, no doubt, those in whose possession it has remained, will be sensible of how much importance it is to the utility of the sciences in general, and to that of navigation and geography in particular, that the discoveries which he made in the course of a long expedition, and all the labour of his co-operators, should not be lost to a nation which bore the expence of it, and to Europe, which ought to share the benefit.

*Dentrecasteaux*, already fatigued by long and uninterrupted services, carried with him the germ, perhaps indestructible, of that fatal disorder which is with difficulty avoided by those whose constitution has for a length of time been affected by long voyages, rapidly repeated, and without a necessary interval

geographical position is irrevocably fixed, occupied, for upwards of two centuries, on various hydrographical charts, positions in longitude, the extremes of which differed a thousand marine leagues, or about fifty degrees. QUIROS'S TIERRA AUSTRAL DEL ESPIRITU SANTO, seen and explored for the first time in 1606, by the Spanish navigator of that name, and found again in 1769, by BOUGAINVILLE, long remained attached to NEW HOLLAND, of which it was presumed that it must form a part: at this day, it has retired five

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of repose: he could not withstand fresh attacks, the violence of which was necessarily increased by a voyage of two years under the torrid zone. He sunk, and carried with him the sincere regret of all those subject to his authority, which he always found means to maintain without ever suffering its weight to be felt. His virtues rendered him dear to his friends, and respected by every one who knew him, as his talents, his courage, and his experience in his profession, and in the details of administration, rendered him useful to his country. The excess of his zeal shortened his days; but, before he terminated a career which he had so honourably filled, he had at least the satisfaction of having brought the dangerous expedition, with which he was intrusted, to such a point, that what remained to be done might be considered in the light of an ordinary voyage.

The reader, undoubtedly, will not disapprove of Friendship having, by the way, strewn a few flowers over the grave of a man, whose memory claims from his countrymen, and from navigators of all countries, a tribute of gratitude which they will be eager to pay him, as soon as circumstances shall have allowed his labours to be rescued from oblivion, and *Europe* shall be informed of what he has done, and what deserved.

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hundred leagues to the eastward of that vast country. When a newly-discovered group presents several incontestable characteristics of identity with another, which we know to have been seen in former times, let us beware of saying that it is not the same group, from the sole reason that it was found in a longitude different from that which the first *discoverer* had indicated only from the erroneous distance at which he supposed it to be from the continent of AMERICA, whence he had been dispatched. And such has been the fate of part of the insulated discoveries of the Spaniards: daring adventurers, bold in trying fortune and chances, lucky in their course, ignorant in tracing it, satisfied, in short, with having discovered half of the globe, they have left to others the task of finding again what they themselves seemed to have forgotten.

In depriving Captain Cook of the barren honour of the first discovery of the SANDWICH Islands, I deprive him not of the smallest portion of that fame which he has so justly acquired: I will even say that it is adding, if possible, to his merit; for merit consists in finding what we look for, in having combined the means that might lead to the discovery; and to discover what we were not looking for, is the merit of chance, which ought not justly to be assigned to the share of the navigator whom chance has favoured; it is a borrowed merit;

merit; and Captain COOK, so rich in his own discoveries, ought to borrow nothing, as he can have nothing to envy in the adventurers to whom we are, before his time, indebted for the shapeless knowledge of the globe. If discoveries immortalize those who have made them, they also immortalize those who have brought them to perfection.

Lieutenant ROBERTS, who constructed the general chart of the third voyage of the English navigator, on which are traced his three Voyages round the World, and towards both poles, has preserved the group of LA MESA of the galleon's chart, and placed it, taken at its middle,  $19^{\circ}$  east from O-WHYHEE and on the parallel of that island: it should seem that, in thus preserving the group discovered by the Spaniards, he was desirous that no one should dare to contest with the English the first discovery of the SANDWICH Islands. But ARROWSMITH, both on his General Chart of 1790, and on his Planisphere of 1794, sacrificing, no doubt, national vanity to evidence, has done justice to this double adoption. As far back as 1786, LA PÉROUSE who, with a view of ascertaining whether there existed any islands to the eastward of the SANDWICH group, had made a point of running, in their parallel, three hundred leagues from east to west, neither perceived, over this whole space, any detached island, nor saw any  
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sign of land; though from the aspect of the Island of O-WHYHEE, and its *table*-mountain, he had no doubt of its being LA MESA of the Spaniards.

But in effacing the group to which LA MESA belongs, and which becomes the eastern group of the SANDWICH Islands, ARROWSMITH has also totally effaced the Island of ROCA-PARTIDA, situated, on the galleon's chart, about one hundred and forty leagues to the east-south-east of LA MESA, and on a parallel less northerly by three degrees and a half: he has merely suffered LA NUBLADA to subsist, whose name indicates a high land, over which clouds hang; and it is laid down a hundred leagues to the eastward and on the parallel of ROCA-PARTIDA. This last-mentioned island was discovered, in, 1542 by the Castilian pilot JUAN GAETANO, in the first voyage that the Spaniards ever attempted, from the west coast of NEW SPAIN to the great archipelago of ASIA. Before he had reached ROCA-PARTIDA, GAETANO had discovered, on the same parallel, and two hundred leagues to the eastward, according to his reckoning, another island which he had called SAN TOMAS\*. This island, situated to the eastward of ROCA-PARTIDA, and which bears no name on the galleon's chart, might be that which the modern charts designate by the name of LA NUBLADA.

\* See *Ramusio. Delle Navigazioni e Viaggi, &c. Venetia, Giunti. 1563. Vol. I. fol. 375, verso.*



We are not justified in supposing that LA NUBLADA, or GAETANO'S SAN TOMAS, are one and the same island, since the Spanish navigator discovered them successively, in the same voyage, in standing from the eastward to the westward, and imposed on them different names.

Hitherto, neither ROCA-PARTIDA nor SAN TOMAS, or LA NUBLADA, have been found again; but let us not be in a hurry to efface them from our charts: let us not forget that the SOLOMON Islands had thence disappeared, since some geographers, supporting themselves on the opinion of the learned ALEXANDER DALRYMPLE, had supposed that these islands must be the east part of NEW GUINEA: and at this day, the archipelago of the SOLOMON Islands occupies its particular place on the globe, over an extent of two hundred leagues, forty leagues to the south-east of that NEW GUINEA, with which it was wished to be confounded\*. Let us suffer all the islands to subsist which the Spaniards have pointed out to us on their charts or in their narratives, till we have well ascertained their identity with others; let us preserve them, were it only as *beacons*, which attract the attention of the navigator, and engage him to make researches.

\* See the *Découvertes des Français dans le Sud-est de la Nouvelle Guinée*, page 4 to 19—85 to 154—201 to 231—The voyage of *Dentrecasteaux* has confirmed what was there said of these islands.

I shall terminate this digression, rather long perhaps, but which, however, is not void of utility, by observing that chronological accuracy, historical truth, and justice, alike require that in placing the SANDWICH Islands on the map of the globe, they should no longer be laid down with the erroneous indication of *islands discovered by Captain Cook*. There might be written above this archipelago: *SANDWICH Islands, explored and named by Captain Cook in 1778; formerly discovered by the Spanish navigators*: this would be to declare what belongs to the moderns, and at the same time to restore to the ancients what they have a right to claim.

I return to the journal of Captain MARCHAND.

He took his departure from the Island of O-WHYHEE, on the afternoon of the 7th of October, and shaped his course for CHINA.

O-WHYHEE and MOWEE, the two easternmost islands of the eastern group of the SANDWICH Islands, both appear particularly remarkable from mountains of the greatest elevation. In order to estimate, by approximation, the height of their summits above the level of the sea, I shall make use of the greatest distances at which these mountains were perceived from the SOLIDE, distances calculated from the way that the ship had made in sight of the land, and rectified by the observation of the latitude.

We find by Captain CHANAL's journal, that on the 9th at six o'clock in the morning, he set, at

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the same time, the mountain of the Island of **MOWEE** bearing north-east 2 or 3° east, and that of **MOWNA-ROA** of the Island of **O-WHYHEE**, east by north 2 or 3° east: he reckoned that the ship was then at the distance of thirty-six leagues from both of them. At half past five o'clock in the afternoon, he still perceived very distinctly the summit of **MOWNA-ROA**, bearing east 2° 30' north, although he was forty-six leagues distant from the west coast of the island, and, consequently, about fifty leagues from the summit of the mountain.

If, with this distance of fifty leagues, and regard being had to the depression of the horizon and the effect of terrestrial refraction, it be wished to seek by calculation, what must be the height of the summit of **MOWNA-ROA**, in order to be perceived at the distance of fifty leagues, it will be found that it is 2598 toises, and thence it will be concluded that, next to **CHIMBORAZO** in **PERU** whose height is 3220 toises, **MOWNA-ROA** is the highest mountain on the globe: for **PINCHINCHA** which occupied the second place, is but 2434 toises; **MOUNT BLANC** which occupied the third, 2391; and the Peak of **TEYDE** or **TENERIFFE**, which occupied the fourth, 1905 toises only, according to the trigonometrical and barometrical calculations of **BORDA**\*. **MOWNA-ROA** is therefore loftier

\* See Note II.

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than the Peak of TENERIFFE, by 694 toises; and this result would seem to confirm that given by Captain KING in the third volume of COOK's last voyage: he says that "this mountain must be at least 16,020 feet high, which exceeds the height of the PICO DE TEYDE or Peak of TENERIFFE, by 724 feet, according to Dr. HEBERDEN's computation, or 3680 English feet or 3452 French feet, according to that of the *Chevalier de BORDA*,"\* which gives  $575\frac{1}{2}$  toises less; this differs, in defect, only  $19\frac{1}{2}$  toises, from the height that I have deduced from the *data* furnished me by Captain CHANAL's journal.

But Captain KING obtained his result by a method different from that which I employed to arrive at mine: he took for the basis of his calculation, according to the principle adopted by LA CONDAMINE for measuring the heights of the ANDES or CORDILLERAS, the elevation of the line at which the snow remains all the year on the high mountains between the tropics. This method was not applicable to the mountains of the SANDWICH Islands, since it has been seen that, in the month of October, there existed no snow on any part of these islands. I therefore consider it as the effect of chance that KING's result and mine agree, within a trifling difference. I observe that KING, still following the principle which he

\* *Cook's third Voyage*, Vol. III. pages 103 and 104.

adopted, adds that the height of *Mowna-Roa* must be much greater than that which he assigns to it; for, says he, "in insular situations, the effects of the warm sea-air must necessarily remove the line of snow, in equal latitudes, to a greater height than where the atmosphere is chilled on all sides by an immense tract of perpetual snow." The principle is true, and the application of it would be just, if it had for its object islands where the snow should last the whole year; but it cannot be admitted with respect to those where the snow does not resist the summer suns\*.

\* In not adopting the consequence which Captain *King* has drawn from the principle on which he rests for deciding that the height of *Mowna-Roa* must be much greater than that which he determines, and which is, within a trifling difference, the same as that I have deduced from the distance at which its flat summit was very clearly distinguished from the *Solide*, I am far from pronouncing that the height of the mountain does not exceed the 2598 toises given me by calculation; for Captain *Chanal* related to me verbally that, on the 10th at sun-rise, several persons belonging to the ship were convinced that they still perceived the Table of *Mowna-Roa* in a line with the horizon; and, at this period, according to the run which had been made during the night, the *Solide* must have been fifty-three leagues distant from it at least; which would give to the mountain upwards of 2700 toises in elevation above the level of the sea.

Captain *Chanal* had not thought it necessary to insert this observation in his journal, because he had not been able to see with his own eyes; but he told me that, on other occasions, he had discovered that several of the people had a sight which extended much farther than his.

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The same observer estimates, according to his method, the height of MOWNA-KAA, (the northern mountain of the Island of O-WHYHEE) at half a mile or 475 toises; and he adds, that this computation must be too low, for the same reason that he has given for supposing too small the estimation which he has made of MOWNA-ROA. Captain CHANAL's journal affords us no *datum* for determining the elevation of MOWNA-KAA, but Surgeon ROBLET thinks that the estimation which Captain KING supposes to be too low, is, on the contrary, very much exaggerated.

In order to find the height of the mountain of MOWEE, the second island of the eastern group, we shall calculate according to the distance of thirty-six leagues, estimated by the eye, at which it was perceived on the morning of the 9th; and it will be found that its summit is 1346 toises high: this height is between that of Mount ST. GOTHARD, 1431, and that of the convent on the GREAT ST. BERNARD, 1241 toises.

The Island of ATOOI, the westernmost of the western group, is also very lofty; for, on the 10th, at noon, it bore north-north-west 3 or 4° north; and, according to the latitude of the ship observed at the same instant, and compared with the known latitude of the island, the distance from the ship to ATOOI must have been thirty leagues: the height of the mountain is therefore 1216 toises.

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In the interval from noon on the 9th to noon on the 10th, the ship had experienced the effect of a violent current, which had carried her 29 minutes, or nine leagues and two thirds to the northward, as was ascertained by comparing the difference of the latitudes observed on the 9th and 10th, with the difference deduced from the dead reckoning during the same twenty-four hours. Captain MARCHAND had constantly steered west-north-west  $3^{\circ} 45'$  north, allowing for the variation; the wind had blown very faintly and unsteadily from the southward during the first five hours; in the night, it had been calm; and, from two o'clock in the morning till noon on the 10th, the wind had stood in the north-east quarter, very faint and baffling; the ship had made very little way through the water: it may therefore be supposed that, as she was abreast of all the channels that separate both the two groups, and the islands of which they are composed, the rapid current which, no doubt, these channels occasion, had acted with all its velocity and strength against the ship whose route crossed its direction; and, by causing her to drift bodily to the northward, although her apparent route was west-north-west, it had carried her ten leagues in twenty-four in the former direction.

On the 11th, at break of day, no land was to be seen.

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The run across the GREAT OCEAN with regular and steady winds, presents only a monotonous series of remarks relative to the velocity and the direction of the currents, and their influence on the ship's course: I have thought it my duty to throw them into the *NOTES*; and I invite the nautical reader to consult them\*.

Captain MARCHAND's intention had at first been to steer between the twentieth and twenty-first parallel north, and to follow this direction as far as CHINA. This track, little frequented, and which afforded the hope of some discovery, is, undoubtedly the most direct, and may, at the first glance, appear the shortest; but he was justly apprehensive, (and the calms which he had recently met with strengthened this apprehension) of finding only faint and variable breezes, if he persisted in keeping on the border of the trade-winds; he therefore determined to penetrate farther into the region which they occupy, and he kept between the thirteenth and fourteenth degree of north latitude, crowding sail, till, on the 2nd of November, he had reached the longitude of  $148^{\circ} 14'$  east from the meridian of PARIS †. He then stood again a little to the northward, and got nearly into the latitude of  $15^{\circ}$ , which is the parallel of TINIAN, one of the islands that compose the MARY-ANNE

\* See Notes LII to LV.

† See Note LVI. and the *Journal of the Route* at the date of the 2nd of November.



Archipelago, which he purposed to make, in order to cross it between this island and that of SAYPAN.

This longitude of  $148^{\circ} 14'$  on the 2nd, was the mean result of four sets of distances from the moon to the sun, observed at half past two o'clock in the afternoon, by Captain MARCHAND and Captain CHANAL, and reduced to noon.

In allowing for the ship's progress by account towards the west, in the interval from the 2nd to the 3d, it was computed that at noon of the latter day, she had reached the longitude of  $146^{\circ} 7'$  east from PARIS, at the same time that she was in  $15^{\circ} 6'$  north latitude.

The observations of Captain WALLIS on board the DOLPHIN, in 1767, place the Island of TINIAN, in  $143^{\circ} 35' 45''^*$ ; thus, at noon, the SOLIDE must have been at no more than  $2^{\circ} 31' 15''$  to the eastward of this island; and at sun-set, Captain MARCHAND reckoned that he was only at the distance of thirty-six leagues from it.

He regulated his sail so as to discover the island the next morning, and sufficiently early for him to hope to cross the archipelago during the day: but all night there was tempestuous weather, with rain and squalls.

It was not till three o'clock in the afternoon that he got sight of the island; and, in estimating

\* See *Astronomical Observations made in the Voyages for making Discoveries in the Southern Hemisphere.* By W. Wales, London, 1788. 4to. INTRODUCTION, page X.

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his distance from it by the eye, he judged it perfectly conformable to the result of the observations which had been made on the preceding days.

At three quarters past five, the mean result of two sets of distances of the sun and moon, combined with that of four other sets observed on the 2nd, gave  $143^{\circ} 38'$  for the east longitude of the ship, which places the eastern extremity of TINIAN, according to the bearing that was taken of it at the same instant and its estimated distance, in  $143^{\circ} 33'$ : it has been seen that the observations of WALLIS placed it in  $143^{\circ} 35' 45''$ : thus the observations made on board the DOLPHIN and those made on board the SOLIDE agree in their results, and this agreement may be considered as the proof of a sufficient accuracy in this determination\*.

Captain THOMAS GILBERT places TINIAN in  $146^{\circ}$  east from GREENWICH, or  $143^{\circ} 39' 45''$  east from PARIS †; but he does not mention on what observations he has founded the position which he assigns to it: DIXON gives it only  $143^{\circ} 10' ‡$ .

As for the latitude of TINIAN, Captain MARCHAND was not enabled to observe it immediately; but GILBERT has concluded from his observations,

\* See Note LVII.

† *Voyage from New South Wales to Canton in the year 1788. By Thomas Gilbert, commander of the Charlotte. London, 1789. 4to. page 63.*

‡ *Dixon's Voyage, page 284.*

that the middle of the island is situated in  $15^{\circ}$ . Captain WALLIS fixed the point of the road where he was at anchor, and which is less northerly than the middle of the island, at  $14^{\circ} 55'$ , and the watering-place which is not far distant from the south-west point, at  $14^{\circ} 59'$ \*. DIXON places the island, in general, in  $15^{\circ}$  †. All these positions agree with each other.

This is not the case with the latitude which Commodore ANSON had assigned to this island: he places it in  $15^{\circ} 8'$  ‡: but although, at the period when the observation was made, HADLEY'S quadrant had for ten years been in use in the English navy, and although it was undoubtedly employed on board ANSON'S ship, I do not think that any regard ought to be paid to this determination; and the middle of the island may be fixed in  $15^{\circ}$  north. This difference between the latitudes determined by ANSON, and those observed by recent navigators, is again to be found nearly the same in regard to SAYPAN. The Commodore's journal places this island, without any other indication than its name, in  $15^{\circ} 22'$ : we are justified in believing that this latitude applies to the PEAK, the most remarkable part of the island; and, in this case,

\* *Hawkefworth's Compilation.* Vol. I. page 500.

† *Dixon's Voyage,* page 284.

‡ *A Voyage round the World in the years 1740-41-42-43 and 44.* By George Anson. Compiled by Richard Walter. The 12th Edition. London. 4to. 1767. page 308.

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it would differ by 9 minutes from that given by the observations made on board the SOLIDE, according to which this mountain must be situated in  $15^{\circ} 13'$ : but if the former determination was applied to the northern point of SAYPAN, it differed only by 2 or 3 minutes from the result of the later observations, which, as will be seen, place this point in  $15^{\circ} 19$  or  $20'$ .

At six o'clock in the evening, the SOLIDE was at the opening of the passage, through which a ship may cross this archipelago between this island and that of TINIAN; but it would not have been prudent to enter it at the moment when the day was on the point of closing, and Captain MARCHAND determined to stand to the offing during the night. He had reason to congratulate himself on the resolution that he had taken; for he met with frequent puffs of wind, and some very hard squalls, which might have occasioned him embarrassment and uneasiness, had the ship been engaged among lands, and there obliged to alter her course according to the changes of the wind.

On the 5th, at the first dawn of day, he again stood in for the land.

At three quarters past six, the passage between the islands bore west-south-west  $6^{\circ}$  west, distant about six leagues: and although Captain MARCHAND carried a press of sail, the ship drifted to the northward so considerably, that he had no hopes of being able to clear the passage with the

wind which blew from the south-south-east and south by east. At half past seven o'clock, he bore up north-west by west in order to pass to the northward of SAYPAN. He ranged along the north-east coast of this island at the distance of about two leagues. At three quarters past eight, its north-east point, which is the most northern extremity, bore west  $2^{\circ}$  south, distant two leagues: no land was perceived to the northward. Before ten o'clock, was discovered, on the west coast of the island, an islot which bore south-west  $6^{\circ}$  west in one with the north point of SAYPAN. At noon, this point bore south-east by south  $1^{\circ}$  south, and at a distance of about four leagues; the west extremity of the island, south by east  $1$  or  $2^{\circ}$  south; and the islot, south by east  $6^{\circ}$  south.

The latitude observed at the same instant was  $15^{\circ} 30'$ ; and thence the northern point of SAYPAN was found to be in  $15^{\circ} 19$  or  $20'$ . The peak of this island is situated, nearly, in latitude  $15^{\circ} 13'$ , and in about  $143^{\circ} 30'$  east longitude.

In comparing the latitude observed at noon, with that which resulted from the dead reckoning during the preceding twenty-four hours, it was discovered, that, in this interval of time, the currents had carried the ship 17 minutes, or five leagues and two thirds, to the northward\*.

\* See the *Journal of the Route* at the date of the 5th of November.

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Ships which cross the Archipelago of the MARY-ANNE Islands are accustomed to pass between SAYPAN and TINIAN, or to the southward of the latter island: these two passages are the most frequented, because they are the best known. Circumstances, as has been seen, forced the SOLIDE to pass to the northward of SAYPAN; and Captain CHANAL thinks, from the remarks which he was enabled to make, that, in all cases, this last-mentioned passage would deserve to be preferred to the other two, when it is not intended to touch at TINIAN. He saw no island, no shoal, to the northward of the northern part of SAYPAN: the charts, indeed, indicate, under the name of FARELLON, a ledge or shoal, situated in the latitude of  $16^{\circ}$ , under the very meridian of the island; but it is there placed at the distance of twelve leagues from its northern point. Off the north-east coast, and the north point, are a few breakers; but they shew themselves, and do not extend a mile into the offing. A ship may double the island to the northward, and range along its coast with safety, leaving, between the land and her, a distance of one or two leagues.

The Island of SAYPAN, uninhabited like that of TINIAN, seems not, as far as a judgment can be formed from coasting its north side, to afford the same refreshments to ships that should touch there: only, among the trees with which the north-east coast

coast is covered, are distinguished a great quantity of cocoa-palms.

Commodore ANSON, who has given us a view of the north-west coast of the island, says that it presents not a less agreeable aspect than that of TINIAN.

In 1765, Commodore BYRON caused the Island of SAYPAN to be visited; and this is the only description of any length that we have of it: the nation which possesses it, without occupying it, is not in the habit of describing its possessions. According to him, SAYPAN is considerably larger than TINIAN, and, in his opinion, has a much pleasanter appearance. But this sentiment is peculiar to BYRON; and voyagers, in general, agree in giving TINIAN the preference to SAYPAN, both in regard to extent and beauty: the Spaniards have denominated it BUENA-VISTA by way of excellence. The TAMAR (the ship which BYRON sent to examine the Island of SAYPAN, while he himself lay at TINIAN), anchored, he says, "to leeward of it, in about ten fathoms water, with much the same kind of ground (hard sand and coral rock) as he had in the road of TINIAN. Her people landed upon a fine sandy beach which is six or seven miles long, and walked up into the woods, where they saw many trees which were very fit for topmasts. They saw no fowls, nor any tracks of cattle; but of hogs and guana-

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coes\* there was plenty. They found no fresh water near the beach, but saw a large pond inland, which they did not examine. They saw large heaps of pearl oyster-shells thrown up together, and other signs of people having been there not long before: possibly the Spaniards," adds he, "may go thither at some seasons of the year, and carry on a pearl-fishery: they also saw many of those square pyramidal pillars which are to be found at TINIAN,

\* The Guanaco or *Huanacu* is the wild animal that takes the name of *Llama*, when it is in a state of domesticity\*. This quadruped originally came from the high mountains of *South America*, and is very common in *Peru*, where it performs the same functions as the pack-horse in *Europe*, and the camel in *Africa*. The flesh of the young guanaco is good eating. It is astonishing that this animal should be found on the Island of *Saypan*; it certainly is not indigenous there; and it must be supposed that the Spaniards have transported it thither from *Peru*, in order to try to propagate the breed. Hitherto, *Byron* is the only one who has seen any of the species in the *Mary-Anne* Islands; at least no other voyager makes mention of it; nor is it spoken of in any description of the Island of *Tinian*; but if the Spaniards wished to try to naturalize it in the *Mary-Anne* Islands, they must have preferred making a trial on *Saypan*, the lands of which, more elevated than those of *Tinian*, must be better suited to the guanaco.

\* This species resembles the *Glama* in many particulars of its external form; but these animals never intermix, either in the wild or domesticated state: besides this, the *Camelus huanacus* wants the protuberance on the breast peculiar to the *Camelus glama*; it has a bunch on the back, which the former animal has not; and its hind legs are likewise considerably shorter in proportion; whence its gait is a kind of bounding or hobbling.—*Translator*.

and



and which are particularly described in the account of Lord ANSON's voyage\*."

Captain PORTLOCK, who has given us a view of SAYPAN, says that, although he coasted it within the distance of half a mile, he could not observe on it an animal of any kind †.

At the first sight of the Islands of TINIAN and SAYPAN, and especially at the aspect of the former, Captain MARCHAND might have been tempted to land on it: the season was favourable for his anchoring there; and he might hope to procure some of the refreshments which a long navigation under the torrid zone occasions to be so ardently wished for by men overwhelmed by the excess of a constant heat, and for a long time past condemned to privations. But these privations and the fatigues of the sea had not impaired the good health which his ship's company had enjoyed during the whole voyage; and the interest of the expedition and of the owners required that he should know how to sacrifice a few transitory enjoyments to the inappreciable advantage of getting the start, if possible, in the markets of CHINA, of the ships of other nations which, like the SOLIDE, were to bring thither furs from the NORTH-WEST coast of AMERICA. The crew murmured not in the least at a decision, the motives of which were known

\* *Hawkefworth's Compilation.* Vol. I. page 121.

† *Portlock's Voyage,* page 317.

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to them; they even abstained from manifesting any regret, that they might not add to that which their commander felt for others, much more than for himself.

While the SOLIDE is making the best of her way towards the continent of ASIA, let us fix our eyes for a moment on the Island of TINIAN, without giving ourselves up to a particular inspection of the other islands that compose the long Archipelago of LOS LADRONES (the Thieves), to which it belongs, and which form a chain of two hundred leagues under the hundred and forty-fourth meridian east from PARIS, between the eleventh and the twenty-first parallel NORTH.

MAGELLAN, who discovered this archipelago in 1521, imposed on it the name of ISLAS DE LOS LADRONES; because the inhabitants of these islands, who had no idea of the exclusive right of property, fraternally appropriated to themselves, on board his ship, every thing that came in their way: but, at this rate, that name might be generic and common to all the islands of the GREAT OCEAN. In the sequel, the LADRONE Islands received the name of ISLAS DE LAS VELAS, from the great number of sailing-craft which came from these islands to meet ships, when they presented themselves there for the purpose of anchoring. Lastly, towards the middle of the seventeenth century, they changed their new name for that of the MARY-ANNE Islands,

Islands, in honour of MARY-ANNE of AUSTRIA, wife of PHILIP IV.

In 1564, or, according to some historians, in 1565, ANDREAS MIGUEL LOPES LEGASPI took possession of these islands in the name of the crown of SPAIN; but he made a short stay there, because he neither found the conveniences that he could desire for a settlement, nor the riches that could gratify his cupidity. He employed, to more advantage, the forces which he commanded, in the conquest of LAS PHILIPPINAS, the islands named the Archipelago of SAN LAZARO\* by MAGELLAN, who discovered them in continuing his route towards the east, after having crossed his archipelago of LOS LADRONES. It is well known that it was in one of these islands that MAGELLAN, a Portuguese by birth †, then employed in the service of SPAIN, lost his life, in wishing to favour, by the help of his arms, the projects of conquest of the sovereign of one of these islands, at war with the sovereign of a neighbouring island, both

\* This name was given them because *Magellan* made the discovery of them, and landed on them on the Saturday that preceded *Passion-Sunday*, a day which the Spaniards keep as a festival in honour of *St. Lazarus*.

† The real name of this celebrated Portuguese navigator, employed in the service of *Spain* when he discovered the strait which bears his name, is *Fernando de MAGALHAENS*, of which the Spaniards who wished to naturalize him as a Spaniard, made *Hernando MAGALLANES*, and of which the French who wish always to translate and who often burlesque proper names, have contrived to make *MAGELLAN*.

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of whom were one day to pass, together with their country, under the domination of another sovereign who, at the distance of six thousand leagues, and without concerning himself about them, was to add their islands to his vast domains. The importance of the PHILIPPINES had required that the Spaniards should make it their business to get possession of them, before they thought of the MARY-ANNE Islands: after having terminated the conquest of the former, they formed there various settlements; and particularly that of MANILLA, in the Island of LUCONIA, with which NEW SPAIN, subdued by the arms, or rather by the genius of CORTES, forty-five years before, opened and maintained habitual communications.

The Islands of LOS LADRONES remained forgotten (and it were to be wished for the sake of their inhabitants that they had always been so!) till the zeal of a celebrated Jesuit, SANTIVORES, interested the devotion of Queen MARY-ANNE of AUSTRIA, regent during the minority of her son CHARLES II. and excited her to cause the Gospel to be carried into these islands, which MAGELLAN had found means to annex to the share of SPAIN, by discovering a new route, that eluded that ridiculous *line of demarcation* by which a pope pretended to cut the earth in two, in order to divide between two sovereigns of EUROPE the exclusive possession of all the new countries that should be discovered in the two Worlds.

In 1688, the Spaniards presented themselves at the MARY-ANNE Islands, with the cross in one hand, and the sword in the other; and with these two weapons, which lent each other mutual aid, their pretended right to the possession of these islands could not fail to be acknowledged. They had no difficulty in making themselves masters of GUAHAN or GUANAM, (and GUAM by corruption) the principal of these islands, and the most southern of the archipelago\*; and, by degrees, they subdued all the others.

Our knowledge of the MARY-ANNE Islands was derived only from the Spanish historians †, and this knowledge was very imperfect; some of them lost nothing by not being better known; but TINIAN deserved to be particularly described, because the usurpers of the archipelago not having established themselves there, and this island being recommerdable on account of its fertility, it might afford valuable resources to ships crossing the GREAT OCEAN between the tropics, from east to west.

\* This archipelago is composed of nine principal islands: *Guanan*, the most considerable and the most southern, is situated in latitude  $13^{\circ}$  at its south point; but to the southward of this island, also lie several islots and rocks, the last of which extends no lower than the eleventh parallel North,

† *Ant. de Herrera, Decad. 3, Lib. 7, et seq.—Argensola Conquista de las islas Malucas, Lib 1.—Gonzales de Oviedo, Hist. nat. de las Indias—Gomara Hist. gen. de las Indias—Ultimo Viage al Estrecho de Magalhanes, &c. page 205 et alibi.*

We

We are indebted to RICHARD WALTER, chaplain to Commodore ANSON, in his voyage round the world, for the first account that has deserved the attention of navigators \*. The Commodore seeking an asylum for his ship, which might be called a floating hospital, made TINIAN, on the 27th of October 1742, and anchored in an open bay, situated at its south-west point: here he provided without difficulty, without expense, and abundantly, for all the wants of the CENTURION: here her crew recovered quickly from their fatigues: the disorder which, the very day before her arrival, was carrying off upwards of twenty men a day, ceased, as by a miracle; and, in less than a week, the worst of the sick were so far recovered, as to be able to walk without assistance.

It was natural to celebrate an island to which so great a number of seamen had owed their lives, to extol the quality of its animals, the richness of its productions, the variety of its sites, the beauty of its walks, the salubrity of its air, every thing that could operate a sort of resurrection: and, indeed, ANSON'S historian has painted to us TINIAN as the garden of EDEN realized. But, if it may be suspected that gratitude has indulged itself in exag-

\* *A Voyage Round the World in the years 1740, 1741, 1742, 1743, and 1744, Book III. Chap. II.*

generating a little the excellence of this land of promise, at least there can be no doubt of the ocular historian having reported, with exactness, facts concerning which, had his narrative been unfaithful, five hundred witnesses, also ocular, might have contradicted him: and the comparison of what TINIAN was in ANSON'S time, with what it is at this day, presents one of those astonishing contrasts which the philosopher cannot see with indifference, and without tracing back the effect to its cause.

Commodore ANSON, who gives to this island twelve miles in length by six in breadth, found it uninhabited at the period when he put in there (1742); but assiduous culture, regular plantations, fruit-trees in great number and variety, monuments still standing and disposed in symmetrical order, the labour of man shewing itself every where to aid or embellish Nature; all things announced that, at a period which must not have been remote, a numerous population had covered a land that presented to the human race so many means of subsistence, so much facility for multiplying their species. TINIAN, in fact, in a more happy time, had been very populous, in proportion to its extent, and for the honour of its new masters, we would wish to refuse our belief to the motive which has completed its ruin. ANSON learnt from a Spanish serjeant and some Indians,

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whom he had made prisoners in a *proa* \*, of which his boat took possession on going on shore, that, fifty years before, the Island of TINIAN reckoned upwards of thirty thousand inhabitants; and that, at that time, an epidemical disorder having carried off the greater part of the inhabitants of the MARY-ANNE Islands, the barbarous policy of the usurpers turned over to the Island of GUAHAN, where they were settled, all the Indians whom the mortality had spared in TINIAN: it unmercifully tore from a land, covered with the bones of their fathers, brothers, wives, children, and friends, unfortunate beings who had the mortification to survive their extinct families; it condemned them to

\* A *Proa*, which Europeans call also a *flying-proa*, is a small sailing-vessel, remarkable for its astonishing lightness, and the prodigious velocity of its movement, which that of no other vessel can equal, and which is asserted to be frequently twenty miles an hour. The ingenious construction of the *proa* must give a great idea of the intelligence and industry of the ancient inhabitants of the *Mary-Anne* Islands, who are the inventors of it. We find, indeed, in several of the islands of the great archipelago of *Asia* and on parts of that continent, some vessels which bear a faint resemblance to the *proa*; but we know of none that can be compared to it for the simplicity of its construction, the swiftness of its sailing, the celerity with which it is managed, and the readiness of its evolutions; and it may be justly said, that the *proa* is the *prototype* that has served for other craft of the seas of *Asia*, which are only the imperfect copy of the most perfect model. A very minute description of a *proa* of the *Mary-Anne* Islands, with all the plans reduced to a common scale, which can make known its dimensions, structure, and rigging, is to be seen in *Anson's* voyage, Book III. Chap. V.



water, with the sweat of their brow, a foreign soil. But cupidity was disappointed in its calculations; and these deplorable relics of TINIAN, with their eyes incessantly fixed on their native shore, died in despair. Was it then reserved for a nation of EUROPE, for a civilized nation, to be the scourge of the two Worlds? In the New, they exterminate the human species, in order to tear, from the bowels of the earth, metals, the object of all their wishes, which Nature had wisely buried! And in the parts of the Old World, which remoteness has not been able to conceal from their yoke, they degrade the human species to such a degree, as to drive men from domain to domain, as the farmer pens up his cattle on lands which he wishes to manure!

The despair of the inhabitants of TINIAN will appear natural to every man who loves his country: and what a country is TINIAN, if, in fact, RICHARD WALTER has given us a faithful picture of this island! It is he himself who is going to speak: I will not weaken his description: I merely reserve to myself the liberty of extracting and abridging, without confining myself always to an uninterrupted transcript; but I shall not take the liberty of making any change that can affect the resemblance.

“The soil of the Island of TINIAN,” says WALTER, “is every where dry and healthy, and being withal somewhat sandy, it is thereby the less disposed

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disposed to a rank and over-luxuriant vegetation; and hence the meadows and the bottom of the woods are much neater and smoother than is customary in hot climates. The land rose in gentle slopes from the very beach where we watered, to the middle of the island, though the general course of its ascent was often interrupted by vallies of an easy descent, many of which wind irregularly through the country. These vallies and the gradual swellings of the ground, which their different combinations gave rise to, were most beautifully diversified by the mutual encroachments of woods and lawns, which coasted each other, and traversed the island in large tracts. The woods consisted of tall and well-spread trees, the greater part of them, celebrated either for their aspect, or their fruit: while the lawns were usually of a considerable breadth, their turf quite clean and uniform, it being composed of a very fine trefoil, which was intermixed with a variety of flowers. The woods too were in many places open and free from all bushes and underwood, so that they terminated on the lawns with a well-defined outline, where neither shrubs nor weeds were to be seen; but the neatness of the adjacent turf was frequently extended to a considerable distance, under the hollow shade formed by the trees. Hence arose a great number of the most elegant and entertaining prospects, according to the different blendings of these woods and lawns, and their various

intersections with each other, as they spread themselves differently through the vallies, and over the slopes and declivities in which the place abounded.

“Nor were the allurements of TINIAN confined to the excellency of its landscapes only; since the fortunate animals which, during the greatest part of the year (except, indeed, when the Spaniards come and disturb their solitude for the purpose of supplying GUAHAN with provisions) are the sole lords of this happy soil, partake, in some measure, of the romantic cast of the island, and are no small addition to its wonderful scenery: for the cattle, of which it is not uncommon to see herds of some thousands feeding together in a large meadow, are certainly the most remarkable in the world; as they are all of them milk-white, except their ears, which are generally brown or black. And though there are no inhabitants here, yet the clamour and frequent parading of domestic poultry, which range the woods in great numbers, perpetually excite the idea of the neighbourhood of farms and villages, and greatly contribute to the cheerfulness and beauty of the place.”

“The cattle on TINIAN,” continues WALTER, “we computed were at least ten thousand\* ; we had

\* This number is very considerable for an island which, according to the account, is not more than four leagues in length by two leagues in breadth; for, supposing, which is not the case, that it had the figure of a parallelogram (and this is that  
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had no difficulty in getting near them, for they were not at all shy of us. Our first method of killing them was shooting them; but, at last, when, by accidents to be hereafter recited, we were obliged to husband our ammunition, our men ran them down with ease. Their flesh was extremely well-tasted, and was believed by us to be much more easily digested than any we had ever met with. The fowls too were exceedingly good, and were likewise run down with little trouble; for they could scarce fly farther than a hundred yards at a flight, and even that fatigued them to such a degree, that they could not readily rise again; so that, aided by the openness of the woods, we could at all times furnish ourselves with whatever number we wanted.

“ Besides the cattle and the poultry, we found here abundance of wild hogs: these were most excellent food; but as they were a very fierce ani-

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of the greatest surface), its superficies would yet be only eight leagues square; but its figure is that of a very elongated ellipsis, which is reduced almost to nothing at the two extremities of its great axis: and if we deduct from its surface, that of the two great pieces of water which occupy the middle of the island, and the most elevated parts of the woody hills, on which it is not probable that the herds should graze, we may reduce the surface of the ground, on which the cattle found their food, to four square leagues at most: *each league* would then have fed *two thousand five hundred oxen!* ought not also some reduction to be made in the *thirty thousand inhabitants* that the Spaniards supposed this island to contain before its depopulation?

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mal, we were obliged either to shoot them, or to hunt them with large dogs, which we found upon the place at our landing, and which belonged to the detachment that was then upon the island amassing provisions for the garrison of GUAHAN. As these dogs had been purposely trained to the killing of the wild hogs, they followed us very readily, and hunted for us; but though they were a large, bold breed, the hogs fought with so much fury, that they frequently destroyed them; whence we by degrees lost the greatest part of them.

“ This place was not only extremely grateful to us from the plenty and excellence of its fresh provisions, but was as much, perhaps, to be admired on account of its fruits and vegetable productions, which were most fortunately adapted to the cure of the sea-scurvy, the disease which had so terribly reduced us. For in the woods there were inconceivable quantities of cocoa-nuts, with the cabbages growing on the same tree: there were, besides, guavoes, limes, sweet and sour oranges, and a kind of fruit peculiar to these islands, called by the Indians *Rbymay*, but by us the *bread-fruit*, for it was constantly eaten by us during our stay upon the island instead of bread, and so universally preferred to it, that no ship's bread was expended during that whole interval\*. Besides the fruits already

\* At the time when *Walter* wrote, the bread-fruit tree and its fruit were little known; but the voyagers of these latter times

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already enumerated, there were many other vegetables extremely conducive to the cure of the malady we had long laboured under, such as water-melons, dandelion, creeping purslain, mint, scurvy-grass, and sorrel; all which, together with the fresh meats of the place, we devoured with great eagerness, prompted thereto by the strong inclination which, in scorbutic disorders, Nature never fails of exciting for those powerful specifics.

“ It will easily be conceived from what hath been already said, that our cheer upon this island was in some degree luxurious; but I have not yet recited all the varieties of provision which we here indulged in. Indeed, we thought it prudent totally to abstain from fish, the few we caught at our first arrival having surfeited those who eat of them; but considering how much we had been inured to that species of food, we did not regard this circumstance as a disadvantage, especially as the defect was so amply supplied by the beef, pork, and fowls already mentioned, and by great plenty of wild fowl; for it is to be remembered, that, near the centre of the island there were two con-

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times have described it so well, that I dispense with transcribing the description given of it by *Anson's* historian. However, it might so happen, that in reading this description, a naturalist might perceive some difference between the bread-fruit tree of *Tinian*, and that which is a production common to all the islands of the *Great Ocean* situated between the tropics.

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siderable pieces of fresh water, which abounded with duck, teal, and curlew: not to mention the whistling-plover, which we found there in prodigious plenty.

“ Having briefly recounted the conveniences of this place, the excellence and quantity of its fruits and provisions, the neatness of its lawns, the stateliness, freshness, and fragrance of its woods, the happy inequality of its surface, and the variety and elegance of the views it afforded, I must now observe that all these advantages were greatly enhanced by the healthiness of the climate, by the almost constant breezes which prevail there, and by the frequent showers which fell; for these, instead of the heavy, continued rains which, in some countries, render great part of the year so unpleasing, were usually of very short and almost momentary duration. Hence they were extremely grateful and refreshing; and were, perhaps, one cause of the salubrity of the air, and of the extraordinary influence it was observed to have upon us, increasing and invigorating our appetites and digestion.

“ After giving these large encomiums to this island, in which, however, I conceive, I have not done it justice; it is necessary I should speak of those circumstances in which it is defective, whether in point of beauty or utility. And first, with respect to its water, I must own, that, before I had seen this spot, I did not conceive that the absence

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of running water, of which it is entirely destitute, could have been so well replaced by any other means, as it is in this island; since, though there are no streams, yet the water of the wells and springs, which are to be met with every where near the surface, is extremely good; and in the midst of the island there are two or three considerable pieces of excellent water, the turf of whose banks was as clean, as even, and as regularly disposed, as if they had been basons purposely made for the decoration of the place. It must, however, be confessed, that with regard to the beauty of the prospects, the want of rills and streams is a very great defect, not to be compensated either by large pieces of standing water, or by the neighbourhood of the sea, though that, from the smallness of the island, generally makes a part of every extensive landscape.

“As to the residence upon the island, the principal inconvenience attending it is the vast numbers of muskitoes, and various other species of flies, together with an insect called a tick; this, though principally attached to the cattle, would yet frequently fasten upon our limbs and bodies, and, if not perceived and removed in time, would bury its head under the skin, and raise a painful inflammation. We found here too centipedes and scorpions, which we supposed were venomous, though none of us ever received any injury from them.

“But



“ But the most important and formidable exception to this place remains still to be told. This is the inconvenience of the road, and the little security there is, in some seasons, for a ship at anchor. The only proper anchoring-place for ships of burden is at the south-west end of the island; the peak of SAYPAN, seen over the northern part of SAYPAN, and bearing north-north-east half east, is a direction for readily finding it; the anchoring place is then eight miles distant. Here the CENTURION anchored in twenty-two fathoms water, about a mile and a half from the shore, opposite to a sandy bay. The bottom of this road is full of sharp-pointed coral rocks, which, during four months of the year, that is, from the middle of *June* to the middle of *October*, render it a very unsafe anchorage. This is the season of the western monsoons, when, near the full and change of the moon, but more particularly at the change, the wind is usually variable all round the compass, and seldom fails to blow with such fury, that the stoutest cables are not to be confided in. What adds to the danger at these times, is the excessive rapidity of the tide of flood which sets to the south-east, between this island and that of AGUIGAN, a small islet near the southern extremity of TINIAN, which, in the galleon's chart, is represented only by a dot. This tide runs at first with a vast head and overfall of water, occasioning such a hollow and overgrown sea, as is scarcely to be conceived;

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so that we were under the dreadful apprehension of being pooped by it, though we were in a sixty gun ship. In the remaining eight months of the year, that is, from the middle of *October* to the middle of *June*, there is a constant season of settled weather; when, if the cables are but well armed, there is scarcely any danger of their being even rubbed; so that during all that interval, it is as secure a road as could be wished for. I shall only add, that the anchoring bank is very shelving, and stretches along the south-west end of the island, and is entirely free from shoals, except a reef of rocks which is visible, and lies about half a mile from the shore, affording a narrow passage into a small sandy bay, which is the only place where boats can possibly land\*.”

Such was the Island of *TINIAN*, when Commodore *ANSON* quitted it towards the end of the month of *October* 1742. The only fault that could then be found with it, was, that it afforded no harbours, no roadstead where ships could anchor in safety; and it seems that Nature, who had bestowed every thing on the land of this favoured island, was determined to refuse every thing to the sea that washes its coast: for it has been seen that the fish there is not good, and the anchorage is no better. Twice had the *CENTURION* her cables cut by the sharp coral rocks, with which

\* *Anson's Voyage*, Book III. Chap. II.

the bottom is strewn; twice was she driven out to sea; and it was not without much difficulty that she could regain her anchorage, to the very great satisfaction of that part of her officers and crew, which had been left on shore by so precipitate and necessary a departure.

I have not stopped to describe those ancient monuments which were found in the island, those double symmetrical rows of square pyramidal pillars, measuring about five feet at the base and thirteen feet in height, each surmounted by a semi-globe, with the flat surface upwards, and which, at a distance, presents the appearance of a large bowl. Of these, a description may be read, and a drawing seen, in RICHARD WALTER'S narrative\*. According to the account of the Spanish prisoners, these pillars must have belonged to some Indian monasteries, and this particularity would alone be sufficient to attest the ancient population of the island: in all the countries of ASIA, the monks establish themselves wherever numbers of inhabitants can feed their idleness; and they must needs have been very numerous on TINIAN, for there

\* The pillars and the semi-globes by which they were surmounted, were solid, and formed of a composition of stone and sand, covered with plaster; but as the voyagers who visited *Tinian* 22 years after the voyage of *Anson*, make no mention of them, we must suppose that, in this interval, time reduced them to dust. However, when in 1765, *Byron* caused the Island of *Saypan* to be visited, the *Tamar's* people there found pillars similar to those of *Tinian*, and which were still standing.

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is no part of the island on which ANSON did not meet with some of these decorations of pyramidal pillars. And how should men, addicted to contemplation, not have abounded in a country where Nature, rich and beautiful, affords eternal verdure, sites picturesque and diversified, trees loaded with blossoms and fruits, meadows enamelled with odoriferous flowers, woods whose sacred shade invites to meditation and seems to command silence; a country, in short, where the beauty of the climate, and the salubrity of the air, remove diseases, and retard the fatal period in which every thing is confounded?

It is with regret that we are going to quit ANSON'S TINIAN, in order to fix our eyes on the TINIAN of which the navigators of these latter times have drawn us the picture. Both, no doubt, have painted what they saw; and of this fact we must be certain, to believe that, within the lapse of barely four lustres, the face of every thing has been changed.

Commodore BYRON put into TINIAN on the 31st of July 1765, and anchored in the same road, situated near the south-west point, which Commodore ANSON had occupied twenty-one years and a half before. Impatient to contemplate those ravishing scenes, those vast meadows enamelled with flowers where herds of cattle of a dazzling whiteness feed at liberty; impatient to breathe, with a pure air, that delicious per-

fume exhaled by the odoriferous productions of the earth, "as soon as the ship was secured," says the Commodore; "I went on shore to fix upon a place where tents might be erected for the sick. We found several huts which had been left by the Spaniards the year before; for this year none of them had as yet been at the place, nor was it probable that they would come for some months, the sun being almost vertical, and the rainy season set in. After I had fixed upon a spot for the tents," continues the Commodore, "six or seven of us endeavoured to push through the woods, that we might come at the beautiful lawns and meadows of which there is so luxuriant a description in the account of Lord ANSON'S Voyage, and, if possible, kill some cattle. The trees stood so thick, and the place was so overgrown with underwood, that we could not see three yards before us; we therefore were obliged to keep continually hallooing to each other, to prevent our being separately lost in this trackless wilderness. As the weather was intolerably hot, we had nothing on besides our shoes, except our shirts and trowsers, and these were, in a very short time, torn all to rags by the bushes and brambles: at last, however, with incredible difficulty and labour we got through; but, to our great surprise and disappointment, we found the country very different from the account we had read of it: the lawns were entirely overgrown with a stubborn kind

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kind of reed or brush, in many places higher than our heads, and no where lower than our middles, which continually entangled our legs, and cut us like whipcord. During this march we were also covered with flies from head to foot; and, whenever we offered to speak, we were sure of having a mouthful, many of which never failed to get down our throats. After we had walked about three or four miles, we got sight of a bull, which we killed, and, a little before night, we got back to the beach, as wet as if we had been dipt in water, and so fatigued that we were scarcely able to stand. We immediately sent out a party to fetch the bull, and found that, during our excursion, some tents had been got up, and the sick brought on shore.

“ The next day our people were employed in setting up more tents, getting the water-casks on shore, and clearing the well at which they were to be filled. This well I imagined to be the same that the CENTURION watered at; but it was the worst that we had met with during the voyage, for the water was not only brackish, but full of worms. The road also where the ships lay was a dangerous situation at this season; for the bottom is hard sand and large coral rocks, and the anchor having no hold in the sand, is in perpetual danger of being cut to pieces by the coral; to prevent which as much as possible, I rounded the cables, and buoyed them up with  
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empty water-casks. Another precaution also was taught me by experience; for at first I moored, but finding the cables much damaged I resolved to lie single for the future, that by veering away or heaving in, as we should have more or less wind, we might always keep them from being slack, and consequently from rubbing; and this expedient succeeded to my wish. At the full and change of the moon, a prodigious swell tumbles in, so that I never saw ships at anchor roll so much as ours did while we lay here; and it once drove in from the westward with such violence, and broke so high upon the reef that I was obliged to put to sea for a week; for, if our cable had parted in the night, and the wind had been upon the shore, which sometimes happens for two or three days together, the ship must inevitably have been lost upon the rocks.

“ I soon found that the island produced limes, four oranges, cocoa-nuts, bread-fruit, guavas, and papaws\* in great abundance; but we found no water-melons, scurvy-grass, or sorrel.

“ Notwithstanding the fatigue and distress that we had endured, and the various climates we had passed through, neither of the ships (the DOLPHIN

\* It appears that the sweet orange was no longer to be found in the island, in *Byron's* time, for he does not speak of it; but he found there the papaw, of which no mention is made in *Anson's* narrative: have the Spaniards conveyed thither the papaw-tree?

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and the TAMAR), had yet lost a single man since their sailing from ENGLAND; but, while we lay here, two died of fevers, a disease with which many were seized, though we all recovered very fast from the scurvy. I am, indeed, of opinion that this is one of the most unhealthy spots in the world, at least during the season in which we were here. The rains were violent, and almost incessant, and the heat was so great as to threaten us with suffocation.

“ Besides the inconvenience which we suffered from the weather, we were incessantly tormented by the flies in the day, and by the muskitoes in the night. The island also swarms with centipedes and scorpions, and a large black ant, scarcely inferior to either in the malignity of its bite. Besides these, there were venomous insects without number, altogether unknown to us, by which many of us suffered so severely that we were afraid to lie down in our beds; nor were those on board in a much better situation than those on shore, for great numbers of these creatures being carried into the ship with the wood, they took possession of every birth, and left the poor seamen no place of rest either below or upon the deck.

“ As soon as we were settled in our new habitations, I sent out parties to discover the haunts of the cattle, some of which were found, but at a great distance from the tents, and the beasts



were so shy that it was very difficult to get a shot at them. Some of the parties which, when their haunts had been discovered, were sent out to kill them, were absent three days and nights before they could succeed; and when a bullock had been dragged seven or eight miles, through such woods and lawns as have just been described, to the tents, it was generally full of fly-blows, and stunk so as to be unfit for use: nor was this the worst, for the fatigue of the men in bringing down the carcass, and the intolerable heat they suffered from the climate and the labour, frequently brought on fevers which laid them up. Poultry, however, we procured on easier terms: there was great plenty of birds, and they were easily killed; but the flesh of the best of them was very ill-tasted; and such was the heat of the climate that, within an hour after they were killed, it was as green as grass, and swarmed with maggots. Our principal resort for fresh meat, was the wild hog, with which the island abounds. These creatures are very fierce, and some of them so large that a carcass frequently weighed two hundred pounds. We killed them without much difficulty, but a black belonging to the TAMAR contrived a method to snare them, so that we took great numbers of them alive, which was an unspeakable advantage; for it not only insured our eating the flesh while it was sweet, but enabled us to send a good number of them on board as sea-stores.

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“ In the mean time,” adds the Commodore, “ we were very desirous of procuring some beef in an eatable state, with less risk and labour; and Mr. GORE, one of our mates, at last discovered a pleasant spot upon the north-west part of the island, where cattle were in great plenty, and whence they might be brought to the tents by sea. To this place therefore I dispatched a party, with a tent for their accommodation, and sent the boats every day to fetch what they should kill; sometimes, however, there broke such a sea upon the rocks that it was impossible to approach them, and the TAMAR’s boat unhappily lost three of her best men in attempting it. We were now, upon the whole, pretty well supplied with provisions, especially as we baked fresh bread every day for the sick; and the fatigue of our people being less, there were fewer ill with the fever: but several of them were so much disordered by eating of a very fine looking fish which we caught here, that their recovery was for a long time doubtful. The author of the account of Lord ANSON’S voyage says that the people on board the CENTURION thought it prudent to abstain from fish, as the few which they caught on their first arrival surfeited those who eat of them. But not attending sufficiently to this caution, and too hastily taking the word *surfeit* in its literal and common acceptation, we imagined that those who tasted the fish when Lord ANSON first came hither, were made sick by

merely eating too much; whereas, if that had been the case, there would have been no reason for totally abstaining afterwards, but only eating temperately. We, however, bought our knowledge by experience, which we might have had cheaper; for, though all our people who tasted this fish, eat sparingly, they were all soon afterwards dangerously ill.

“ Besides the fruit that has been mentioned already, this island produces cotton and indigo in abundance, and would certainly be of great value if it was situated in the WEST INDIES\*.”

Such was the state in which the Island of TINIAN presented itself to Commodore BYRON, during the stay that he made there in 1765, from the 31st of July to the 1st of October.

Captain WALLIS, who visited it in the month of September 1767, draws of it a picture neither more flattering, nor better calculated for retracing to us the charms of the TINIAN described by Commodore ANSON. He says, however, that “ the hunters, whom he had sent out on the day of his arrival, brought in a fine young bull of near four hundred weight: and that in this place he got beef, pork, poultry, papaw-apples, bread-fruit, limes, oranges, and every refreshment that is mentioned in the account of Lord ANSON’s voyage;

\* See *Hawkeſworth’s Compilation*. Vol. I. p. 116 and following.

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\* *Hawkeſworth’s*  
Chapter X

but that flesh meat could be scarcely kept sweet one day. There had been many cocoa-nut trees near the landing-place," continues he; "but they had been all wastefully cut down for the fruit, and none being grown up in their stead, we were forced to go three miles into the country before a single nut could be procured. The hunters also suffered considerable fatigue; for they were frequently obliged to go ten or twelve miles through one continued thicket, and the cattle were so wild that it was very difficult to come near them; so that I was obliged to relieve one party by another; and it being reported that cattle were more plenty at the North end of the island, but that the hunters being quite exhausted with fatigue, when they got thither, were not able to kill them, much less to bring them down, I sent Mr. GORE, with fourteen men, to establish themselves in that part of the island, and ordered that a boat should go every morning, at day-break, for what they should kill\*."

In addition to the refreshments before-mentioned, Captain WALLIS obtained an ample stock of limes, which he appropriated to the wants of his people.

Captain PORTLOCK, who, on the 4th of October, 1787, crossed the Archipelago of the MARY-ANNE

\* *Hawkefworth's Compilation, Vol. I. Wallis's Voyage, Chapter XI. page 279.*

Islands between TINIAN and SAYPAN, says that, in the plains of the former, he observed a number of white animals grazing, which he supposed to be the white cattle that, in Lord ANSON'S Voyage, are said to be so common there; but he reconnoitred the island only at a distance, and could not judge of its present state\*.

Captain GILBERT, commanding the ship CHARLOTTE, passed the beginning of the month of August 1788, at the anchorage of TINIAN; he would have been well pleased to find there the terrestrial paradise represented in ANSON'S voyage; but he found only the wild country of which BYRON has drawn us so hideous a picture: his account is as follows: "From the observations I was able to make, during my short stay at this island, the description given by Captain WALLIS seems to correspond the nearest with the present state of it. The ground was overgrown with underwood, and the cattle did not appear to be by far so plenty as described in ANSON'S voyage. The well, at which Lord ANSON watered, was dry; and as for the numerous springs there spoken of, few of them fell in my way. The nearest water to the landing-place lay too far off for me to receive any benefit from it, in the present debilitated state of the ship's company. Among the trees I observed great numbers of the cotton-tree, in

\* *Portlock's Voyage*, p. 317.

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full bloom; and fell in with a village, the huts of which appeared to have been for some time deserted. However, the little time I was there, I got great abundance of cocoa-nuts, cabbages, bread-fruit, wild hogs, fowls, &c. &c. I saw large herds of white cattle, but was not able to manage any of them, except a few of their calves\*."

Like Commodore ANSON, Captain GILBERT experienced the danger of the roadstead: the CHARLOTTE, and the SCARBOROUGH which anchored there near her, were forced, in a gale of wind, to cut their cables, and put to sea †.

I observe

\* *Voyage from New South Wales to Canton, in the year 1788.* By Thomas Gilbert. London, 1789. pages 66 and 67.

† In recapitulating what is reported of the road and anchorage in the different journals, to which we refer the reader for farther particulars, it appears:

That, on the 22d of September, 1742, the *Centurion* parted two cables and was driven to sea, dragging with her a third anchor, which she had let go on the edge of the bank; and that she could not regain the road till the 11th of October.

That, on the 14th of October, being but the third day after her arrival, a sudden gale of wind, brought home her anchor, forced her off the bank, and drove her to sea a second time; and she was five days before she could return to her anchorage.

That, in the beginning of August, 1768, the westerly swell forced *Byron* to get under way; and that he could not take up the anchorage again for a week.

That, on the 8th of August, 1788, the *Charlotte* and the *Scarborough* were forced to cut their cables, and put to sea.

But *Anson* affirms that, during eight months of the year, that is, from the middle of October to the middle of June, there is a constan

I observe that, among the large trees which GILBERT saw at TINIAN, he distinguished a great number of cotton-trees, and that they were in full blossom: we have seen that in 1765, BYRON had already found there the cotton-tree, together with the indigo-tree. It cannot be doubted that this island would have been very fertile, and that it would have been very easy to naturalize there the useful productions of both INDIES, if the right of conquest had subjected it to other masters than the Spaniards: but the latter, incapable of cultivating, with their own hands, every part of the earth of which they have declared themselves the proprietors, have too frequently, by a policy no less inhuman than contrary to their true interests, destroyed or dispersed, the real proprietors, the original cultivators, who alone can compensate for the insufficiency of the conquerors.

Captain SEVER, commanding the Ship LADY PENRHYN, touched at TINIAN, in the month of September 1788. He confirms all that Commodore BYRON and Captain WALLIS have reported of the present situation of this island; but although

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a constant season of settled weather, and that, provided the cables be put well armed, or buoyed up, there is little danger of their being rubbed; in short, during these eight months, the road on the south-west end of the island of *Tinian* is, he adds, as secure a road as could be wished for.

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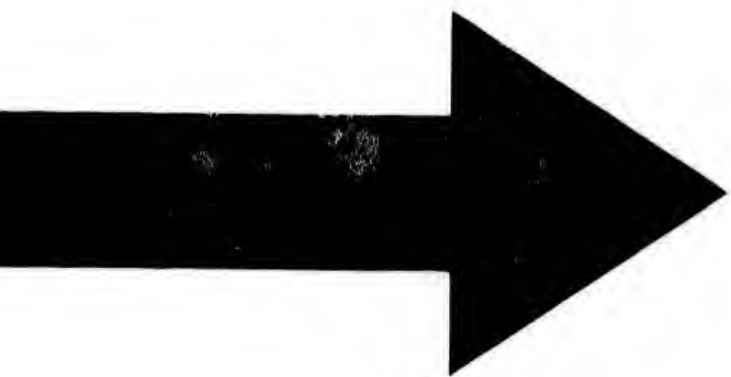
he landed there at the same time of the year as the latter, he found the season very backward; most of the fruits were not arrived at their point of maturity: however, he procured two oxen, a wild hog, and a dozen of fowls\*.

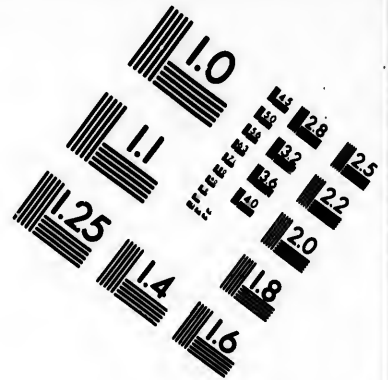
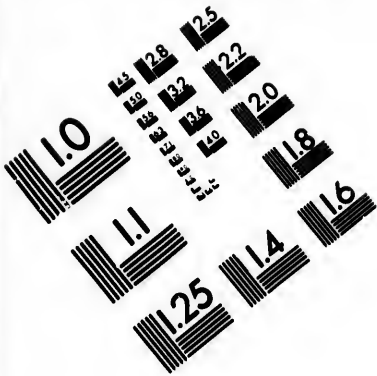
When we have read the two descriptions of TINIAN, which both, no doubt, equally merit our confidence, from the well-founded opinion of the veracity of the voyagers by whom they were written, we cannot avoid being struck with astonishment, on examining the ravages which time, whose hand is not always slow, has been able to commit in an interval that does not amount to the fourth of a century. Behold TINIAN in 1742, divided between smiling plains and sloping hills, crowned with woods whose tall trees growing in rows, at regular distances, and cleared of barren and obstructing shrubs, leave to the air a free circulation, which permits it to purify itself in its course; behold it decked out with all the gifts of the creation, which the colouring of the painter has, if you please, embellished, but the features of which he has given; and return to TINIAN in 1765: you will see withered rushes, melancholy heaths, and prickly brambles, occupy its plains, now become wastes, the places which were covered by verdant trefoil, salutary herbs, useful plants,

\* See *The Voyage of Governor Philip to Botany Bay, &c. London, 1789. 4to. page 245.*

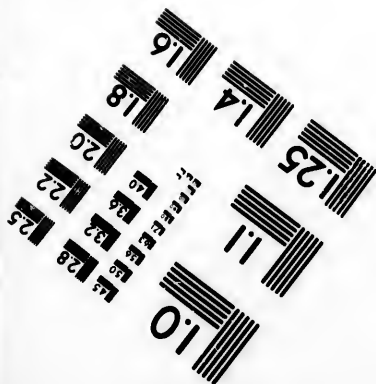
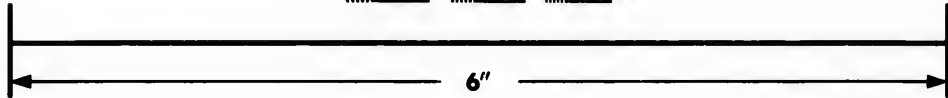
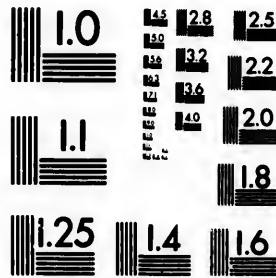








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and odoriferous flowers: seek on those lawns the numerous herds which constituted their ornament and richness, and on which a fecundified land lavished food ever-reviving: at this day, a hideous, bristling, impassable bur repels them, and denies them subsistence: attempt to penetrate into these woods, thick briars, stubborn and strong grass prohibit you from entering them; parasitical *lianes*\*, intertwined and intermingled, stretch their tendrils from one tree to another, and intercept all communication; a soil, on which the down of the enamelled moss extended into the very heart of the clumps, is now only the impure asylum of centipedes, scorpions, and all the venomous insects which live and generate their poison in the rubbish of vegetation: there no longer remains

\* *Lianes*, winding like ivy, run up the large trees which they meet with; and, there are some which, after having reached the tallest branches, throw out tendrils which fall again perpendicularly, bury themselves in the ground, there take fresh root, and rise again, ascending and descending alternately. Other filaments borne obliquely by the wind, or by some accident, frequently fasten on the neighbouring trees, and form either an impenetrable forest, or a confusion of cords hanging in every direction, which present to the eye the same aspect as the running rigging of a ship. There are *lianes* as thick as the arm; some, by dint of clasping the tree which they embrace, finish by choking it. Sometimes it happens that the tree dries while standing, rots, and entirely decays, and that there remain only the spirals of the *liane*, which form a sort of twisted column, insulated and perforated, which art would find much difficulty in imitating." (See *Bonars's Dict. de Hist. Nat.* at the word *Liane*.)

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of the former TINIAN any of the charms which occasioned to be overlooked the importunity of its gnats, the noxious quality of its fishes, and the dangers of its roadstead: the fourth of a century has been sufficient for effecting all these changes!

This contrast of two pictures so different from each other, that, in comparing them, we have some difficulty in persuading ourselves that the voyagers meant to delineate the same island; this contrast, I say, leads us back to the observation, deposited in his immortal work by the sublime philosopher, whose bold genius, traversing the obscurity of time, and hovering over space in order to aid creation, would have divined Nature, had Nature chosen to be divined, and who has at least marked out to us the track, which she might have followed, if it be not, in fact, the track which she has followed.

“Man,” says BUFFON; “master of the domain  
“of the earth, has changed and renewed its  
“whole surface, and at all times has shared the  
“empire with Nature. However, he reigns only  
“by right of conquest; he enjoys rather than  
“possesses; he preserves only by unremitting  
“care: if that cease, every thing languishes, every  
“thing changes, every thing returns under the  
“hand of Nature; she resumes her rights, effaces  
“the works of Man, and leaves him nothing but  
“the regret of having lost, through his own  
“negli-

“negligence, what his ancestors had conquered by  
“their labours\*.”

This digression has made us lose sight of the  
SOLIDE; it is time to rejoin her, that we may fol-  
low her in her route to MACAO.

After having crossed the archipelago of the  
MARY-ANNE Islands, Captain MARCHAND steered  
between west-north-west and west by north, in  
order to make the south point of the Island of  
FORMOSA.

The observations for the longitude made on  
the 16th of November in the morning, placed the  
ship, at noon on that day, in  $122^{\circ} 6'$  east from  
PARIS; and her observed latitude was  $21^{\circ} 34'$  north.  
This position afforded Captain MARCHAND the  
hope that, on the following day, he would get  
sight of the land. It appeared, in fact, the next  
morning at half past seven o'clock, and he distin-  
guished the Islands of BOTEL TABAGO XIMA †,  
situated at the distance of about five leagues from  
the south point of FORMOSA, and on the same  
parallel: the large island is a high land which may  
be perceived, in clear weather, eighteen or twenty  
leagues. At half past nine o'clock, the largest of  
these islands bore from west half north to west by  
north, and the small island, west half south, dis-  
tant about twelve leagues.

\* *Hist. Nat. 1<sup>re</sup> Vue de la Nature.*

† According to Alexander Dalrymple; and according to  
others, Botel or Bottel, Tabaco Xima, or Tabago Xima; and  
Tabaco-sima, according to D'Arville.

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At half past five o'clock in the afternoon, at the moment when the eastern extremes of both the BOTEL Islands bore, in one with each other, north by west, was perceived to the west by north the south point of the Island of FORMOSA. This part of the island presents a land of a remarkable height, which is to be perceived at the distance of twenty or even twenty-two leagues.

On the 18th, at noon, the SOLIDE had left this point to the east-north-east half north, at the distance of about four leagues and a half, and was standing on for MACAO.

Captain CHANAL, according to the observations of Captain MARCHAND, and his own, combined with various bearings taken of the land, has endeavoured to fix the geographical positions, both absolute and relative, of the BOTEL Islands, of the south point of FORMOSA, and of VELE-RETE, a very dangerous shoal, lying in the track of ships coming from the GREAT OCEAN to the northward of the BASHEE Islands. As the positions given by Captain CHANAL do not all agree with those which have been employed by ALEXANDER DALRYMPLE, in his *Chart of the China Sea*, published in 1771; by LA PE'ROUSE, in the journal of his voyage and in his chart; by GEORGE ROBERTSON, in his large *Chart of the China Sea*, which appeared in 1791, and in his *Table of Positions*, which makes part of the Memoir that accompanies the chart and serves as a foundation for it; I have thought it



incumbent on me to report them as given by each, to the end that navigators who may have an opportunity of making observations in sight of the same points, may the more easily verify the different positions, and decide which merit the preference.

According to the observations and the bearings taken on board of the SOLIDE in sight of the land :

The great Island of *BOTEL TABAGO-XIMA*, at its south-east point, is situated in  $22^{\circ} 3'$  north latitude, and  $119^{\circ} 34'$  east longitude \*. This island is sufficiently elevated to be perceived, in clear weather, at the distance of fifteen leagues: it may be four or five leagues in circumference. The fires which were seen blazing during the night left no doubt of its being inhabited, at least in a temporary manner, by fishermen, if, however, it have not inhabitants who make it their constant residence.

*	According to <i>Dalrymple's</i> Chart	Lat.	Long.
	$8^{\circ} 15'$ from <i>Macao</i> which is situated (Note LX) in $111^{\circ} 15'$ . . .	0 1 "	0 1 "
	According to the observations of <i>La Pérouse</i> . . . . .	22 6 30 ..	119 30 00
	According to <i>Chanal</i> , the middle of the island, $22^{\circ} 4'$ and $119^{\circ} 33'$ ; and in taking away 1 minute from the latitude, and adding 1 min. to the longitude, in order to reduce them to the south-east point of the island . . . . .	21 57 00 ..	119 32 00
	According to <i>G. Robertson</i> , in his Table of Positions . . . . .	22 3 00 ..	119 34 00
		22 6 00 ..	119 21 45

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But, in order not to suffer the opinion of seamen to waver, I think I may venture to take the liberty of here anticipating on the publication of LA PÉROUSE's voyage, for the purpose of adding that the island is inhabited, that it even appears well peopled, since LA PÉROUSE, on approaching very near to it, distinguished three villages within the space of a league.

The small island of the same name lies to the south by east of the great one\*, its latitude is  $21^{\circ} 57'$ , and its longitude  $119^{\circ} 36' \dagger$ . It is somewhat less elevated than the great island, but however sufficiently so to be seen ten or twelve leagues.

The passage between these two islands may be four or five miles in width: the channel and both shores appeared equally free from rocks or shoals.]

The south-west point of the Island of FORMOSA may be placed in latitude  $21^{\circ} 54'$ , according to

\* On the parallel of the middle of the great island, according to Dalrymple's chart, and on the parallel of its south-east point, according to that of La Pérouse.

	Lat.	Long.
† According to Dalrymple's Chart,	o 1 "	o 1 "
in $8^{\circ} 22'$ east from Macao . . . . .	22 7 00	.. 119 27 00
According to La Pérouse, from his		
difference of meridian in regard to		
the great island, taken on his		
chart, 5 min. more to the east-		
ward . . . . .	21 57 00	.. 119 37 00
According to Chanal (as above) ..	21 57 00	.. 119 36 00

But,

that of the ship observed on the 18th at noon, in  $21^{\circ} 48'$ , and according to the bearing, which placed this point 6 minutes more to the northward than the ship: its longitude is about  $118^{\circ} 40' *$ .

The VELE-RETE shoal lies to the south 4 or  $5^{\circ}$  west of the south point of FORMOSA, towards the latitude of  $21^{\circ} 45'$ , and longitude of  $118^{\circ} 39' \dagger$ . These rocks are even with the water's edge, and cannot be perceived at more than two leagues' distance. A ship must borrow on the point of the Island of FORMOSA, which is safe, closer than on

	Lat.	Long.
* According to <i>Dalrymple's</i> chart	0 1 "	0 1 "
7° 19' to the eastward of <i>Macao</i>	22 2 30 ..	118 34 00
According to that of <i>La Pérouse</i> , 5 min. more to the northward, and 52 min. less to the eastward than the south-east point of the <i>Great Botel</i> .....	22 2 00 ..	118 40 00
According to <i>Chanal</i> (as above) ..	21 54 00 ..	118 40 00
<i>Robertson's</i> Memoir (in his Table of Positions) .....	22 6 00 ..	118 49 45
† According to <i>Dalrymple's</i> chart		
7° 21' 20" to the east of <i>Macao</i> ..	21 48 00 ..	118 36 30
According to that of <i>La Pérouse</i> , 3 min. less to the northward, and 40 min. less to the eastward than the south-east point of the <i>Great Botel</i> ..	21 49 00 ..	118 52 00
According to <i>Chanal</i> (as above) ..	21 45 00 ..	118 39 00
According to <i>Robertson</i> .....	21 45 00 ..	118 47 45

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the shoal, to which it is prudent to give a good birth\*.

On the 18th of November, in sight of the south-west point of the Island of FORMOSA, I stop the calculation of the SOLIDE's run from the SANDWICH Islands to MACAO.

In deducing the longitude of this point from that of the south-east point of the Great BOTEI TABAGO-XIMA, which is determined by the observations of LA PE'ROUSE, we find that the former must be  $118^{\circ} 40'$ ; and according to the bearing taken at noon of the 18th, the ship was, with respect to the south-west point of FORMOSA,  $12\frac{1}{2}$  minutes less to the eastward than the point: her longitude must therefore have been  $118^{\circ} 27' 40''$ .

\* G. Robertson in his *Memoir of a Chart of the China Sea*, page 33, gives an extract from the Journal of the Royal Captain, which presents a few details respecting the *Vele-Rete* Shoal.

"On the 23d of October 1762, at 9 A. M. saw the Rock "*Vele-Rete* bearing west by north; at noon, it bore north  $2\frac{1}{2}$  leagues: it seems environed with rocks, extending a mile or two round it, on which the sea breaks very high: I judge its distance from the south part of *Formosa* to be 5 or 6 leagues; and, appearing very small, it is not to be seen above 3 or 4 leagues in clear weather. When this rock bore north-west by north, we perceived the water discoloured; but in half an hour it changed its hue to a sea-colour.

"Latitude observed  $21^{\circ} 38'$  north,

"Ditto of the rock  $21^{\circ} 45'$  north."

Since *Vele-Rete* is in latitude  $21^{\circ} 45'$ , nearly south of the south point of *Formosa*, and since this point lies in about  $22^{\circ}$ , the width of the passage between the island and the shoal must be 15 miles or 5 leagues.

But on the 16th at noon, the longitude of the SOLIDE deduced from the observations was  $122^{\circ} 6'$ ; and, from the 16th to the 18th, the progress by account towards the west had been  $3^{\circ} 43'$ : thus her longitude on the 18th was  $118^{\circ} 32'$ . It is seen that it differs from the true only by 4 minutes, or about a league and a quarter\*: and the difference might have been more considerable, without our navigators being justified in imputing it to the observations of the 16th, since they were obliged to employ the dead reckoning for the forty-eight hours elapsed between the 16th and the 18th.

If, at present, we wish to find the error of the reckoning on the whole of the run, we have only to compare the difference of longitude indicated by the dead reckoning between the point of departure on the 7th of October and the point arrived at on the 18th of November, with the true difference deduced from the observations which have fixed the position of these two extreme points.

The true difference of longitude is  $83^{\circ} 3' \dagger$ ; the

\* See Note LVIII.

† Longitude of the point of departure in sight of *O-Whydee*, on the 7th of October,  $158^{\circ} 29'$  west—Longitude of the point arrived at in sight of the south-west point of the Island of *Formosa*, on the 18th of November (as above)  $118^{\circ} 28'$  east. Difference of longitude  $83^{\circ} 3'$ . (See the *Journal of the Route* at the 7th of October and at the 18th of November, and Note LVIII.)

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difference given by the dead reckoning is  $76^{\circ} 44' *$ . The latter is therefore smaller than the former by  $6^{\circ} 19'$ , which, on the parallel of the point arrived at, answer to a little more than one hundred and seventeen leagues.

If we divide this sum of the partial errors of the reckoning, by the number of days of the run, that is to say, by  $41\frac{1}{4}$ , we shall have for the mean error in twenty-four hours,  $8\frac{1}{6}$  miles: and the quantity of this error confirms a remark which we have reason to make in reading the journals of navigators; this is, that in crossing the GREAT OCEAN between the tropics, the general current of the waters, from east to west, carries ships to the westward by an imperceptible movement which may be estimated at eight or nine miles, or about three leagues a day. But this movement, which escapes the uncertain methods of the pilot, cannot escape the observations of the astronomer.

On losing sight of the Island of FORMOSA, the SOLIDE directed her course for MACAO.

On the 20th, land was discovered at half past six o'clock in the morning; it bore north-west; but the mist did not yet allow of its being distinguished; Captain MARCHAND stood on to approach it. The fog not having cleared up, he

\* Longitude of the point of departure  $158^{\circ} 29'$  west—Longitude of the point arrived at, by account,  $124^{\circ} 47'$  east. Difference of longitude, by account,  $76^{\circ} 44'$ . (See the *Journal of the Route*, and Note LVIII.)

was compelled to pass the night in making short boards.

The next morning, at half past seven o'clock, he discerned PEDRA BRANCA (the White Rock) to the west by south  $3^{\circ}$  south: he steered so as to pass to the southward of it; and at half past nine, it bore directly north, distant two miles. PEDRA BRANCA is a small white rock, high, and steep, situated eighteen leagues to the east-north-east of the GRAND LEMA, the most eastern and the most considerable of the group which bears that name \*, and lies to the eastward of the numerous islands that form the roads of MACAO, and the mouth of the river of CANTON. PEDRA BRANCA may be perceived at four or five leagues' distance.

The sea was covered with fishing-boats. Captain MARCHAND fired a gun as a signal for a pilot acquainted with the coast; and it was not long before an officious Chinese, but we cannot say a

\* According to *G. Robertson* (page 12 of his *Memoir of a Chart of the China Sea*) the latitude of *Pedra Branca*, from a good observation, is  $22^{\circ} 20' 00''$  north; and its longitude from *Greenwich*  $115^{\circ} 8'$  deduced from *Macao*, or  $115^{\circ} 14' 00''$ , if we place *Macao*, as I have done (Note LX) in  $113^{\circ} 35' 15''$ . *Robertson* adds that its longitude was confirmed by nine sets of astronomical observations (objects east and west of the moon,) made by Captain *W. Frazer*; whose mean of the whole places it in  $115^{\circ} 4'$  east. If we choose to take a mean between these two determinations, we shall have  $115^{\circ} 9' 00''$  east from *Greenwich*, or  $112^{\circ} 48' 45''$  east from *Paris*: *Robertson* has adopted  $115^{\circ} 8' 00''$  from the meridian of *Greenwich*.

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disinterested one, made his appearance. The weather being rather bad, he was not afraid of rating his services at too high a price: he demanded 70 dollars, and required that the sum should be paid him beforehand: as he neither understood French, English, nor Portuguese, and as Captain MARCHAND neither had the means nor the time to dispute about the sum, he paid it, and put the SOLIDE under his direction, with the confidence that the blind man has in his guide.

The wind blew from north-north-east to north; and, agreeably to the indication of the pilot, the ship was brought close to the wind in order to keep the coast aboard.

At half past one o'clock in the afternoon, PEDRA BRANCA bore east-north-east half north, distant about four leagues; and, a little time after, was out of sight. Captain MARCHAND regulated his course by the *Chart of part of the coast of China, &c.* published by ALEXANDER DALRYMPLE, a copy of which is to be found in D'APRES' *Neptune Oriental*, 2nd edition, No. 53.

The weather was overcast and misty: at half past five o'clock in the afternoon, the pilot proposed to come to for the night; and the anchor was let go in eighteen fathoms, over a bottom of soft mud; little SINGLE Island bearing north-east half east, and TONEANG Island north-east by north, at the distance of two or three leagues from these islands; the GRAND LEMA south-west.

On



On the 22nd, in the morning, Captain MARCHAND got under way with a fresh breeze at north-north-east, and steered west-south-west, in order to range along the south coast of POO-TOY, and pass to the northward of the GRAND LEMA. The ship had run eighteen miles to the west south-west half south: LING-TING Island bore west by south, and the Island of POO-TOY, from north-north-west to north-north-east, at the distance of half a mile, when he hauled his wind to steer for the Peak of LAN-TAO, and pass to windward of LING-TING. But the wind came round to the north-north-west, at the same time blowing strong: as it was no longer possible to weather the north side of this last-mentioned island, the pilot bore up in order to pass it to the southward.

Captain CHANAL remarks, that to the northward of LING-TING, are seen two shoals, even with the water's edge, which are not laid down on DALRYMPLE'S chart: the distance from the most northern of these shoals to the island is rather more than a mile.

At half past noon, the SOLIDE was to the southward of LING-TING; Captain MARCHAND hugged the wind, leaving on the larboard hand, to leeward, the SA-MOAN Islands and those of Tsoy, and steering for CHI-CHOW Island, in order to double it to the southward: the wind blew strong from the northward.

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Quite close to the SA-MOAN and TSOV Islands, are seen some small islots, which are not laid down on the chart; but they are not dangerous.

In the mean time, the wind continued to scant more and more: and, although the ship carried all the sail that circumstances would allow, no hopes were entertained of her being able to weather some shoals, situated to the northward of the CHOOK-CHOW Islands, which the chart has not indicated. Captain MARCHAND determined to anchor under CHI-CHOW Island, where he came to, at a quarter past three o'clock, in thirteen fathoms, over a muddy bottom; the Peak of that island bearing north-north-east half east, one mile from its south-west coast; the most eastern of the CHOOK-CHOW Islands south-south-west half south; and the peak of the Island LAN-TAO north by east.

CHI-CHOW consists of two small islands close to each other; although, on the chart, these two islands are represented as one only.

On the 23d, the wind blew with too much violence, from north to north-north-east, for the SOLIDE to get under way: this day was spent at anchor, and the ship was thus detained, till the morning of the 25th, by an alternate contrariety of wind or tide.

The latitude of the anchorage was observed on the 24th, at noon, in  $22^{\circ} 3' 30''$  north: which places the south coast of the island in  $22^{\circ} 4'$   
or

or 5'\*. It was high water at eleven o'clock in the morning, at the distance of two days from the new moon: the flood set to the west-north-west; and the ebb, to the eastward.

On the 25th, at six o'clock in the morning, the weather at length permitted Captain MARCHAND to get under way: the wind was moderate, and the first of the flood was favourable to the course: he made a short stretch to the eastward; and, on putting about again, the ship looked up for the road of MACAO.

He ranged along the Island of LAF-SAM-MEE, which he doubled to the southward; thence, he steered for that of CHUC-TUAN, which he passed, leaving it on the starboard hand at a very small distance: at the moment when it bore north, LAF-SAM-MEE bore east-north-east, and POTOZ (TAILOW-CHOW on the English chart) west-south-west. With the wind which had veered to the northward, blowing fresh, he passed between the small Islands TAI-LOCK and SY-LOCK: the channel that they leave between them is narrow, and its middle is obstructed by a small rock, which is above water; but the pilot, by signs, gave our

\* I observe that, on *D'Après'* chart, N° 53, and on that of *Dalrymple*, of which it is a copy, the latitude of the south coast of *Chi-Chow* Island is 22° and about *thirteen minutes*, that is, 8 or 9 minutes more northerly than that given by the observation on board the *Solide*; but on these same charts, *Macao* is placed in 22° 18', that is, 5½ minutes too much to the northward.

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navigators to understand that there exists no hidden danger, and that a ship may, with safety, make free, with both islands and the rock in the middle. The SOLIDE, in fact, passed very close to SY-LOCK; to the eastward of this island, is seen a small rocky islet, near which were found five fathoms water; and this is the smallest depth that was met with between the islands: near SY-LOCK, the soundings were eight fathoms.

After Captain MARCHAND had passed the islands, he continued to hug the wind in order to fetch the anchorage of MACAO, for which he was steering; he was obliged to make a board to the eastward; and, at half past eleven o'clock, he dropped anchor in five fathoms and a half water, over a bottom of soft mud; the town of MACAO bearing west-north-west half west, distant two leagues; the east point of the south peak of MONTANHA (Mountain) Island south-west by south; LING-TING Island north-north-east half east; and the peak of LAN-TAO east north-east half north. In this position, the latitude which was observed on this same day at noon, was  $22^{\circ} 11'$  north.

The anchors came home in this first birth, with a fresh wind from north to north-north-east. Two days after, Captain MARCHAND took another anchorage more to the northward, in six fathoms, with the same bottom as that of the former. The town of MACAO then bore west  $8^{\circ}$  south, at the distance of two leagues.

As

As the *SOLIDE* had sailed round the world in taking her route by the west, she had lost a day when she arrived at *MACAO*, and Captain *MARCHAND* was obliged to change the computation of time; the day after his arrival, in lieu of reckoning Saturday the 26th of November, as he ought to have done in following the calculation of the ship from the period of her departure from *MARSEILLES*, he subtracted that day from the calendar, and reckoned Sunday the 27th.

The news that Captain *MARCHAND* learnt at *MACAO* disconcerted all the speculations which the owners of the *SOLIDE* had in view in the expedition of their ship to the *NORTH-WEST* coast of *AMERICA*; and a failure, in the first instance, must have had an influence on every farther operation which depended on the sale that would have taken place in *CHINA*. He was informed, on his arrival, that the Chinese government had, under severe penalties, just prohibited all introduction of furs into the southern parts of the empire, and particularly that of otter-skins. The rigour of this prohibition was pretty generally attributed to some stipulation made in favour of the Russians, in the new treaty of commerce between the Emperor of *CHINA* and the Empress of *RUSSIA*, a treaty that must necessarily have originated from the disputes which had occurred latterly between these two powers, and which were known to have been terminated to the satisfaction of both; but some persons

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sons who thought themselves more clear-sighted or better informed, conceived that the prohibition was to be imputed solely to the avarice and cupidity of the Mandarins. From whatever cause it arose, the prohibition subsisted in all its force, and it even appeared impossible to be evaded. Already a Spanish ship, which had come from MANILLA with three hundred otter-skins, had been, from the impossibility that was experienced of dealing with the Chinese traders, forced to deposit her cargo in a storehouse, on which the senate, self-denominated Portuguese, but acting only at the voice or through the impulse of a Mandarin, were obliged to cause the seals to be affixed: an English ship, likewise laden with furs, had, by going up to WHAM-POA or WAM-PU, attempted to elude the vigilance of the customs; but not having been able to procure the sale of a single skin, her commander resolved to carry his whole cargo to ENGLAND: a Portuguese brig and another English vessel were expected from the coast of AMERICA with cargoes of the same kind, and it was supposed that a French ship which was to have been dispatched from Port l'ORIENT, since the SOLIDE had sailed from France, might have the same destination, and arrive at MACAO in the next season. This union of unfavourable circumstances left little hope of trading with advantage, even in case that the prohibition should happen to be taken off during the SOLIDE's stay at MACAO; for the great competition

tion of venders must necessarily have lowered the furs to such prices that the sale would yield a loss rather than a profit.

Captain MARCHAND, however, before he came to any determination, waited till he received an answer from the correspondents of the house of BAUX, settled at CANTON (QUANG-TCHEOU-FOU), to whom he had written in order to procure more precise information; but this answer confirmed every thing that he had heard at MACAO: the impossibility of selling at CANTON the cargo of furs, on account of the prohibition; the inutility of going up to WHAM-POA, where the ship, although not of a considerable burden, would be taxed by duties, the sum of which would amount to no less than six thousand dollars. A tax so enormous was occasioned by the want of activity of foreign trade; this year, there was scarcely reckoned in the port of CANTON, half the number of ships that had come to trade there the preceding year; and the Mandarin collector, being obliged to pour, annually, into the treasury of the empire, an equal sum, whatever may have been the produce of the customs, finds a very simple method of bringing this produce to a par with his obligation, and even, it may be supposed, of rendering it much greater; he doubles or triples, at his pleasure, and according to circumstances, the duties to be levied on ships that touch at CANTON. The Chinese government, whatever encomiums may

may have wisdom or rant that mote the frequent follow.

From MARCHAND every idea the change remained as soon as of FRANCE of his own for a full

The country annexed prices as it was the first dollars. former year of them appears which the new by HANNA rate of

may have been passed by several writers on the wisdom of its administration, seems to be still ignorant that the augmentation of duties does not promote the increase of the produce; and that, most frequently, a quite contrary effect must thence follow.

From the certain information which Captain MARCHAND had just received, he relinquished every idea of a sale, even by having recourse to the channel of smuggling, the only one that remained open to him, and he resolved to put to sea as soon as possible, in order to proceed to the Isle of FRANCE; where, according to the instructions of his owners, money would be transmitted to him for a further commercial operation.

The correspondents of the house of BAUX had annexed to their answer, a memorandum of the prices at which furs had sold the preceding year: it was there seen that the price of otter-skins of the first quality had not risen to more than fifteen dollars. In comparing these prices with those of former years, which we learn from the detail given of them by the Editor of DIXON'S Journal\*, there appears a considerable decrease in the profits with which the Europeans flattered themselves from this new branch of commerce: in 1786, Captain HANNA had sold skins of this description at the rate of sixty dollars; in 1787, they had fallen to

\* *Dixon's Voyage*, page 316 and following.



fifty; but, in 1788, Captain MEARES made them rise to seventy, and some even to ninety-one; though in the same year, and shortly after, those of Captains PORTLOCK and DIXON experienced a considerable decrease, the markets of CHINA were already abundantly supplied, and there was felt the inevitable effect of too large a stock: the skins, exported latterly, greatly exceeding the proportion of the wants foreseen, the new and the old were reciprocally depreciated.

But the taste of the Chinese for furs is so decided, so general, and this nation is so wedded to its habits, that it may be presumed, that, if the prohibition be not speedily taken off, the activity of the venders and the eagerness of the purchasers, seconded by the cupidity of a Mandarin, will find means to evade the law, as has happened with respect to the introduction of opium; and, the avenues being then open to smuggling, the prices will rise or fall alternately, in proportion to the difficulties, more or less great, which this illicit traffic may meet with.

Captain MARCHAND, during his stay at MACAO, had frequent occasions of experiencing the injustice and oppression of the Chinese government, of which there is no voyager who does not loudly complain, if he has made ever so short a stay in the only port of CHINA, the access to which is open to foreigners. Obligated to apply to a *Comprador*, or Chinese broker, for the purchase of their provisions, which  
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they are not they pay for Portuguese g debasement v solence, the darin. Their rors of INDI QUERQUE, in under the fer who, with th despotic sove rulers of As are oppressed the world, fo that the ocea

I should de detail respect customs, and voyager, no ject, filled w is not one wh much ill of th bibe an opin them, if we and its two h the report of dore ANSON in order to hideous, the

they are not permitted to procure for themselves, they pay for every article double its value. The Portuguese government of MACAO is in a state of debasement which can be compared only to the insolence, the avidity, and the knavery of a Mandarin. There it is that are to be seen the conquerors of INDIA, the successors of the great ALBUQUERQUE, in the dependence, and, in a manner, under the ferula of a Chinese custom-house officer, who, with the title of *Hoppo*, exercises a sort of despotic sovereignty; every moment, makes the rulers of ASIA kiss the iron rod by which they are oppressed; and seems to revenge this part of the world, for the tyranny of the first Europeans that the ocean threw on its shores.

I should deem it superfluous to enter into any detail respecting the government, the manners, the customs, and the arts of the Chinese: there is no voyager, no missionary, who has not, on this subject, filled whole volumes; and, probably, there is not one who has not said too much good or too much ill of these various matters. We should imbibe an opinion undoubtedly too unfavourable of them, if we were willing to judge of the empire and its two hundred millions of inhabitants, from the report of navigators, who all, from Commodore ANSON, have improved the one on the other, in order to paint by new touches, always more hideous, the dishonesty of the Chinese government,

which, according to their accounts, can be equalled only by that of the individuals to whom, says the philosophic historian of the two INDIES, there no longer remains that shame common to all knaves, who choose to be so, but who do not suffer people to tell them of it\*. But navigators absolutely insist that we should judge of all CHINA, by the city of CANTON, the only one of which they can get a glimpse, and into which they are not allowed to penetrate but with formalities that would render null the talents of the observer the most clear-sighted, and the most habituated to form, by a rapid glance, a judgment of men and things. In reading what they say of CHINA, we recall to mind, in spite of ourselves, that well-known anecdote of a traveller, who having, in an inn, had an altercation with the mistress of the house, that was red-haired and ill-tempered, noted down in his common-place book, that all the women of the country were ill-tempered and red-haired. How can EUROPE ever fix its opinion respecting an immense empire, alike shut against strangers who have not the liberty of entering it, and against the natives who have not that of coming out of it? Perhaps, in order to succeed in forming an idea that would come near the truth, we must

\* Raynal, *Histoire Philosophique et Politique des Etablissements et du Commerce des Européens dans les deux Indes.*

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wait, as RAYNAL says, till permission be given to disinterested and judicious men, deeply versed in the language, both as to writing and speaking it, to make a long stay at the court of PEKIN, to visit the provinces, to inhabit the country-places, and converse freely with the Chinese of all ranks\*. The enumeration of every thing that would be necessary for bringing us acquainted with CHINA, naturally leads us to pronounce, that we shall never know it otherwise than as we lately knew the inside of a convent, from having been admitted sometimes into the parlour.

During the SOLIDE's stay in MACAO road, three English East-Indiamen passed by without stopping, and continued their route in order to proceed to EUROPE. Captain MARCHAND availed himself of this opportunity of writing to his owners, and of addressing to them the particular chart of the ILES DE LA RÉVOLUTION which he had discovered, on the 22d of June 1791, to the north-west of the group of LAS MARQUESAS DE MENDOÇA. We are certain that this chart reached FRANCE, and that the house of BAUX laid it at the feet of the national Assembly upwards of four months and a half before the SOLIDE's return; for, on the 17th of April 1792, the chart was presented to that assembly, which decreed that honourable men-

\* Raynal, *Histoire Philosophique et Politique des Etablissements et du Commerce des Européens dans les deux Indes.*

tion should be made of it in the verbal-process of that day\*.

About the same time, arrived in the road an American brig, an officer belonging to which came to beg Captain MARCHAND's permission for the surgeon of the SOLIDE to go on board of this vessel, in order to give his advice to the captain who was ill. Captain CHANAL, being directed to repair thither with Surgeon ROBLET, for the purpose of offering to the American captain every assistance in the French captain's power, had an opportunity of learning the object and the success of this vessel's voyage.

She had sailed, fifteen months before, from New ENGLAND. In the beginning of May 1791, she

\* Captain *Chanal* has procured, from the Archives of the Republic, an extract from this verbal process, which I transcribe from the original that he put into my hands.

ARCHIVES OF THE FRENCH REPUBLIC.

*“ Extract from the verbal-process of the National Assembly, of the 17th of April 1792, 4th year of Liberty.”*

“ A Member presents to the Assembly a chart of several islands, newly discovered in the Indian seas by the Sieur *Marchand*, of *Marseilles*, commander of the ship *Solide*, dispatched to the South Sea, by Messrs. *J. and D. Baux*, ship-owners; he moves that honourable mention should be made of this offer. The proposition is decreed.

*“ Collated and found conformable to the Original deposited in the Archives of the French Republic, by me, Keeper of the Archives; in witness whereof I have signed and caused to be affixed the seal of the said Archives. Paris, 5th Ventose, year five of the French Republic one and indivisible.”*

*Signed to the Original, CAMUS.*

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had put into the Bay of LA MADRE DE DIOS in the Island of SANTA CRISTINA of the MARQUESAS DE MENDOÇA; but her boats had not been sent on shore, and she had received on board wood and water, which the natives had brought in their canoes. On quitting this bay, and standing to the north-west, the American Captain had discovered a group of *nine* islands on which he had imposed names; but he had not stopped there, and had not even detached a boat to examine them closely and visit them: he had contented himself with having a view of them, and had not thought himself bound to deviate from his route for the purpose of acquiring a more particular knowledge of them.

From the latitude which the American captain gave to the islands which he had seen; from their relative positions with respect to each other, and to the MARQUESAS DE MENDOÇA, Captain CHANAL could not doubt that the REVOLUTION Islands, which Captain MARCHAND had discovered in the month of June of the same year, were the same as those which the American captain had perceived in the month of May; or that at least the REVOLUTION Islands made part of these latter; "for," says Captain CHANAL, "Captain MARCHAND reckoned only *four* principal islands, while the American captain reckoned *nine* in the group which he discovered."

I cannot entirely adopt the opinion of Captain CHANAL: I am persuaded, as he is, that the group of the American is the same as that of the French captain; but I think that he has not rightly understood the captain of the brig, and that, when he said that his group is composed of *nine* islands, he meant that the group of the MARQUESAS DE MENDOÇA of which till now five islands only, LA MADALENA, SAN PEDRO, SANTA CHRISTIANA, LA DOMINICA, and HOOD'S Island, have been reconnoitred, is composed of *nine*, by the addition of the *four* new islands which he has discovered to the north-west of the former MARQUESAS; and on what follows I ground my opinion:

If the reader cast his eye on the large planisphere which the English geographer ARROWSMITH published in 1794, he will see to the north-west of the MENDOÇA Islands, a new group situated with respect to those islands, as is, in regard to them, the REVOLUTION group: both occupy about a degree and three-fourths in latitude; both are composed of four principal islands and of a few islots or rocks: and if we did not read English names in the place of French names, we might suppose that ARROWSMITH has had a knowledge of the group of the REVOLUTION Islands, discovered by Captain MARCHAND, and which he has inserted in his planisphere, from some plan where these islands were not regularly placed, but merely scattered at hazard. In comparing the  
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group delineated by the English geographer with that of which Captain CHANAL has constructed the chart, and in carrying the eye, in this comparison, along both groups from south-east to north-west, it is seen that the small island, called RTOU'S Island by the English, is the little ILE PLATE of the French; that TREVENNEN'S Island of the former is ILE MARCHAND of the latter; that SIR HENRY MARTIN'S Island, the largest of ARROWSMITH'S group, is ILE BAUX, the largest of MARCHAND'S group; that the two rocks called HERGEST'S ROCKS by the English, are the rocks called LES DEUX FRÈRES by the French; and that, in short, the two most northern islands, which lie north-east and south-west, with respect to each other, under the single name of ROBERT'S ISLANDS, are ILE MASSE and ILE CHANAL, which have between them the same bearing as the former, and whose distance is the same on the two charts. It therefore appears to me proved, that if, as we must suppose, the new group which is seen on ARROWSMITH'S planisphere, to the north-west of the MARQUESAS DE MENDOÇA, is that which the American captain discovered, this group is composed of a number of islands equal to that of the REVOLUTION ISLANDS; and that if this Captain has said that the group which he saw is composed of *nine* islands, he meant to speak of the whole archipelago of the MARQUESAS, of which the *four* new islands (that we reckon for *five*) are only an integral group



gral part, which, added to the *five* old islands, discovered by MENDANA, and found again by Captain COOK, form, in fact, that archipelago composed of *ten* islands\*, which the hydrographer of the islands of the GREAT OCEAN, TUPIA, had delineated on his chart, before any modern navigator had explored the portion of that archipelago formerly discovered by MENDANA.

The scale of ARROWSMITH'S planisphere is too small for us to be able to take, with any degree of precision, the latitude of each of the new islands in particular, as well as their relative differences of longitude, and to compare them afterwards with

\* It appears that the American Captain has not reckoned in the number of his islands the small island called, by the English *Riou's* Island (our *Ile Plate*); and the new group is thus composed, according to him, of only *four* islands (the four principal islands of those reconnoitred by *Marchand*), which, with the five *Mendoça* Islands, compose his whole group of *nine* islands that we carry to *ten*, reckoning our *Ile Plate* for one.

The following note is taken from the *Additions* to Vol. I. of the original 4to edition.—*Translator*.

“ Thus I reasoned,” says M. FLEURIEU, “ before I had read an account of the complete survey which Lieutenant *Hergeft* made, in 1792, of the group situated to the north-west of the *Marquesas de Mendoça*; but it may be seen, in the *Additions to the Voyage*, that, without reckoning our little *Ile Plate* for any thing but an islet or a rock, the *north-west* group is, in fact, composed of *ten* islands, as I had supposed, because Captain *Marchand*, from the route which he followed in sight of these islands; could not perceive one of them, situated 7 leagues to the eastward of his *Ile Baux*, and which was called *Riou's* Island by Lieutenant *Hergeft*.”

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those which are assigned to them by the observations made and bearings taken by Captains MARCHAND and CHANAL; but, admitting that there are differences rather considerable in the latitudes, in the longitudes, and, consequently, in the bearings and distances, these differences do not destroy the proofs of the identity of the groups: for it is well known that the American captain had, as it were, only a glimpse of his, in passing, and could, at most, but give a sketch of it; whereas Captain MARCHAND, by numerous observations and bearings, has ascertained, on the one hand, the latitudes and the relative situations of the islands which compose the REVOLUTION group; on the other, their position with respect to the group of the MARQUESAS; and as Captain CHANAL has constructed a chart of it with the authorities of which his journal has made us acquainted.

Captain MARCHAND, undoubtedly, cannot aspire to the honour of priority; but he has not, on that account, like the American captain who anticipated him, the less pretension to the honour of the discovery; for he could not know, in the month of June 1791, while he was navigating in the GREAT OCEAN, that a month before, another navigator, standing the same course with himself, had made the same discovery. We must, however, grant to the French Captain an additional merit, that of having made known to us the natives of the new islands, and of having fixed the geographical

phical positions of this group with an exactness sufficient for the safety of navigation.

I must not omit that the American Captain mentioned to Captain CHANAL, that, during his navigation in sight of the new islands, he constantly perceived, to leeward, an appearance of land, the form, the distance, and the position of which had not varied all the time that he was abreast of these islands. This remark, conformable in all points to that which was made on board of the SOLIDE, in the same track of sea, and in the same situation, seems to afford nearly the certainty that, to leeward of this new group, there exist other lands still unknown.

Captain CHANAL, in his conversation with the captain of the American brig, picked up a few other particulars of his voyage, which will not appear foreign to that of Captain MARCHAND.

This vessel had traded for the fifteen hundred furs which she brought to CANTON, partly on the coast of AMERICA, to the southward of QUEEN CHARLOTTE'S Islands, partly along the west coast of those islands; but she had proceeded no farther to the northward than CLOAK BAY, and had employed only forty days in carrying on her trade. Her voyage presents no discovery in that quarter.

During the stay which, on his return from the NORTH-WEST coast, the American Captain had made at ATOOI, the most northern and the largest of the west group of the SANDWICH Islands, he had

had received two years English brought obliged effect they had they had those islands soners. ought to sailors; b Captain C SON, and RESOLUT it their natives of cused of the certain been willing they do not strongly in I leave of two sailors sufficient no less intent on this point Have the fully reported to make

had received on board his vessel two sailors, who, two years before, had been carried off from an English brig by the natives of the island, and were obliged to employ no small share of cunning to effect their escape. These two men reported that they had been well treated; but they affirmed that they had been convinced with their own eyes, that those islanders are cannibals, and eat their prisoners. I know not what degree of confidence ought to be granted to the testimony of these two sailors; but, it appears, on the other hand, that Captain COOK, Lieutenant KING, Surgeon ANDERSON, and several of the officers belonging to the RESOLUTION and the DISCOVERY, who had made it their particular business to inquire whether the natives of the SANDWICH islands ought to be accused of cannibalism, were never able to obtain the certainty of the fact; and if they have not been willing to pronounce the negative, at least they do not suffer it to be doubted, that they were strongly inclined to repel this horrible accusation. I leave others to judge whether the testimony of two sailors, however positive it may appear, be sufficient for deciding a question, which observers, no less intelligent than enlightened, and particularly bent on inquiries which might fix their opinion on this point, have not succeeded in clearing up. Have these sailors seen distinctly? Have they faithfully reported what they saw? Have they not wished to make a sort of merit, have they not thought to give

give themselves a degree of consideration and importance, in announcing themselves as men who had escaped the tooth of cannibals? They may, besides, probably have been deceived by appearances: for it is well known, that the custom of the natives of the SANDWICH Islands is to cut in pieces the bodies of their dead enemies, which they have been able to seize on, to burn their flesh, and to preserve their bones as trophies, which are to perpetuate the memory of their exploits. Thus it was that they dealt with the body of the unfortunate COOK. When Captains CLERKE and GORE, Lieutenant KING, and the other companions of that heroic navigator, claimed the remains of their HECTOR, and had obtained that they should be restored to them, these remains were wrapped up in a large quantity of fine new cloth, and covered with a spotted cloak of black and white feathers\*. "We found in the bundle," says KING, "both the hands of Captain Cook entire, which were well known from a remarkable scar on one of them, that divided the thumb from the fore-finger, the whole length of the metacarpal bone; the skull, but with the scalp separated from it, and the bones that form the face wanting; the scalp, with the hair upon it cut short, and the ears adhering to it; the bones of both arms, with the skin of the fore-arms hanging

\* *Cook's third Voyage.* Vol. III. page 79.

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\* *Cook's*  
 † *Ibid,*

“ to them; the thigh and leg-bones joined together, but without the feet. The ligaments of the joints were entire; and the whole bore evident marks of having been in the fire, except the hands, which had the flesh left upon them, and were cut in several places, and crammed with salt, apparently with an intention of preserving them\*.” The English also claimed the bodies of the marines who had been killed; but the natives explained that the common people had shared their members among them, and that they were irrecoverable: they added that they would bring the remaining bones of the captain, “ these alone having been preserved as belonging to TERREEOBOO (the principal chief of the island) and the *Earees* †.” In the whole course of this melancholy treaty, the English gathered no indication which could make them suspect that their unfortunate companions had served as food to their murderers: we merely discover, in the eagerness of the chiefs to possess some portion of a being who had seemed to them supernatural, whom they thought invincible, perhaps even invulnerable, and who had fallen under the dagger which he himself had forged, we discover, I say, that desire natural to warlike and half-savage islanders, to possess a monument of their victory, a testimony of their

\* *Cook's third Voyage*. Vol. III. page 79.

† *Ibid*, page 81.

valour. Perhaps too superstition is blended with this sentiment of pride; perhaps, after having deified Captain Cook in his life-time, they wished, by sharing his mortal part, to preserve his remains in the nature of talismans, or to expose them, as relics, to the veneration of the people. Be this as it may; nothing proves, nothing indicates that the natives of the SANDWICH Islands are cannibals; and we should not be justified in concluding that they are so, because they sacrifice men in certain ceremonies: the Taheiteans also sacrifice men, and yet are not cannibals; while the inhabitants of NEW ZEALAND, who, no doubt, are less superstitious and more cruel, eat men, but sacrifice none. The natives of the SANDWICH Islands have priests; they therefore have superstitions; and human sacrifices have been in use among all nations over whom superstition has reigned; madmen as they were, they imagined that the blood which they shed was to appease the angry divinity, or obtain from his power signal protection, and the assurance of victory, if they marched to battle: but history, which has handed down to us the recital of these horrible burnt-offerings, does not tell us that the people who sacrificed men, carried their blind fury so far as to devour their fellow-creatures; one of these horrors is not inseparable from the other.

If, however, it were true that the inhabitants of the SANDWICH Islands were cannibals, let us hope that their frequent communications with Europeans

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(which, in other respects, may be so fatal to them) by softening their still ferocious manners, will be the means of causing them to renounce their execrable festivals. Captain Cook, who, in the Island of TAHEITEE, had been witness of a human sacrifice, flattered himself that the horror with which he had inspired the Taheiteans for these homicidal ceremonies, would abolish the use of them for ever: would it then be more difficult to persuade the former that, if it is repugnant to Nature to sacrifice a man, it is still more repugnant to her to feed on his flesh? Ah! no doubt, the glory the most to be coveted, the sweetest fruits that Europeans ought to promise themselves from their long voyages, would be, that, in visiting every part of the inhabited earth, they might every where be able to recall the savage to the dignity of man, and destroy, over the whole surface of the globe, the abominable remains of cannibalism! In favour of so great a benefit, the philosopher might forget some of the outrages which Europeans, in discovering the world, have done to humanity.

The Captain of the American brig, during his stay at the SANDWICH Islands, had received on board four natives belonging to those islands, who had offered to accompany him; but it appears that they had been soon disgusted with a kind of life so different from that of an islander of the GREAT OCEAN. One of these who had come on



board of the SOLIDE, when the ship lay to abreast of the Island of O-WHYHEE for the purpose of procuring refreshments there, recollected at MACAO Surgeon ROULET, whom he earnestly, and repeatedly intreated to take him on board the French ship: this request could not be complied with; though he knew not that to him it would have been only to change his prison. A native of the SANDWICH Islands must with difficulty accustom himself, or rather would never accustom himself, to a state of dependence and obligatory labour: curiosity may probably lead him to seek employment in the service of Europeans who are to him a new race of men, and must appear to him extraordinary and superior, when he compares their industry to his own: but if he have attained a certain age, if he have already known how to appreciate liberty, the life of a sailor is not calculated for him; shortly will he regret his island, his woods, and his hut; and as soon as he has it in his power, he will return to his home, *revertet ad suos.*

Captain CHANAL was informed by the American Captain, that the three-masted vessel, perceived from the SOLIDE off BERKLEY SOUND, and which had been suspected to be one of the frigates that the Spanish government, under the appearance of a voyage of discovery, had dispatched to watch the conduct and the operations of the English, was a ship belonging to the UNITED STATES, and was

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to winter on the coast: an officer of this ship and some of her people had fallen victims to the fury of the savages, in a harbour situated to the southward of NOOTKA SOUND. He likewise learnt that the brig which had been perceived to the eastward of Cox's Channel, was an American, and that he had left on the coast, another brig and a schooner of the same nation. These three last-mentioned vessels were to come this year to CHINA, and intended to return to the NORTH-WEST coast of AMERICA; they had left there a boat, which, during the winter, was to be employed in collecting, for the following year, the quantity of skins necessary for forming their cargoes. The schooner, in her way to the coast, had anchored at O-WHY-HEE: the natives had killed two of her people; and the vessel had been forced to cut her cables and make sail, for fear the natives, too strong in number, and become too enterprising, should succeed in getting her into their possession.

These different accounts sufficiently shew that the Americans of the UNITED STATES, whose navigation and commerce are daily acquiring fresh extension, have seized with ardour, and without being discouraged by the distance, the new support which the peltry of the NORTH-WEST coast of AMERICA offers to their speculations, to their industry, and to their want of enriching themselves in order to pay the public debt: to the nations of EUROPE, they are become formidable competitors;

titors; and their activity is by no means inferior to that of the English. It is well known too that the Spaniards, under the name of the PHILIPPINE Company, are endeavouring to rival both; and even the Portuguese of MACAO, roused from their lethargic languor by the seducing allurements of the enormous profits that the first operations have yielded, have attempted to engage in the new career which had just been opened to cupidity. Thus, EUROPE, ASIA, and NORTH-EAST AMERICA, by a simultaneous movement, have directed their ships towards the NORTH-WEST coasts of the New World, and vied with each other in multiplying, without principles as well as without prudence, their bold speculations.

But the fur-trade has limits fixed by nature and by reason: speculations ought, on the one hand, to be combined with the population of a country far from favourable to the multiplication of men, and with the time necessary for the reproduction of the animals against which they make war, and for whose skins trade is waiting; on the other hand, with the annual consumption that may be made of these furs, when the introduction of them is free, by the people of that empire of ASIA, to which the total produce of the trade of AMERICA is confined.

Before the voyages of our time had made known the part of the NORTH-WEST coast, comprised between the fiftieth and sixtieth parallel north, Rus-

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SIA had already created this trade; and it seemed likely to be to her a sort of exclusive property, which her geographical position might insure. The English carried to ST. PETERSBURG, as they still carry thither at this day, their peltry from CANADA and HUDSON'S Bay: thence, taking the road of the interior, partly by land, partly by the lakes and rivers, and augmented on the route, by the addition of the furs furnished from SIBERIA, and by those which the navigation of the Russians has procured them, since they have discovered the Archipelago of the KURILES, that of the ALEUTIAN Islands, and the continent of AMERICA above the sixtieth parallel, all these furs assembled arrived, after a passage of several months, at the frontier town of KIATCHTA\*, the mart of the Russians; and traffic was open with MAIMATSCHEIN†, the town, or the market of the Chinese, which is separated from the former only by the rivulet

\* *Kiatchta* is situated a little to the northward of the *fiftieth* parallel; and it is an error of the press which places it in the latitude of *thirty-five* degrees, in the estimable work of *William Coxe*, entitled *Account of the Russian Discoveries between Asia and America*. London, 1780. 4to. page 212.

† "The frontier town of *China*," says *Coxe*, page 214 of the work quoted in the preceding note, "is called by the Chinese and Mougols, *Maimatschin*, which signifies *fortress of commerce*;" but the Chinese have another emporium, that of *Zuruchaita*, alike situated on the frontier of *Siberia*, on the western branch of the river *Argoon*, 12° 40' more to the eastward, and about a degree less to the northward than *Kiatchta*.

rivulet of KIATCHTA. From MAIMATSCHIN the furs reached PEKIN, and thence were distributed throughout the whole empire. It is easy to conceive that the new introduction of furs by sea and the southern ports of CHINA, by calling the English, the Americans, the French, the Spaniards, and the Portuguese to a share of this trade, by occasioning them to enter into competition and rivalry with the Russians, must make the merchandise that is the object of it, fall to prices which no longer hold out a sufficient profit to excite and maintain the activity of fresh speculations.

It may therefore be foreseen, that the maritime nations will do each other a mutual prejudice, by crowding too much to the markets of CHINA; at the same time that they will reciprocally injure one another in their purchases, by a too great resort to the NORTH-WEST coast of AMERICA. Doubtless, they have already perceived that, if they are desirous of preserving this valuable branch of trade, and of preventing it from drying up in their hands, they must not require from it more fruit than it can yield without being exhausted. Let them hasten then, if yet it be time, let them

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“Formerly the commerce carried on at *Zuruchaita* was considerable; but at present it is so trifling that it hardly deserves to be mentioned; almost the whole traffic between *Russia* and *China* is confined to *Kiatchta*.” (*Russian Discoveries*, by *W. Coxe*, page 244 and 245.)

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hasten to relax and arrange their hitherto disorderly operations, in order to regulate their extent by the quantity of furs which it is possible to draw annually without drying up their source, and by the presumable proportion of the vents that may be open to the general produce of the trade. The interest of commerce and that of the sciences are here blended; and we must wish that a conduct far from rational and disappointed hopes, may never force the Europeans to interrupt that interesting succession of voyages into the GREAT OCEAN, which, by multiplying, in every direction, the tracks of our ships, must indubitably, and in the course of a few years, perfect the description of the parts of the globe little known, and obtain a fresh increase to the stock of our knowledge.

## CHAPTER VIII.

*DEPARTURE from Macao.—Passage of the China Sea.—Rectification of the Chart of that Sea.—The Solide passes through Gaspar's Strait between the Islands of Banca and Billiton.—New Plan of the two Straits which present themselves between these islands.—These Straits preferable to that of Banca.—Navigation from Gaspar's Strait to the Isle of France.—Arrival at Port du Nord-Ouest (Port North-west) in this last-mentioned island.—Transactions there.*

THE SOLIDE set sail from MACAO Road for the Isle of FRANCE, on the 6th of December, at half past ten o'clock in the evening, and directed her course so as to strike soundings on the MACCLESFIELD Bank, situated towards the latitude of  $15^{\circ} 45'$  north, in the middle of the CHINA SEA.

On the 8th, at eight o'clock in the morning, soundings were struck on it, in sixty-five fathoms, the bottom broken shells, mixed with small black and white gravel. Two hours before, no ground could be reached with a line of eighty fathoms.

Having ascertained the situation of the ship by these soundings, which Captain MARCHAND could not doubt to belong to one of the limits of the bank, he steered south-west in order to get sight of PULO-SAPATA, small islands situated towards the

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the tenth parallel north, about the distance of forty-two leagues from the south-east point of the kingdom of CAMBOJA.

On the 11th, a little time after noon, the sea, which till then had been rough, fell all on a sudden; and it was not without great surprise that, at forty minutes past four in the afternoon, he perceived to the west by south, at the distance of about five leagues estimated by the eye, an island in a situation where, by the course which the ship had steered, none ought to be met with.

According to the latitude of  $11^{\circ} 14'$ , which had been observed at noon, and the run which the ship had made since that moment, the land that was in sight could be only the islands called the TWO BROTHERS, situated on ALEXANDER DALRYMPLE'S Chart of the CHINA SEA, at the distance of eleven leagues west by north  $3^{\circ}$  west from the most eastern of the PULO-SAPATA.

Although the land that was perceived could be no other than the TWO BROTHERS, yet there remained some uncertainty in this respect; because on the supposition that it was the TWO BROTHERS, the ship ought to have passed so near to the most southern islands of those which compose the PARACELS, that it would have been impossible for our navigators not to have seen them, and yet not one of them had been perceived. On consulting the Table of geographical positions inserted in the *Connoissance des Temps*, (French ephemeris,



meris, or nautical almanac), which gives the longitude of PULO-SAPATA, as it was determined by the observations made in COOK'S third voyage, Captain MARCHAND thought he discovered that this island is placed, on DALRYMPLE'S chart, about  $1^{\circ} 200$  far to the westward: and as the Two BROTHERS must have been laid down there from their bearing and distance in regard to PULO-SAPATA, he judged that the error of their position must be the same as that of the position of these latter islands. From the moment that he had perceived the Two BROTHERS, he steered south-west and south-west by south; and at six o'clock, they bore from west  $26^{\circ}$  north to west  $45^{\circ}$  north. He then stood on to get sight of the largest of the group of the PULO-SAPATA; and about midnight, by the help of the moon, he discovered it to the south-west by west. This island is small and barren, but high land; and its form, which is that of a *shoe*, as its name indicates\*, admits not of mistaking it and confounding it with another island†: in clear weather, it may be seen ten or eleven leagues from the deck of a merchant-ship. He steered so as to round it at a suitable

\* *Zapato* and *Capato*, shoe, in Spanish and in Portuguese.

† "When *Pulo-Sapata* bears north," says *George Robertson*, "it is extremely curious in appearance, and looks as if it were going to fall to the right; both sides in that point of view stand a great way off their centre." (See *Memoir of a Chart of the China Sea*, &c. London, 1791, 4to, page 6).

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distance; and at three quarters past midnight, it bore directly west, distant four or five miles.

This remark of Captain CHANAL has appeared to me to deserve to be examined with attention, because it points out two corrections to be made: the one in the *Chart of the China Sea* by ALEXANDER DALRYMPLE, a copy of which is to be found in the second edition of the *Neptune Oriental* of D'APRÈS DE MANNEVILLETTE, and on which all the French navigators regulate their course in the CHINA SEA; the other on the *General Chart of the World*, by Lieutenant ROBERTS, which accompanies the account of Captain COOK's third voyage. The error in DALRYMPLE's chart lies in the longitude of PULO-SAPATA, reverts on that of the Two BROTHERS, and is owing to the difference of meridian, on this chart, between PULO-SAPATA and MACAO being too great by 50 minutes of a degree\*. The error in the chart of COOK's third voyage consists in its placing the Two BROTHERS to the north about  $40^{\circ}$  east of PULO-SAPATA; whereas, by the route which the SOLIDE followed, in passing from the former islands to the latter, the Two BROTHERS must be situated to the north about  $22^{\circ}$  west of PULO-SAPATA, nearly in the position in which they are seen on DALRYMPLE's chart†. I refer the reader to the NOTES which are to be found at the end of this narrative, for

\* Note LX.

† Note LXI.

the detail of the combinations, calculations, and trigonometrical operations, by which I have endeavoured to determine the quantity of this error. The excellent *Memoir* which G. ROBERTSON published in 1791, for the elucidation of his capital *Chart of the China Sea*, has been very useful to me for the first of the corrections to be made; and if my results differ sometimes from his, I am not the less indebted to him for a great number of *data*, with which his inquiries have furnished me, but which have not always led me to the same consequences that he thought he might draw from them. The discussion in which I was involved by the combination of these various data, has put me in the way of treating of the position of some points of the CHINA SEA, which it was important to fix with the precision necessary for lessening the perils of navigation, in a sea where the currents which master ships, leave a great uncertainty respecting their direction and velocity, and where shoals, sand-banks, and dangers of all sorts present themselves every moment.

Captain MARCHAND took his departure from PULO-SAPATA, which he supposed ought to be placed in the latitude and longitude deduced from the observations made in COOK'S third voyage; and he directed his course to the south-west, in order to make PULO-TIMOAN.

He had the first view of it to the south-south-west, on the 15th at six o'clock in the morning,  
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at the moment when the soundings were thirty-eight fathoms, over a bottom of rather hard mud; and at eight o'clock, PULO-TIMOAN bore south-south-west, and PULO-PISSANG south half-west. This latter island is the largest of a group situated near the MALAY coast, between the parallels of 2 and 3° north, and composed of the Islands or PULO, VARELA, AOR, TIMOAN, PISSANG and TINGI: PISSANG is a high land, which may be discerned at the distance of twenty or twenty-one leagues.

Clouds did not admit of observing the meridian altitude of the sun; but at three quarters past two o'clock, PULO-AOR (or PULO-LAOR, according to D'ANVILLE\*) was seen at the distance of four leagues and a half, bearing south-south-west. The east part of this little group presents very high land, forming two hills, which lie in regard to each other south-east and north-west, the most easterly of which is the highest. Its geographical position was determined by the observations made in COOK's third voyage, which fix its latitude at 2° 42" north, and its longitude at 102° 19' 45" east from PARIS †: on deducing the position of the ship

\* And according to the natives of the Island *Pulo-Wawoor*.

† Lat.	}	According to <i>King</i> ..	2	40	00	} Mean 2° 42' 00" N.
		According to <i>Bayly</i> ..	2	44	00	
		East from <i>Paris</i> .				

Long.	}	According to <i>King</i>	102	16	45	} Mean 102° 19' 45"
		According to <i>Bayly</i>	102	22	45	

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ship from the bearing of PULO-AOR, we find that her latitude must have been  $2^{\circ} 56'$ , and her longitude,  $102^{\circ} 26'$ ; but the dead reckoning from the last bearing of PULO-SAPATA, on the 11th at three-quarters past midnight, gave  $3^{\circ} 17'$  for the latitude, and  $103^{\circ} 19'$  for the longitude; and thence it was concluded that, in the interval from the 11th to the 15th, the currents had carried the ship 21 minutes to the southward, and 53 minutes to the westward.

I must apprise French navigators that the situation of PULO-AOR, on the chart No. 49 of D'APRÈS' *Neptune Orientale* (second edition) is not conformable to the results of the observations made in Cook's third voyage: if these be admitted, the latitude which on the chart is only  $2^{\circ} 30'$ , must be increased about 12 minutes; and on the general chart, No. 9 of this Collection, where the latitude is the same as on the particular chart, No. 49, the longitude, which is only  $102^{\circ}$ , must be carried to  $102^{\circ} 20'$ .\*

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See *Original Astronomical Observations made in a Voyage to the Northern Pacific Ocean*, &c. page 351.—See also Note LX. at the end of this narrative.

\* In making this criticism on D'Après' two charts which I have designated, I ought not to neglect to inform the reader that *George Robertson*, as well as the French hydrographer, employs on his great chart of the *China Sea*, the latitude of  $2^{\circ} 30'$ , and that it is the same on *Alexander Dalrymple's* chart. Most assuredly, *Robertson* was unacquainted with the observations

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When the SOLIDE had doubled PULO-AOR, she steered south-south-east in order to pass without the DOOGER'S BANKS, which are said to be dangerous, and the position of which is still uncertain\*.

On the 17th, about nine o'clock in the morning, land was perceived to the south-south-west. It was supposed, according to the calculation made of

tions of *Cook's* voyage, which are considerably prior to the publication of his chart, but later than that of *Dalrymple's* chart, and yet he has not employed their result: nor has he explained himself in regard to the motive that may have determined him not to make use of it; but merely says, (page 9 of his *Memoir*) that the latitude of *Pulo-Aor* or *Pulo-Auro* is between  $2^{\circ} 29'$  and  $2^{\circ} 30'$  north. (See Note LX.)

\* I transcribe what *G. Robertson* says of the *Dooger's Banks*, in the *Memoir* which he published in 1791, for the elucidation of his chart of the *China Sea*, page 34.

"The *Dooger's Banks* certainly exist, and are very dangerous: they are placed on the chart, in their true situation, and from the following corresponding accounts: I took Mr. *D'Après'* distance from *Pulo-Panjang* (folio, No. 49<sup>nd</sup> of the *Neptune Oriental*, 2nd edit.) allowing my own longitude of that island, which places them in  $0^{\circ} 40'$  north, and longitude  $105^{\circ} 26'$  east: (or  $103^{\circ} 5' 45''$  east from *Paris*) to confirm which the *Ganges* saw the shoals: her latitude of them is  $0^{\circ} 37'$  north,  $105^{\circ} 29'$  east from *Greenwich*; so that I have little doubt of their being nearly right."

I observe that *G. Robertson* (page 34 of his *Memoir*) has placed, by a chronometer, the longitude of *Pulo-Panjang* from that which he has given to *Pulo-Aor*: and as the latter, according to my calculations, is more easterly by 2 minutes than that adopted by *Robertson*, that of the *Dooger's Banks* must be likewise increased by 2 minutes. (See Note LX.)

the ship's run, that this must be a small island without a name which D'APRÈS' Chart, No. 49 (2nd) places a league and a half to the eastward of the east point of LINGIN Island: Captain MARCHAND stood to the south-south-east, in order to double the small island; but squalls and rain presently concealed it from his view. At three quarters past ten, he founded in twenty fathoms water, over a bottom of sand and ooze.

In deducing, by the dead reckoning, the situation of the ship from that of PULO-AOR, placed according to the observations made in Cook's voyage, it was found that, at noon, she was 4' north of the equinoctial line, and in  $103^{\circ} 12'$  east longitude.

At three o'clock in the afternoon, land was again discerned to the west half south, and it was judged to be the same that had been seen in the morning. The winds were rather faint from the west-north-west and north-west, the weather overcast, and as Captain MARCHAND intended to pass through the Strait of BANCA, he hauled the wind to make PULO-TAYA. But before six o'clock in the afternoon, land was seen stretching from south to south-south-west. He immediately determined to anchor in order to wait for daylight, and he came to in nineteen fathoms, over a bottom of mud and sand.

The next day, at six o'clock in the morning, he discovered that the land seen to leeward was the

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the northern coast of the Island of BANCA, which extended from south a few degrees east to south-south-west, distant seven leagues. He continued to perceive the same island which had been seen the day before, and it bore north-west  $2^{\circ}$  west; but near this island, and to the north-west by west, was seen another of a flat shape, and larger than the former; it was reckoned that the distance from the ship to these two islands might be five or six leagues.

According to these bearings, it could not be doubted that the currents had set at a very considerable rate to the *south-east*: and this effect does not agree with what is to be found in the sailing directions of D'APRÈS, who says that, in this sea, the currents set strongly to the *south-west*. It is clearly proved that the ship had been carried to the *southward* and *eastward*; for the point of BANCA which bore south a few degrees east, was certainly Point PESANT, the most northern of the island, which there was soon an opportunity of verifying; and it is evident that the two islands which lay to windward, and which, the day before, had been taken for the small island situated to the eastward of the east point of LINGEN Island, because, according to the dead reckoning, the ship was supposed to be much more to the northward than she was in reality, it is evident, I say, that these were the RIGAUDIÈRE Islands. Captain CHANAL observes that, according to their situa-



tion on the chart of the *Neptune Orientale* (second edition, No. 49, 2nd of the supplement), and according to that of the ship, PULO-TOTY, which, however, was not perceived, ought to have been seen at the same time: this might induce the supposition that the last-mentioned island is not rightly laid down on the chart with respect to the RIGAUDIÈRE Islands, and that it must be much nearer to them: it is even presumable that, of the two islands which were in sight, the one was PULO-TOTY, and the other, the higher of the RIGAUDIÈRE Islands, if, in fact, there be two of these; for, although D'APRÈS has laid down two islands on his chart, the denomination which he gives them of ILE RIGAUDIÈRE, would seem to indicate one island only: perhaps too the second is but a little islet which cannot be perceived far off. Be this as it may, of the two islands which were perceived from the SOLIDE, at the same time that the northern coast of BANCA was in sight, the one bore north by west, and the other, north-north-west half north from Point PESANT (TONG MACOODA,) at the distance of about thirteen leagues from this point\*.

Captain

\* The remarks made by Captain *Chanal*, who navigated by *D'Après'* chart, and could not be acquainted with that which *George Robertson* did not publish till 1791, leads us to conceive that the French chart is defective in this part; and we are confirmed in this opinion if we cast our eyes on the English chart, which is constructed from the various observations made on board  
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Captain MARCHAND weighed anchor at half past seven o'clock in the morning, and with a breeze

the East India company's ships that trade to *China*. On this are seen two islands, the former, under the name of *Pulo-Toty* to the east, the latter, to the west, under the name of *Docan*, both situated at the distance of fourteen leagues from the eastern extremity of Point *Pesant* of *Banca*. The bearings differ, as is seen, about a point from those which were taken on board the *Solide*, and the distance is the same, within a mile; but Point *Pesant* is not a mathematical point; and, according to the part that was set of it, if it lie more to the eastward or more to the westward, the bearings of the islands which are determined from it must experience a change: the distance must be less affected by it; and, indeed, that which was estimated on board the *Solide*, and that given by *Robertson's* chart, differ from each other but a league. On *D'Après's* chart, *Pulo-Toty* stands alone, at fourteen leagues' distance, to the north by west of the eastern part of Point *Pesant*; and nothing there indicates the Island of *Docan*, which the English chart places three leagues to the west-south-west of *Toty*; but to the north and the north by east of the latter, at six or seven leagues' distance, *D'Après* places two other islands, *Rigaudière* and *Saint Pierre*, which are not to be found on *Robertson's* chart; and these two islands are placed, in regard to each other, on the French chart, at the bearings and at the distance which the English chart has given to *Toty* and *Docan*. We are fully justified in believing that, if we judge by the names given to the Islands *Rigaudière* and *Saint Pierre*, their position has been fixed according to the track of some French ship that had a mistake in her reckoning. *Robertson's* chart appears to me to merit the preference to that of *D'Après*, because it presents two routes, indicated by two sets of soundings, which pass within two leagues of *Pulo-Toty*, and extend, the former to the north-north-west, rounding the eastern part of *Toty*, and the latter, to the north by west: from the former, *Toty* and *Docan* may both have been seen at the same time; and the track passes only within five leagues of Point *Pesant*.

breeze from the north by west, he plied to windward, in hopes of reaching the northern entrance of the Strait of BANCA. During the forenoon, the soundings were from nineteen to eighteen fathoms over a bottom of sand and ooze.

From the observation of the sun's meridian altitude, it was concluded that, at noon, the latitude of the ship was  $1^{\circ} 15'$  south; and her longitude, fixed according to the bearings of the land, was  $103^{\circ} 18'$ .

Had the ship's place been deduced from the dead reckoning brought forward from PULO-AOR, her

In continuing to compare the two charts in this part, we remark that *Robertson* places an island called *Porto-Bello*, twenty-two leagues to the east half north of *Pulo-Toty*, and *D'Après* lays down none.

If we carry our eyes farther to the west-north-west of *Toty*, we see that, on the French chart, *Pulo-Taya* lies to the south by west 3 or  $4^{\circ}$  west, and at the distance of ten leagues from *Lingen* Island; and that, on the English chart, the bearing is south, and the distance eight leagues only. This latter chart presents a track, which must have passed within sight of these two points, and which, no doubt, has served to fix their relative position.

As *Pulo-Toty* and *Pulo-Taya* are leading marks for ships which, in order to get out of the *China* Sea, stand either for the Strait of *Banca*, or for that between *Banca* and *Billiton*, I have thought that it would be useful to make known to French navigators who are not provided with *Robertson's* chart, the differences that are to be remarked between this chart, and that of *D'Après*, of which they make use: it will be for them to verify, when they may find an opportunity of so doing, which of the two charts, in this part, merits a preference.

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latitude would have been only  $0^{\circ} 20'$  south, and longitude  $102^{\circ} 57'$ : in comparing this latter position of the ship with the former, it is seen that, in the interval of two days and a half, the currents had carried her near a degree to the southward, and more than a third of a degree to the eastward.

As it was perceived, at half past three o'clock in the afternoon, that the currents were contrary to the route, Captain MARCHAND determined to come to an anchor at three leagues' distance from the northern coast of BANCA, in sixteen fathoms water, over a bottom of sand, gravel and shells. The latitude of the anchorage, deduced, by the dead reckoning, from that at noon, was  $1^{\circ} 23'$  south, and her longitude  $103^{\circ} 27'$ .

During the night, the wind blew fresh from the north-west to the north, accompanied with squalls. The velocity of the current was estimated at a mile an hour.

The part of the Island of BANCA which our navigators had coasted, is of a middling height: but, towards Point PESANT, the most northern point of it, are distinguished some hillocks more elevated than the rest of the ground.

On the 19th, Captain MARCHAND got under way in the course of the forenoon, but he was obliged to anchor a second time; he made useless efforts to reach the entrance of the Strait of BANCA, and experienced rather strong currents, some of which set to the east-north-east, others to the east,

and others to the east-south-east. He parted a cable in this second anchorage, where the ship pitched very heavily, and he was obliged to leave the anchor behind.

Persuaded that it would be in vain to persist in struggling against these obstacles, he renounced the idea of going out of the CHINA Sea by the Strait of BANCA, and he determined to sail out by another strait situated more to the eastward, between the Island of BANCA and that of BILLITON.

This strait, little frequented by the French, is known under the names of GASPAS', BILLITON'S, or CLEMENTS' Strait. Captain MARCHAND was in possession of no plan of this strait but that which is to be found on the sheet N<sup>o</sup>. 48 of our *Neptune Oriental*, under the title of *Petit Plan du DÉTROIT A L'EST DE BANCA, par lequel a passé un Vaisseau Espagnol, commandé par le Sieur GASPAS* (no date); but D'APRÈS, in publishing this plan, appeared to doubt its correctness; and, in his sailing directions, he gives notice that it would be imprudent to enter this strait, till it is better known. Since the time of this publication, several French and English ships, instead of passing through the Strait of BANCA, have taken their route, in order to get out of the CHINA Sea, or to enter it, by the Strait BETWEEN BANCA and BILLITON. This strait is divided into two arms by an island, to which its situation has occasioned to be given the name of MIDDLE ISLAND: the WEST PASSAGE is properly

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GASPAR'S Strait; because it is that by which the Spanish navigator, who has given us the first plan of it, had passed: the EAST PASSAGE, which presents several practicable channels between the small islands, is called CLEMENTS' STRAIT, because, in 1781, an English captain of that name, commanding a fleet of Indiamen, is the first known navigator who attempted to go out of the CHINA Sea by this passage. A chart of the strait BETWEEN BANCA and BILLITON was constructed in 1784 and 1785, by DORDELIN, a lieutenant in the French navy, who passed through this strait, both in going to CHINA and on his return. This manuscript chart, which belongs to the *Dépôt Général des Cartes, Plans, et Journaux de la Marine*, was not published at the time, because DORDELIN, too scrupulous, in regard to his own labours, and fearing to expose the safety of ships that might direct their course by his chart, judged that it ought not to be rendered public, till a farther verification had enabled him to improve it: this chart, although not perfect in all its parts, was far superior to the defective plan of the Spanish navigator, on whose word DORDELIN had not been afraid to attempt the passage from the southward, in a contrary direction to GASPAR, who had found it in coming from the northward. Since then, ALEXANDER DALRYMPLE, on the one hand, and GEORGE ROBERTSON, on the other, have published various plans and charts of this strait, constructed at different times by English

navigators; and DALRYMPLE has printed in his valuable Collection of nautical *Memoirs* respecting the *Seas of Asia*, the journals of the captains of his nation to whom we are indebted for the plans and charts of which we are in possession.

But these plans and charts are little known in FRANCE, and Captain MARCHAND, reduced, as I have said, to the necessity of having recourse to the shapeless plan of GASPAR, in order to direct his route in a strait, against which the French navigators were likely to be prepossessed, hesitated not, however, to enter it, and seized with ardour the opportunity of justifying or destroying the uneasiness that D'APRÈS' sailing directions must occasion respecting the safety of a passage, which, in his time, was, as it were, only suspected: success has proved that this uneasiness was not well-founded.

As it is to be presumed that the strait BETWEEN BANCA AND BILLITON, at this day well known by the repeated trials of English and French navigators, will henceforth be preferred, on account of its advantages, and in all cases, to the long and dangerous Strait of BANCA, I have thought that it would be of some utility to the officers in our navy and merchant-service, to trace minutely the track which the SOLIDE followed in passing through GASPAR'S Strait; to report the observations of latitude which were made in the passage, and to indicate the principal bearings that were taken  
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from the places where, in order to stop tide, the ship was forced to come to an anchor. These details will be comprehended more easily, if the reader will follow them with the chart before him\*.

On the 20th, at half past seven o'clock in the evening, the SOLIDE got under way from the second anchorage which she had been obliged to take up in sight of the northern coast of BANCA; and Captain MARCHAND could not but congratulate himself on having quitted it; for it was discovered, when the anchor was weighed, that the cable was stranded near the clinch; and it was judged that if the ship had remained longer exposed to the violence of the pitching which she had experienced during the night, the cable would inevitably have parted, and occasioned the loss of a second anchor.

On the 21st, at three quarters past six in the evening, Captain MARCHAND anchored to the north-west of the entrance of GASPAR'S Strait, in fourteen fathoms, over a bottom of mud, gravel, and broken shells, after having passed between four breakers situated to the north-west and north by west of the east coast of the Island of BANCA; the farthest is fifteen leagues distant from this point, and the nearest, twelve. Point BRISÉE (TONG RYOTT) of the same island, situated between Point

\* See the Charts, Nos. VII and VIII.



PESANT (TONG MACOODA) and the EAST Point, bore, from the anchorage, west-south-west, four or five leagues' distance.

On the 22d, the ship was under sail at fifty minutes past seven in the morning, and steered south-south-east half east; the soundings were constantly fourteen fathoms, with a bottom of sand and gravel, mixed with broken shells.

At forty minutes past nine o'clock, a small island, surrounded by breakers, and situated more to the offing than three others, lying all together on a line, to the east and east by south of Point BRISÉE, bore west-south-west.

From that moment, Captain MARCHAND steered south-east by south; and the lead indicated from thirteen to fourteen fathoms, with the same kind of bottom as that which had been found in the morning.

At eleven o'clock, GASPARD Island, which is situated nearly under the same meridian as MIDDLE Island, and eight or nine leagues north of its north point, was perceived from the mast-head: it bore east  $6^{\circ}$  south. A quarter of an hour after, the extremities of a remarkable mountain on the Island of BANCA, serving as a leading mark for its EAST point, which lies to the east  $9$  or  $10^{\circ}$  north, and at about the distance of seven leagues from this mountain, bore from south  $13^{\circ}$  west to south  $42^{\circ}$  west.

At noon, the EAST point of BANCA bore south  $43^{\circ}$  east,

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43° east, and the middle of GASPARD Island, directly east: in this situation, the latitude observed was 2° 21'; and, allowing for the action of the currents, it was estimated that the longitude of the ship might be 104° 12'; which would carry that of GASPARD Island, the distance from which was reckoned twenty-eight or twenty-nine miles, to 104° 40'.

Captain MARCHAND steered east-south-east half east: the lead continued to indicate twelve, fourteen, and sixteen fathoms water, till one o'clock in the afternoon when it shewed twenty fathoms, over a bottom of sand and gravel: he began to perceive the first of the islots of ROCHER-NAVIRE (TREE ISLAND) situated between the EAST point of BANCA and GASPARD Island.

At three quarters past two, another of the islots of TREE-ISLAND, the southern islot, bore, one line with the south point of GASPARD Island east 23° north: a chain of rocks was discovered between this second islot and the first. At the same time, a small islot was discovered to the southward of the EAST point of BANCA.

Captain MARCHAND steered south-east half south till three o'clock: from half past one, he had carried with him twenty and twenty-one fathoms water, with the same kind of bottom as in the preceding soundings.

At three o'clock, the EAST point of BANCA bore south 53° west; GASPARD Island, north 53° east;

east; and the first-mentioned islot between that island and the EAST point of the great island, north  $39^{\circ}$  east.

He then steered south by east, in order to get up with the peninsula of SEL \*, which, with the south-west point of MIDDLE Island, forms the narrowest part of the WEST PASSAGE. Till four o'clock, the soundings were still twenty-two, twenty-three, and twenty-four fathoms. He then discovered the peninsula of SEL, and the islands which are situated in the east part of the strait. The EAST point of BANCA bore north  $71^{\circ}$  west; the NORTH-EAST extremity of the peninsula of SEL, south  $32^{\circ}$  west.

It was perceived that the currents carried the ship to the eastward of her course; and, in order to counterbalance their effect, and draw more in with the peninsula of SEL, by entering the passage, Captain MARCHAND steered south by west. At a quarter past four, the lead announced that the water was shoaling; there were no more than eighteen and seventeen fathoms; but it kept at this depth, and the bottom was constantly gravel and shells.

\* Several charts or plans have designated as an island the land which, on GASPAR'S Plan, bears the denomination of the *Ile de Sel*: it is at this day admitted that it is only a peninsula, connected with the Island of *Banca* by a slip of land so low as not to be always perceived from the distance at which the reef, that terminates this land to the eastward, requires that ships should keep from it.

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As the currents set rapidly to the south-south-east, at five o'clock, Captain MARCHAND steered south-south-west half south: the soundings were seventeen fathoms, with the same kind of bottom, till six o'clock, when the EAST point of BANCA bore north  $23^{\circ} 30'$  west; GASPAR Island, north  $17^{\circ}$  east; the most eastern of the small islands situated to the northward of the peninsula of SEL, south  $81^{\circ}$  west; the NORTH-EAST point of the peninsula, south  $77^{\circ} 30'$  west, and its SOUTH-EAST point, south  $15^{\circ}$  west.

The SOLIDE was then beginning to enter the passage between MIDDLE Island and the peninsula of SEL: Captain MARCHAND steered south half east, under easy sail, till forty minutes after six, when he came to an anchor in seventeen fathoms water, over a bottom of sand and fine gravel, mixed with broken shells.

During the night, the wind varied from north-west to west-north-west, the currents set to the south-south-east, and then to the south, at the rate of a mile and a half or two miles an hour.

From the anchorage, the hummock on the EAST point of BANCA bore north  $21^{\circ}$  west; GASPAR Island, north  $13^{\circ} 30'$  east; the peninsula of SEL, from south  $22^{\circ}$  west to west  $1^{\circ}$  south; the south-west extremity of MIDDLE Island south  $84^{\circ}$  east; and four small islands which were perceived to the south-east and south-south-east of this last-men-

tioned island, from south  $76^{\circ}$  east to south  $56^{\circ}$  east.

The SOLIDE was under sail at three-quarters past six in the morning, and steered south half east; but, a little time after, she bore up south-east by south, and then directed her course south-south-east half-south. On the east coast of the peninsula of SEL, were distinguished some breakers which appear to run a mile into the offing, and to extend as far as the south point of this peninsula. The depth of water kept increasing from seventeen to twenty fathoms, with a bottom of sand and gravel.

At twenty-two minutes past seven, all the lands in sight were set by the compass, in order that their bearings might be laid down on the plan. The SOUTH-EAST extremity of the peninsula of SEL then bore south  $54^{\circ}$  west. Captain MARCHAND steered south, and the soundings increased from twenty to twenty-four fathoms, with the same kind of bottom. He perceived more and more the south part of the Island of BANCA, and was on the point of being clear of the Strait. He crossed some strong rippings of currents, which, at a distance, might have been taken for chains of breakers.

At twenty minutes past eight, MIDDLE Island bore from north  $11^{\circ} 30'$  east to north  $32^{\circ}$  east; and the middle of the most eastern of the islands situated

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situated to the northward of the peninsula of SEL, in one with the NORTH-EAST point of the latter, bore north  $34^{\circ} 30'$  west.

From this point, Captain MARCHAND steered south half west: the water gradually shoaled from twenty-four to twenty fathoms, with the same kind of bottom.

At seven minutes past nine o'clock, the islots, seven in number, which lie to the south-east and south-east by east of MIDDLE Island, were partly shut in, the one by the other, in the direction of north  $43^{\circ}$  east; and the SOUTH-EAST point of the peninsula of SEL bore north  $53^{\circ} 30'$  west.

Till three quarters past nine, Captain MARCHAND steered south-south-west half south, and the soundings were regular from twenty to seventeen fathoms. At this period, the extremities of the eastern coast of the peninsula of SEL bore from north  $13^{\circ} 30'$  west to north  $44^{\circ} 30'$  west.

The SOLIDE was then clear of the strait, and Captain MARCHAND hauled his wind, at the same time carrying a press of sail on the starboard tack.

At half past ten o'clock, the ship fell all at once from seventeen fathoms into nine, with a bottom of sand and gravel: this sudden diminution of the depth of water obliged Captain MARCHAND to navigate with precaution: he constantly kept the lead going; it indicated the same soundings, varying only from eight fathoms to nine, till half past eleven

eleven o'clock, and from ten fathoms to eleven, till noon.

At this last-mentioned period, no other lands were perceived than those to the southward of the Island of BANCA, which extended from north-west half west to north-north-west half north. The observation of the sun's meridian altitude gave  $3^{\circ} 30'$  south latitude; and, in allowing for the effect of the currents, which, according to the result of the dead reckoning compared with that of the observation, had carried the ship 25 minutes to the southward, in twenty-four hours, and which was also reckoned to have carried her 11 minutes to the eastward, it was concluded that the longitude must be  $104^{\circ} 28'$ .

The detail of Captain MARCHAND's navigation in GASPAR'S Strait, such as I have just represented it, as it were, hour by hour, would be a sufficient guide, by which navigators who should wish to get out of the CHINA Sea by this passage, might direct their course with safety; but, in order to render more useful the remarks that were made on board the SOLIDE, Captain CHANAL, associating his nautical knowledge with the talents and zeal of the Engineer LE BRUN, who had embarked in the ship, for the purpose of going from MACAO to the Isle of FRANCE, carefully constructed a plan of GASPAR'S Strait; he subjected it, on the one hand, to the latitude that was observed on the 22d in the parallel of GASPAR Island, the principal leading

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leading mark of the two passages for ships coming from the northward, and that which was observed on the 23d on coming out of the Strait, the ship being clear of all land; and on the other hand, to numerous bearings that were taken in the different situations, under sail or at anchor: he has accurately laid down on the plan all the soundings that were taken, from the most northern point of the Island of BANCA to the parallel of its south coast; and each sounding has been placed at the point of that track which the bearings have determined\*.

Captain CHANAL was not able to extend his work beyond GASPAR'S passage; and, in order to complete his chart, he copied from that of D'APRÈS the EAST passage between MIDDLE Island and the Island of BILLITON; but he took care to give notice that he was very far from vouching for the correctness of this borrowed part; and this notice was the better timed, as the eastern part of the chart published by D'APRÈS as unwarranted, is defective in every point, and as the west part is scarcely more correct: most assuredly there would be less danger for a ship to attempt the passage

\* I have conceived that it was useless to transcribe all the bearings which were taken on board the *Solide*, from the time that she was within sight of the north point of Banca till after she came out of the Strait; I have laid down those only which appeared to me useful for fixing the relative positions of the principal points.



from the mere inspection of the land, and with the precautions that are employed in a voyage of discovery, than to trust to a plan such as that of **GASPAR**, which could only lead the navigator into error.

I have been of opinion that the chart which was constructed on board of the **SOLIDE** would become still more useful, if, in order to complete it, use were made of the work of the English, who have given us several tracks in the West Passage, and others in the East Passage, marked on authentic plans, some of which have been published by **ALEXANDER DALRYMPLE** in his valuable collection, and others by **GEORGE ROBERTSON**. I have combined together six different plans, two of which belong to the French, and four to the English; and I think I may venture to affirm, that the General Chart which I present must have all the correctness that can result from the information which we have, till this day, acquired respecting the two passages or straits that present themselves to ships of all rates between the Island of **BANCA** and that of **BILLITON**: I refer the reader to the *NOTES* for the examination and analysis of the materials which I have employed in the construction of this new chart\*. It was not without

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\* See Note LXII. This note contains not a mere geographical analysis and the discussion of the materials which have been employed

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concern that I found myself under the necessity of criticising some of the plans which the English have given us; but, in not always adopting their opinions and their plans, we cannot, while we are combating them, avoid acknowledging that their bold voyages into every sea, and their numerous labours concerning every coast, have long since acquired them incontestable claims on the gratitude of all navigators: and if criticism be severe

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employed in the construction of the *General Chart of the Strait between Banca and Billiton*, comprehending *Gaspar's* and *Clements' Straits*, with the different passages which both present; it likewise contains a minute description of the two straits, as well as sailing directions for the navigation of the two passages. I have laid under contribution the journals of several English navigators, which have not been translated into our language, and with whose names even our navigators were not acquainted: their observations are valuable, and deserved to be collected; to these I have added those of our Captains *Dordelin* and *Chanal*, and I have formed of the whole a regular work, the ground of which does not belong to me, and of which I have only arranged the parts, in order to connect them together by comparing the reports of the different navigators, strengthening them the one by the other when they agree, and opposing them to each other when they are at variance. This work may, with French seamen, supply the place of a great number of foreign journals which would afford them, besides, only useless repetitions. I shall have accomplished my object, if, in presenting to them the *Straits Between Banca and Billiton* as preferable to the Strait of *Banca* as well for ships returning from *China* as for those going thither, I have furnished them with the information necessary for navigating there with safety, by directing their course according to the tracks of the experienced navigators who have opened the way.

when the question is to examine their productions, it is because it may be feared that their weighty authority will too easily accredit errors.

I have already said that D'APRÈS, in publishing the Plan of GASPAR'S Passage, such as it had been communicated to him, judged that it was prudent to dissuade navigators from entangling themselves between the Islands of BANCA and BILLITON; and he thought it incumbent on him to advise them to continue to take their route through the Strait of BANCA; but the experiment of the SOLIDE, and previously that of the TRITON, the PROVENCE, and the SAGITTAIRE under the command of DORDELIN, that of the English ships, the MACCLESFIELD, the SULIVAN, the HAWKE, the PONSBORNE, the WARREN HASTINGS, the CARNATIC, the VANSITTART, the GLATTON, and her fleet under the orders of JOHN CLEMENTS, &c. must dispel for ever the fears that were maintained, and with reason, by the imposing authority of a learned navigator, who, from a long acquaintance with the seas of ASIA, and great labours, executed with success, for improving the hydrography and facilitating the navigation of them, had acquired the right of speaking as a master, and of causing himself to be heard with attention. No doubt, his opinion would have changed, and he would have been eager to amend his decision, had he been acquainted with tracks which have been followed only subsequently to his work and his death: he

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would have judged that a passage on a straight line and very short, like that of GASPAR, in which, throughout, if the wind be not favourable to the course, or if it be wished to pass the night at anchor, a ship may come to in a good depth of water, and on a good bottom, deserves every preference to a long and winding passage, such as that of BANCA, the entrance of which, in coming from CHINA, it is difficult to reach with the winds necessary for engaging in it; in which the different directions of the lands require different winds for passing from one branch to another; and which presents, on leaving it, shoals and over-falls that obstruct navigation and multiply its dangers.

CLEMENTS' Passage, the most eastern of the two straits that are comprised between the Islands of BANCA and BILLITON, affords, in many respects, the same advantages as that of GASPAR, through which Captain MARCHAND passed; but ships coming from the westward, will prefer the latter of the two straits; and those coming from the eastward will also prefer it, if the wind allow of their so doing; for CLEMENTS' Strait, in the narrowest part, is strewn with islets, banks, and shoals, which, indeed, are mostly visible, and near which is found a good bottom fit for anchoring, but which, however, may occasion some uneasiness and embarrassment in a confined passage, where the action of the currents is commonly very violent, and where navigators must experience sudden

variations in their direction, in proportion as they present themselves at the opening of the numerous channels which the banks and islots form between them, and according to the time and the setting of the tides. But CLEMENTS' Passage, obstructed as it is, appears to be frequented by the English; and this is a strong reason for believing that its navigation is not dangerous, since they have the choice between the two passages. I am persuaded, however, that a navigator who neither has used the one nor the other, will, on an inspection of the chart, give the preference to GASPAR'S Passage: but, unquestionably, he will prefer either to the Strait of BANCA, if, in coming from CHINA, he wish to arrive more expeditiously and more safely in the Strait of SUNDA; or if, coming from EUROPE, and after having passed this last-mentioned strait, he wish to proceed with greater dispatch to the coast of CHINA whither his trade calls him.

On the afternoon of the 23d, Captain MARCHAND, after having doubled to the southward all the lands which form GASPAR'S and CLEMENTS' Straits, and wishing to make the Island of SUMATRA, off the small islands called the Two BROTHERS, directed his course towards the Strait of SUNDA, standing on close to the wind which blew from the north-west quarter. During the whole day, the soundings were constantly ten fathoms, at first a bottom of fine gray sand, then oozy sand; and

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and they afterwards increased to twelve fathoms. He anchored several times in this run, when, a calm coming on, he was apprehensive that the currents might drive the ship out of her course.

On the 25th, at half past twelve o'clock at noon, he got sight of the coast of SUMATRA, at the distance of six or seven leagues. The latitude observed at noon, had been  $4^{\circ} 25'$  south; and in comparing it with that by the dead reckoning, it was discovered, that, since noon of the preceding day, the currents had carried the ship 17 minutes or near six leagues to the southward. It was reckoned that the longitude deduced from that of Point PESANT on the north side of BANCA, was, at the moment when SUMATRA was perceived,  $103^{\circ} 44'$ , and the latitude,  $4^{\circ} 26'$ ; the ship was then in twelve fathoms water.

Captain MARCHAND passed the night at anchor, and weighed at half past six o'clock the next morning. Half an hour after he had got under sail again, he discerned the islands called LES DEUX SŒURS\*, which he had intended to make; and they bore south-west at the distance of two or three leagues.

He concluded from the latitude of  $5^{\circ} 4'$  observed at noon, and from the bearing that was taken at the same moment, that LES SŒURS, the

\* These are the same islands that are named on the English charts the TWO BROTHERS.

most southern of which bore south-west, distant one league, are situated in latitude  $5^{\circ} 6'$ : the longitude of the ship was then  $103^{\circ} 36'$ . The middle of these two islands is placed on the chart, No. 47, of D'APRÈS' *Neptune Oriental*, in latitude  $5^{\circ}$ ; and their distance from the coast of SUMATRA, which is seven leagues on this chart, appears to be too considerable; it is reckoned that it might be reduced to five.

From within sight of LES DEUX SŒURS till he made Point ST. NICHOLAS in the Island of JAVA, at the entrance of the Strait of SUNDA, calms and contrary winds obliged Captain MARCHAND to anchor repeatedly: it was not till the 31st, in the afternoon, that he reached the entrance of the strait; but the wind not permitting him to weather the rock situated in the middle of the passage between MIDDLE Island and TOCA or HOG'S POINT in the Island of SUMATRA, he came to an anchor off PULO REMOW, or LONG Island, three-quarters of a mile from the land, in thirty fathoms water, over a bottom of gravel and shells. In this situation, MIDDLE Island bore from south-east to south-south-east  $4^{\circ}$  south; the peak of CRACATOA Island, south-west half west; the GRAND TOQUE, east-south-east; and the rock in the MIDDLE of the passage, south half west.

On the 1st of January 1792, at half past seven o'clock in the morning, the ship set sail for the Isle of FRANCE.

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On the afternoon dead reckoned by the observation  $11^{\circ} 37'$  in count, from

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\* *Connoissance de la France* Française (

For a few days the contrariety of the winds allowed not of her increasing her distance from the vicinity of the strait; at length, on the afternoon of the 4th, Captain MARCHAND took his departure from PRINCE'S Island, situated to the northward of the west point of JAVA, at the mouth of the strait, and, according to astronomical observations, in  $6^{\circ} 36' 15''$  south latitude, and  $102^{\circ} 55'$  east longitude\*.

On the 11th, at half past four o'clock in the afternoon, the latitude of the ship deduced by the dead reckoning from that which had been given by the observation of this same day at noon, was  $11^{\circ} 37' 10''$ ; and her longitude deduced, by account, from that of PRINCE'S Island,  $95^{\circ} 14' 15''$ .

At that moment, a low land was perceived to the south-south-east, at the distance of six leagues.

From this bearing, the land in sight must have been situated in latitude  $11^{\circ} 54'$ , and longitude  $95^{\circ} 21' 15''$ : it was judged that it could be no other than the largest of the Islands of Cocos, that group of small islands thrown at about the distance of a hundred and sixty-five leagues to the south-west of FLAT Point, the most southern of the Island of SUMATRA; but, at the same time, it was concluded that there was an error in the distance esti-

\* *Connaissance des Temps* (Ephemeris.) An VIII. de l'Ere Française (1800.)



mated by the eye, from the ship to these islands\*, and an error in the dead reckoning since she had quitted PRINCE'S Island; for, according to astronomical observations, the large Island of Cocos is situated in latitude  $12^{\circ} 11'$ , and longitude  $94^{\circ} 3' \dagger$ .

The

\* It might also be supposed that there was an error in the latitude observed on board the ship; but it is more probable that the distance from the ship to these islands had been incorrectly estimated by the eye, an error which is very common.

† This is the longitude which is to be found in the *Connaissance des Temps* of the year VIII. of the French era (1800) and the preceding years: it is there indicated as deduced from lunar observations made at sea; and is presented as the situation of the middle of the largest of the islands.

G. Robertson gives us, respecting these Islands of Cocos, a detail which deserves to be mentioned: it is engraved in English at the bottom of his Chart of the *China Sea*.

*Memorandum for ships leaving Java Head* (the most western part of the Island of Java) *for Europe*.

“ The true situation of the *Kelling* or *Cocos* Islands, determined by an exact *Arnold's* box-chronometer, in a short run from *Java Head*, and corroborated by three sets of lunar observations, objects east and west.

“ The northernmost is a single low island, in latitude  $11^{\circ} 50'$  south, longitude  $8^{\circ} 1'$  west of *Java Head*, or  $97^{\circ} 8'$  east from *Greenwich* ( $94^{\circ} 47' 45''$  east from *Paris*); and it lies due north from the most western of the cluster of islands, distant 14 miles. Between them is a fair passage, which in the *General Coote*, Captain *Baldwin*, we passed through.

“ The southernmost are a circular cluster of low islands, whose latitude is from  $12^{\circ} 4'$  to  $12^{\circ} 23'$  south. Their eastern extreme  $7^{\circ} 50'$  west of *Java Head*,  $97^{\circ} 19'$  east from *Greenwich* ( $94^{\circ} 58' 45''$  east from *Greenwich*); and their western extreme under the meridian of the most northern island,” that is to say,  $97^{\circ} 8'$  from *Greenwich* ( $94^{\circ} 47' 45''$  from *Paris*).

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The error of nearly 17 minutes in the latitude which the bearing, deduced from the latitude of the ship, gave to the Island of Cocos, proves that the distance estimated from the vessel to that island was not sufficiently great; and the difference of  $1^{\circ} 18' 15''$  in the longitude, proved that, from PRINCE'S Island, whose longitude is likewise determined by observation, the calculation of the run made by the ship, in the space of seven days, was in error all this quantity, which she had been carried to the westward by the movement of the waters, without the ordinary methods of navigation having been able to furnish any means of estimating its effect.

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" In ranging along the north part of the cluster of islands, I saw no danger detached from them, being steep-to close into the shore, which is a beautiful white beach appearing like sand, but which I believe is white coral.

" A reef runs out from the north-west corner of these islands a short quarter of a mile, and they may be seen in clear weather, from an Indiaman's deck, five leagues."

Signed, G. R. (*George Robertson.*)

*Robertson*, in his Table of Positions (page 79 of his Memoir) gives the longitude of *Java Head*  $105^{\circ} 9'$  east of *Greenwich*; it is only  $105^{\circ} 5'$  according to the observations made in *Cook's Third Voyage* (page 351 of the *Original Astronomical Observations, &c.*): and if we adopt this latter determination, the longitudes of the *Cocos* Islands must be diminished by 4 minutes.

N. B. There is an error of the press in the Collection of Observations, which I have just quoted. We there read, *Java the most easterly Point of the Straits of Sunda*; read *the most westerly Point, &c.*

From

From the Island of Cocos, the SOLIDE directed her course west-south-west, in order to get into the parallel of RODRIGUE Island, from which Captain MARCHAND wished to take a fresh departure before he stood for the Isle of FRANCE.

On the 16th, a little before nine o'clock in the morning, in the latitude of  $15^{\circ} 47' 15''$  south, the mean between the results of several observations of distances of the sun and moon, gave for the longitude of the ship  $85^{\circ} 15'$ ; that which was deduced, at the same instant, from the dead reckoning since the departure from PRINCE'S Island, was  $86^{\circ} 45'$ : thus, in the space of twelve days, the sum of the errors of the reckoning was a degree and a half, which the ship had advanced more to the westward than was supposed. And as, when she was in sight of the Island of Cocos, on the 11th, the error in the same direction was only  $1^{\circ} 18'$ , it might thence be inferred that, from the 11th to the 16th, the error had increased 12 minutes; but this inference would imply, that we grant to the result of the lunar observations so great a degree of accuracy that they may be employed with safety in correcting small errors. What we may solely conclude, is that, from the 4th, when the ship took her departure from PRINCE'S Island, to the 16th, the day of the last lunar observations, she was constantly carried to the westward by the effect of the currents; and that the quantity of this unperceived progress was about a degree and a half

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On the 19th, at eight o'clock the morning, in  $18^{\circ} 37' 20''$  latitude south, the mean result of four sets of lunar observations fixed the longitude of the ship at  $77^{\circ} 59'$ ; that which was indicated by the dead reckoning, brought forward from the observation of the 16th, was  $78^{\circ} 17'$ : thus the error in the interval had been 18 minutes, or six miles in twenty-four hours, in the same direction as the preceding ones.

Other lunar observations, made on the 27th, at eleven o'clock in the morning, in latitude  $19^{\circ} 40'$ , gave  $62^{\circ} 29'$  for the longitude; that which was deduced from the dead reckoning, brought forward from the observation of the 19th, was  $63^{\circ} 21'$ : the error of the reckoning had therefore been, in the space of eight days, 52 minutes, or six miles and a half in twenty-four hours, and still in the same direction, the currents had constantly set the ship to the westward, or *abead* of the reckoning.

From the result of the observations of that day, Captain MARCHAND reckoned, at six o'clock in the evening, that he could not be more than seventeen or eighteen leagues from RODRIGUE Island, when it was perceived as far as it could be seen, that is, at the distance of thirteen or fourteen leagues: thus the error of the ship's situation by account, with respect to her true situation, was not more than three or four leagues in a run of upwards

of

of eight hundred; but it would have been about fifty-seven leagues *astern*, that is to say, he would have met with RODRIGUE Island fifty-seven leagues sooner than was expected, had he employed, for regulating his course, only the arbitrary and uncertain methods of the dead reckoning: for, in recapitulating the partial differences, arising, at various periods, between the results of the dead reckoning and those of the observations, we find that the ship had been carried  $2^{\circ} 40'$ , or about one hundred and fifty miles *ahead* of the account, and one hundred and sixty in adding thereto the small error discovered on making the land.

Hence it therefore results, that the unperceived progress of the ship to the westward, had been (on an average)  $7\frac{1}{2}$  miles in twenty-four hours. This may be attributed to the effect of the currents, which may have had a constant direction; but might it not also be considered as the effect of a general movement of the waters from east to west, which is most commonly estimated, in an open sea, between the tropics, at the rate of eight or nine miles for each diurnal revolution of the earth?

I have thought it incumbent on me not to throw into the *NOTES* the result of the observations which were made in the run from MACAO to PRINCE'S Island (Strait of SUNDA), and from the Strait to RODRIGUE Island: it is well known that the currents have a considerable influence in the  
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Indian Seas : their direction, which varies according to the seasons, sometimes in the same season, requires all the attention of the navigator, because their action has a material effect on the ship's course, and may give rise to fatal errors. In presenting to seamen these runs with minuteness, I wished to enable them to appreciate the utility of the lunar observations for the safety of navigation and the improvement of hydrography; the example here stands by the side of the precept; and if they persist in rejecting evidence, if they repel light, I shall not at least have to reproach myself with not having made it shine to their eyes.

Captain MARCHAND, after having made RODRIGUE Island, directed his course towards the Isle of FRANCE; and, on the 30th of January, the SOLIDE anchored in the principal port in the island situated on the NORTH-WEST coast.

The run from PRINCE'S Island had lasted twenty-six days, and the mean progress of the ship had been thirty-five leagues one-third in twenty-four hours.

The ship had kept the sea for thirteen months and a half; and, with the exception of thirty days spent at anchor at LA PRAYA, LA MADRE DE DIOS, TCHINKITANAY, and MACAO, she had been constantly under sail. The health of the crew did not appear to be impaired by the fatigues of this long voyage; but, in order to return to the port in EUROPE from which the ship had been dis-

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patched, there remained three or four thousand leagues for her to run, which might occupy four months: the relaxation necessary for preventing disorders, the repairs to be made to the ship, the examination and the renewal of the provisions, the purchase, the taking on board, and the stowage of merchandise; in short, all the preparatives of a long voyage required that Captain MARCHAND should spend two months and a half at the Isle of FRANCE.

## CHAPTER

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## CHAPTER IX.

*DEPARTURE from the Isle of France.—The Solide touches at the Isle of Bourbon, now called the Isle of Réunion, in order to load there with coffee.—Run from that island to St. Helena.—Stay at this latter island.—Directions for anchoring in its road.—Various considerations respecting St. Helena.—Advantages of its situation, and of that of Gibraltar, to the nation which occupies those two rocks.—Navigation from St. Helena to the Strait of Gibraltar.—The Solide returns to Toulon.—On the length of voyages round the World, and the means which might shorten it.—Praises due to the owners of the ship, to the Captain, and to the officers.—Utility of the new methods for determining at sea the position of the ship.*

IT was on the 18th of April that the SOLIDE got under way from PORT NORD-OUEST in the Isle of FRANCE, in order to return to EUROPE, calling at the Isle of BOURBON, now denominated the Isle of RÉUNION, where she was to take in a cargo of coffee.

On the 20th, Captain MARCHAND came to at the anchorage of ST. DENIS; and, on the evening of the 21st, he again got under sail, and directed his course to make the coast of AFRICA, and double the Cape of GOOD HOPE.



This run, like that which preceded it, presents, concerning the effect of the currents and the errors of the reckoning, several observations, which, notwithstanding the little interest that details of this sort can afford to the generality of readers, have appeared to me to deserve, for the instruction of seamen and the improvement of navigation, to be mentioned at some length, reserving to myself to extend, in the *NOTES*, such of these observations as may appear necessary.

On the 28th, the longitude of the ship deduced from lunar observations, and reduced to noon, was, by a mean between four sets,  $42^{\circ} 44'$ : that which was given by the dead reckoning, deduced from the Isle of *RÉUNION*, whose geographical position is determined by astronomical observations\*, was  $44^{\circ} 51'$ : thus, in the space of seven days, the ship had been carried to the westward, or *abead* of her apparent run,  $2^{\circ} 7'$ , or thirty-eight leagues and a half †.

The daily errors in the direction of the latitude, ascertained by observation, were no less remarkable: from the 24th to the 25th, the ship had been carried 34 minutes, or eleven leagues and two thirds, to the southward; and during the last two days, she had been carried 9 and 12 minutes to the northward.

\* Longitude of *St. Denis*  $53^{\circ} 10' 0''$  east. *Connoissance des Temps. an VIII.*

† See Note LXIII.

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The observations of the next day, the 29th, in like manner reduced to noon, shewed that, in the last twenty-four hours, the apparent progress of the ship towards the west, had been again increased by the effect of the currents, 24 minutes or about six leagues; and the observation of latitude indicated that she had been carried to the northward 7 minutes, or two leagues one-third\*.

She was again carried 13 minutes towards the north, from the 29th to the 30th; 3 minutes in the same direction from the 30th of April to the 1st of May; and 11 minutes from the 1st to the 2d; but from the 2d to the 3d, she was carried 33 minutes or eleven leagues to the southward.

For some days, the weather did not allow of observations being made for the longitude; and on the 8th of May, at three o'clock in the afternoon, our navigators had the first sight of the coast of AFRICA in the vicinity of the Land of NATAL off LAGOA Bay: they could not have expected to see it so soon.

The bearings of the land, whose position in longitude, subjected to that of the Cape of GOOD HOPE, cannot be defective, shewed, on the 9th, at noon, that, since the observations of the 29th, in the space of ten days, the ship had again been carried 1 degree to the westward, *ahead* of her apparent progress towards this coast †.

\* See Note LXIV.

† See Note LXV.

Thus then, in the space of nineteen days, from the time of the SOLIDE's departure being taken from the Isle of RÉUNION to that of her making the land on the coast of AFRICA, there is a sum of errors in longitude, of more than three degrees and a half, or upwards of sixty leagues, which Captain MARCHAND would have reckoned himself distant from the coast when he got sight of it, if the observations made since the departure had not corrected this error by  $2^{\circ} 30'$ , and reduced it to that of  $1^{\circ}$  degree, which had taken place in the interval between the last day of observation, and that of making the land.

The errors in the latitude were considerable during the latter days: from the 2d to the 3d, 33 minutes or thirty-three miles; from the 4th to the 5th, sixteen; from the 5th to the 6th, three; from the 6th to the 7th, four; from the 7th to the 9th, forty. The sum of these errors, in seven days, is  $1^{\circ} 40'$ , or one hundred miles, which the ship had been carried to the southward beyond the quantity indicated by the dead reckoning; this is at the rate of fourteen miles two-thirds in twenty-four hours: but the differences towards that side cannot be a matter of astonishment. The ship had sailed, in that space of time, at the opening of the MOZAMBIQUE Strait; and the direction of this strait, which is nearly north-north-east and south-south-west, must determine that of a strong current the effect of which is felt at a distance, and carries vessels

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vessels to the southward, declining towards the west, according to the direction of the strait.

On the 9th, at noon, the latitude observed was  $33^{\circ} 33'$ ; and, according to the bearing of the land, the longitude must have been  $25^{\circ} 57'$ .

At two o'clock, the change of the water announced that ground would be reached in sounding: at a quarter past three, soundings were struck in seventy-five fathoms, over a bottom of gravel and rotten shells.

The coast, at that moment, extended from north-east by north  $2^{\circ}$  north to west  $4^{\circ}$  north; and the ship's distance from it might be five leagues.

A dreadful storm came on in the night of the 9th, and lasted till the morning of the 12th. The violence of the wind, which varied from west-north-west to west, joined to the extreme agitation of an overgrown sea, would have exposed to the greatest dangers a ship that had not possessed the excellent qualities of the *SOLIDE*. She was then directing her course to double the Cape of Good Hope; and it seemed that the conspired elements were, in some measure, disposed to justify the old name of *STORMY CAPE*, which the Portuguese navigators, who first attempted to double it, had imposed on that famous promontory. This was the season when the winter begins at the *CAPE*; and it is well known that the Dutch did not suffer their ships to remain in *TABLE Bay* beyond the 15th of May: all their vessels were bound to re-

pair, at that period, to FALSE BAY, where they are completely sheltered from the north-west winds, which blow with violence, often with fury, during the whole winter. The SOLIDE kept constantly lying to during the gale. Captain CHANAL observes, on this occasion, that when a ship joins strength to other qualities, to lie to appears to him preferable to scudding, according to the expression of the English seamen; he reckons that the situation of a ship is rendered less critical by lying to: whereas in apparently avoiding danger, by running before the wind and sea, a vessel is no less exposed to the ravages of the former, and she runs the risk of being overtaken and pooped by the waves which press and precipitate themselves against her stern.

The weather, which cleared up on the morning of the 12th, admitted of the land being perceived to the northward; and it was rather high: it was judged to be MOUNTAIN Cape, situated a hundred leagues to the east by north of Cape AIGUILLAS.

A calm, which had succeeded the gale, at a quarter past nine o'clock, allowed also of taking lunar observations, the mean result of which reduced to noon, gave  $21^{\circ} 49'$  for the longitude, and confirmed a great error in the reckoning, an error which the sight of the land had already indicated: according to the dead reckoning, deduced from the result of the observations of the 8th, the longitude of the ship must have been  $24^{\circ} 48'$ ; thus,  
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in the short space of four days, the error *aftern* was  $2^{\circ} 59'$ , or forty-nine leagues, which the ship had been carried to the westward beyond what the reckoning had implied.

If we recapitulate all the errors in the same direction since the departure from the Isle of RÉUNION, on the 21st of April in the evening, we shall find that the sum of these errors, in the space of twenty days and a half, was  $6^{\circ} 30'$ , or about one hundred and twelve leagues\*. When we reflect that navigation *by account or dead reckoning*, is still subject, at the end of the eighteenth century, to similar mistakes, we cease to be astonished that the geographical positions, given, after passages of several months, by the first navigators of the GREAT OCEAN, to islands of which they made the discovery, have been sometimes five or six hundred leagues in error. But ought we not at the same time, through the impulse of just gratitude, to pay a well-merited homage to the arts and sciences, which, by withdrawing us from the empire of arbitrary opinion, have furnished us with sure means of guarding against the dreadful effects of an uncertainty, to which the most skilful seaman in vain opposed his knowledge and long experience.

\* The Reader may convince himself of this, by casting up the sum of the errors *aftern*, from the 21st of April to the 12th of May. (See at the end of the NOTES, the *Table of the effect of the currents*.)

The errors in the latitude had, within these few days, been no less remarkable than those in the longitude: the observations shewed that, from the 9th to the 11th, the ship had been carried to the southward,  $1^{\circ} 11'$ ; and from the 11th to the 12th, 32 minutes; thus in the space of three days, the sum of the errors in this direction was  $1^{\circ} 43'$ , or thirty-four leagues one-third.

If we combine together the error of the longitude, which was forty-nine leagues, during these last days, with that of the latitude, thirty-four leagues one-third, it will be found that, in the space of three days, the ship, driven out of her apparent course by the movement of the waters, was carried sixty leagues to the west  $35^{\circ}$  south: this is at the rate of twenty marine leagues in twenty-four hours, or upwards of a common league an hour\*; while, on the contrary, owing to the natural consequence of the direction, and the violence of the wind which blew from the west, varying towards the north, the ship, lying to, ought to have been drifted towards the east-south-east and south-east. We are therefore justified in concluding that, but for the resistance which the direction of the wind and waves must have opposed to the action of the current, the effect of the latter would have been still greater; and it is, no doubt, to the struggle of these opposite powers, that must

\* See Note LXVI.

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be attributed the excessive agitation of the sea during the gale of wind. We may present, in support of this conjecture, what Captain CHANAL mentions in his journal: that on his return from INDIA in 1789, on board the Tuscan ship, IL GRAN DUCA DI TOSCANA, he experienced in the same latitude, an effect of the same current, still much more considerable than that of twenty leagues a day, since, in the space of twenty-one hours, the ship was carried thirty-five leagues to the south-west  $3^{\circ}$  south. The current was no longer felt when they had passed Cape TALHADO, situated to the west-south-west of MUSCLE BAY. The Tuscan ship had sailed at the same distance from land, twelve, fifteen, and twenty leagues, at which Captain MARCHAND had kept.

On the 13th, at noon, our navigators were assured by the observation of the sun's meridian altitude, that the effect of the current which, on coming out of the MOSAMBIQUE Strait, ought to set to the southward, had no longer acted on the ship, since, being more advanced towards the west, she had been sheltered by the southern lands of AFRICA; for, on comparing the latitude observed with that which had been deduced from the dead reckoning, it was found that the ship, very far from having been carried to the southward, had, on the contrary, been drifted 17 minutes, or five leagues and two-thirds, to the northward; this might be attributed to a strong swell from the south-



south-west, which must have driven her towards that side. Some lunar observations, taken at fifty minutes after ten in the morning of this same day, had likewise proved that, in the interval between the 12th and the 13th, the currents had ceased to set to the westward\*.

In the night between the 13th and the 14th, the *SOLIDE* carried away her main-yard, while the watch were employed in cluing up the topsails, in a squall that was not sufficiently strong to cause this accident: it was supposed to have been sprung during the gale of wind; however, it was expeditiously replaced by a spare yard.

From several observations made on the 15th and 16th, it was concluded that at noon on the latter day, the ship was in longitude  $17^{\circ} 47'$ , and latitude  $35^{\circ} 44'$ . Since the observations of the 12th and 13th, the differences between the longitude observed and that by account, had been so small, that it might be imagined that at least a part, or perhaps the whole of these differences, belonged to the trifling error which an observer cannot be assured of guarding against in the observation, or to the error which may still be found to affect the astronomical tables that are employed in the calculation of the longitudes deduced from the moon's distance from the sun or stars.

We are therefore justified in thinking that, in the interval from the 12th to the 16th, the differ-

\* See Note LXVII.

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ences between the results of the dead reckoning and those of the observation, were by no means occasioned by the effect of the currents which had mastered the ship during the preceding days\*.

Captain MARCHAND, having found by the observations of the 16th, that, at noon on that day, he was under the meridian of Cape ARGUILLAS, and fifteen leagues to the southward of that cape; steered north-west; in order to make the Island of ST. HELENA, where he intended to pass twenty-four hours, in order to procure some refreshments for his crew; and, in concert with Captain CHANNEL, he employed himself in this run in ascertaining the route of the ship by the use of astronomical observations which, in the course of the voyage, had constantly guarded him against the uncertainties and errors of the dead reckoning.

The observations of the 25th of May gave  $4^{\circ} 42'$  east longitude, and proved that, in the space of the last nine days, the ship had been carried to the westward  $1^{\circ} 6'$ ; beyond the result of the dead reckoning†.

Those of the 28th shewed that the error on the same side, had been, in three days,  $1^{\circ} 9'$  ‡.

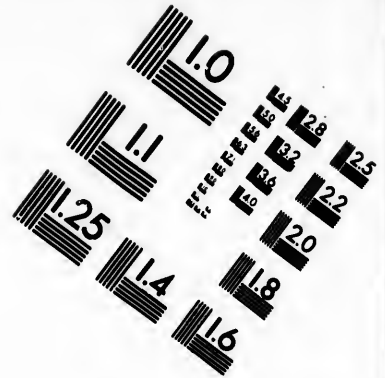
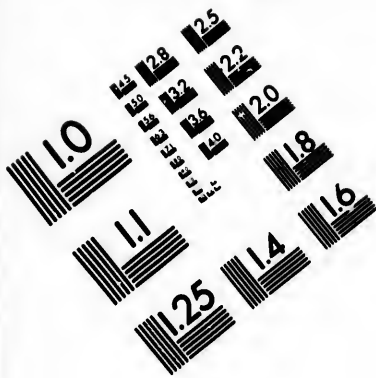
On the 29th, at noon, the longitude of the ship; deduced by the twenty-four hours' dead reckoning, from that which had, on the noon of the preced-

\* See Notes LXVIII and LXIX.

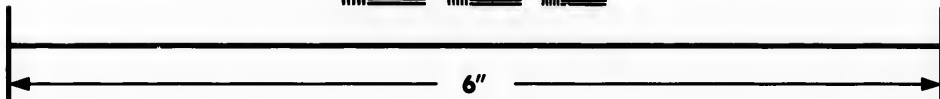
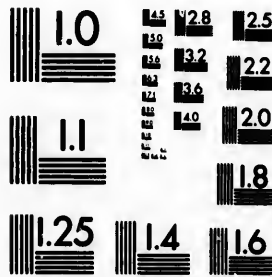
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ing day, been given by the observations made that same day, was  $0^{\circ} 15'$  west from PARIS, and the latitude, observed at the same instant,  $20^{\circ} 52'$  south. Thence it was concluded that at half past ten o'clock, in the morning of the 29th, the SOLIDE had been under the first meridian of FRANCE, under which she had already passed in the MEDITERRANEAN, after her departure from MARSEILLES, on the 19th of December 1790: thus, in the space of seventeen months and ten days, or only thirteen months and a half, deducting the time passed at anchor, at the different anchorages, and the length of the stay at the Isle of FRANCE, the ship had circumnavigated the globe in the direction of the diurnal revolution of the sun, or to express myself more correctly, in the inverse direction to the diurnal revolution of the earth: and if, on his arrival at MACAO, Captain MARCHAND had not added a day to the computation of time, he must have added it here, in order to agree again with the date and the calendar of the meridian of PARIS.

The observations for the longitude on the 29th, proved that, in the last twenty-four hours, the currents had acted feebly in increasing the ship's progress by account towards the west\*; and those of the 30th even seemed to indicate a progress still smaller by 1 minute towards that side, than was given by the dead reckoning†.

\* See Note LXXII.

† See Note LXXIII.

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But if the movement of the waters had no longer acted in the direction of the longitude, their action occasioned considerable errors in the direction of the latitude: the observations shewed that, in the interval of four days, from the 30th of May to the 3rd of June, the currents had carried the ship 33 minutes, or thirty-three miles to the southward\*.

Half an hour before noon of this latter day, our navigators had the first sight of ST. HELENA, bearing west by south, at the distance of about twelve leagues; and it is at this distance, and in this direction, that the island ought to have borne from the ship, according to the dead reckoning, deduced from the longitude which had been determined on the 30th of May by observations of the distances of the sun and moon. This situation being ascertained left little doubt that, the next day in the course of the forenoon, the ship might cast anchor in the road of JAMES TOWN, situated about the middle of the north-west coast of the island.

On the 4th, at nine o'clock in the morning, SUGAR-LOAF Point bore west south-west, and the extremity of the most eastern land in sight bore directly south. After having hoisted out the boats, and doubled the north point, Captain MARCHAND stood in for the road under the topsails, by the help of a light breeze from south-east to east-south-

\* See Note LXXIV.

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east, and at half past ten o'clock, the *SOLIDE* came to an anchor off JAMES TOWN, in thirteen fathoms, over a bottom of fine gray sand; SUGAR-LOAF Point bearing east  $31^{\circ} 45'$  north, MUNDAN'S Point, south  $20^{\circ} 30'$  east, and the flag-staff of the governor's house, south  $9^{\circ} 15'$  east.

Captain MARCHAND found at the anchorage two English East-Indiamen; and, a few hours after his arrival, a ship which he had met with at sea likewise came and anchored in the road.

I shall not here terminate what concerns the *SOLIDE*'s run from the Isle of REUNION to St. HELENA, without shewing, both with what exactness she made the land on this latter island, and to what a dangerous error she would have been exposed, had not the dead reckoning been rectified by astronomical observations.

The last observations for the longitude had been made on the 30th of May, and it was from this fixed point that Captain MARCHAND set out for making the land. In applying to the longitude determined by these observations, the progress by account towards the west since that period, a progress which he had reason to think sufficiently exact, since, during these latter days, the currents had ceased to act on the ship in the direction of the longitude, we find that the longitude of the ship, in sight of JAMES TOWN agrees, to a minute, with that which had been fixed for that town by NEVIL MASKELYNE, the astronomer royal of

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GREENWICH. This extreme precision is, no doubt, an effect of chance; since Captain MARCHAND was obliged to employ the dead reckoning for the last five days of the passage, and since this calculation might be affected by some error; but let us see in what longitude the ship would have been supposed to be, if, in sailing only from within sight of the coast of AFRICA, on the 9th of May, he had been under the necessity of directing his course by the dead reckoning.

On the 4th of June, Captain MARCHAND, would have reckoned that he had arrived at  $3^{\circ}$  west longitude, when he had already reached  $8^{\circ} 4'$ ; the error *after* would then have been, after *seventy-five days* only,  $5^{\circ} 4'$ , which, in the parallel of St. HELENA, answer to upwards of *ninty-seven leagues*; but if, as that was possible, and has often happened, he had not made the coast of AFRICA, but had made a direct run, from the Isle of REUNION to St. HELENA, the error *after*, after *forty-three days*, the length of a very ordinary passage, would have been  $8^{\circ} 35'$ , or upwards of *one hundred and sixty-seven leagues*.

In order to make the reader sensible what fatal consequences might have ensued from an error *after* of upwards of five degrees, which still remained, at the time of making the land on the island of St. HELENA, notwithstanding the con-

See Note LXXIV.

rection

rection of  $3^{\circ} 30'$ , made, twenty-five days before, within sight of the coast of AFRICA, it will be sufficient to observe that, in the persuasion in which Captain MARCHAND must have been that the ship was still near *one hundred leagues* to the eastward of ST. HELENA, it was possible that if, in coming to seek this small island, he had not kept exactly in its parallel, he would not have perceived it during the night, and that, in the dark, he would have passed it without suspecting it; and it was the more to be feared that he would not be able to keep in a given parallel, as in the latter part of the run, the ship had been constantly carried to the southward, and sometimes at a considerable rate in the interval of twenty-four hours. Besides, it is well known that, in the parallel of ST. HELENA, the winds blow constantly from the points of the compass near the east; and it is well known too that there is no longer a possibility of getting again to windward of the island, if a ship has once passed its meridian: I shall add that the steadiness of the winds here presents an additional danger; for if, in consequence of an error in the longitude, a vessel should happen to be hemmed in during the night on the windward coast of the island, this iron coast affords no other prospect than that of shipwreck, without any hope of safety either for the vessel or for the people.

As the road of ST. HELENA is little frequented by the French, to whom, however, it may be im-

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portant to be acquainted with it, and as it is so well known to the English, that, in the accounts of their voyages, they dispense with entering into any detail respecting the anchorage, I have thought that it would be useful to preserve the remarks which Captain CHANAL was enabled to make, as well in regard to the precautions to be taken, as to the course to be held, by a ship that intends to anchor in this roadstead.

The Island of ST. HELENA is sufficiently high to be discerned, in clear weather, at the distance of twenty leagues. It presents, at the first aspect, nothing but a heap of steep rocks, separated by narrow and deep vallies. The anchorage, as has been said, is situated on the part of the coast that faces the north-west: and as the island is placed in the region of the trade-winds, it is always necessary to make the land to the northward of this part, and to steer for SUGAR-LOAF Point, the most northern of this coast: first, you must range very close to this point; near it, there is no danger to be dreaded; the coast every where is bold and safe. On SUGAR-LOAF Point is seen a small fort, bearing this inscription, which is a warning to ships coming into the roadstead: "*Send the ship's boat ashore*." From this point, a boat may be dispatched in order to announce to the governor

\* I have been told that this notice is there written in three languages, English, French, and Portuguese.

the ship's arrival. Captain CHANAL says he was told that if the commander of a vessel neglected to conform to what is prescribed in this respect, she would be exposed to be fired at by the fort: Captain MARCHAND was unable to comply with this formality till after he had anchored in the road, and yet the fort did not fire.

After you have passed SUGAR-LOAF Point, you continue your course under easy sail, till you are arrived at the anchorage.

From this first point, you perceive the ships that may be lying in the road, and you steer for them: if there be none there, which is very seldom the case, you should steer so as to pass at a little distance from MUNDEN'S Point, where is built a small fort by which it may be known. It is necessary to range close along the land, if you do not wish to be forced to ply to windward in order to reach the anchorage: you have nothing to fear but the squalls that come from the two vallies situated between SUGAR-LOAF and MUNDEN'S Points: you must therefore carry little sail, and stand by the topsail haliards. Each of these vallies is defended by a battery of cannon.

JAMES Valley, in which JAMES TOWN is situated, presents itself immediately after MUNDEN'S Point. As soon as you begin to discover the flag-staff of the governor's house, you may let go the anchor; you will have from ten to twenty fathoms water, according as you have anchored nearer to or farther

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\* *Hankesworth*  
page 794 to 795  
† *George Forster*  
page 357 to 370  
‡ *W. Dampier*  
544 to 548, &c.

ther from the shore; but if you anchor in ten fathoms, bringing the flag-staff of the governor's house to bear south-east 6 or 7° south, you will be nearer to the landing-place and to that for filling water.

It is sufficient to moor with a stream anchor which must be carried to the north-west by the compass. The sea-breezes, from the south-west to the north-west, are here very rare: and if they happen to blow, they are always very faint: only, in this case, you experience a heavy swell which causes a violent surf on shore.

It will not, undoubtedly, be useless to French navigators to add to these merely nautical directions various particulars important to be known, which are neither to be found in the descriptions that have been given us of the Island of ST. HELENA, by Captain COOK\*, and GEORGE FORSTER †, nor in the more ancient Journals of WILLIAM DAMPIER ‡, to whom maritime nations are indebted for the first accounts of voyages from which it is possible to obtain exact information.

JAMES TOWN is built in the bottom of a narrow valley, commanded by two hills. A battery which

\* *Hanckensworth's Compilation. Cook's First Voyage. Vol. III. page 794 to 798.—Cook's Second Voyage. Vol. II. page 270.*

† *George Forster, A Voyage Round the World, &c. Vol. II. page 357 to 370.*

‡ *W. Dampier, A Voyage Round the World, &c. Vol. I. page 544 to 548. Knapp's edition, 1699. 270.*

occupies the whole breath of this valley, defends the approach to it, and protects the anchorage. Some redoubts, towards the sea, and forts erected on the slope of the adjacent hills, add to the defence of the place and to the protection of the roadstead. A garrison of five hundred men is maintained for the guard and the duty of these different works, as well as for the police of the island. Landing appears impracticable under the fire of the batteries in front, the lateral redoubts, and the commanding forts. The enemy who should intend to attack ST. HELENA, can do no more than attempt a bombardment, under cover of his ships of the line. The enterprise would at least be hazardous, if not altogether rash; and the destruction of the town would not involve the surrender of the island; for it is doubtful whether a descent could be effected till after having reduced the forts that command the valley: and the commanding situation of these forts is such, that they have little to dread from the effect of the artillery of ships which could cannonade them only at a distance, and firing directly upwards, while the forts would fire on the ships directly downwards, and make use of red-hot balls and shells, with a most decisive advantage. Neither do the other points of the north-west coast, more than those of the windward and leeward coasts of the island, present any facility for a debarkation, and on those which appear less inaccessible, batteries or redoubts well-situated and

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and commanding the ground, still add to the difficulties, almost insurmountable, which nature seems to have taken a delight in multiplying on the whole circumference of the island.

Within these few years, there has been constructed, as near as possible to the landing-place, a new fountain, by means of which a ship completes her water with all the facility and dispatch that can be wished for on the most extraordinary occasion. The casks are landed and re-shipped very easily by means of a crane, under which the long-boat comes alongside the quay without danger. For want of a long-boat or launch, a raft or string of casks may be formed, and towed on shore, and from the shore on board, by the smallest boat.

Each vessel pays for the duty of anchorage, five pounds sterling, or twenty dollars, if she fills more than twenty casks with water; three pounds, or twelve dollars, if she wants only that quantity or less. Foreign vessels are not taxed at a higher rate than that which is required even from the ships belonging to the English East-India company.

This company have, in the Island of ST. HELENA, of which they are proprietors, storehouses supplied with all the rigging, furniture, spare sails and masts, that a ship can stand in need of after a long voyage, or after a gale of wind that has occasioned her some damages. JAMES TOWN is a naval storehouse, in the middle of the SOUTH AT-

LANTIC OCEAN, open indiscriminately to ships belonging to the nation and to foreigners. The company, in delivering the articles which they hold in reserve for the wants of navigators, put on them, for their own profit, an increase of fifty per cent. on the prices of EUROPE. But a ship that should have occasion to heave down or get in new lower masts, would not find a possibility of making good those great defects; however, she might there procure topmasts.

The resources which this island presents to navigators are not confined to supplies of naval stores: the attentions of the company have likewise provided for the means of husbanding for them succour in point of provisions. An unprecedented drought, which, in 1790 and 1791, spread desolation through the island, has for a time destroyed part of these resources; but when we are acquainted with the laborious activity of the inhabitants who cultivate this rock, and we calculate the interest of the company, we are persuaded that this wound will ere long be healed, and perhaps is so already. Captain CHANAL, who had touched at ST. HELENA in 1789, tells us that, at that period, were reckoned there three thousand head of oxen, a considerable number of sheep, goats, and poultry; that vegetables of all sorts, and of the best quality, were to be had there in abundance; that potatoes were very common, and water-cresses propagated to such a degree that they were sold by the sack.

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sack. The island was enabled to furnish annually to the ships that put in here five or six hundred oxen. The examination took place in the month of January of every year; five or six oxen might be delivered to each vessel; and the number was carried to ten or twelve for ships that had sick on board, or extraordinary wants. But, in order to prevent all abuse, and maintain an equal distribution, the captains were bound to address their demand to the governor; and the latter regulated the number of oxen to be delivered to each ship.

Such was the state of this colony before 1790; but the two years of drought, and the want of fodder and grain that was the consequence of it, had occasioned the death of a third of the oxen, and destroyed the greater part of the sheep, goats, and poultry. In 1792, there was as yet granted only one ox in case of the most extreme want; and although the Governor, Mr. BROOKE, had manifested to Captain MARCHAND the best disposition for gratifying his requests; although he had made him the most obliging and the most sincere offers, and had loaded him with civilities, our navigators could obtain only six sheep, a few potatoes, and some sacks of herbage, but not a single fowl.

There is no bazar or public market at ST. HELENA; a stranger is obliged to apply to some inhabitant in order to procure the provisions of which he stands in need, with the exception of

oxen; but the price of every article is fixed by a regulation; and the governor takes the strictest care that strangers are neither cheated nor suffer extortion\*.

I shall not undertake to give a minute description of the Island of ST. HELENA, already known by the

\* Captain *Chanal's* journal gives us the prices of eatables in the month of July, 1789; it may be useful to preserve the memorandum of this, because it is to be hoped that after a few years of abundance shall have repaired the losses of the island, provisions may fall again to the price at which they were obtained before the years of drought.

An ox, weighed alive, cost four pence half-penny *sterling* the English pound; which amounted to 9 sous *tournois*.

*Ditto*, weighed by quarters, 6 pence *sterling*, the pound, or 12 sous *tournois*.

A goat, small and lean, a dollar and a half.

A sheep 2 dollars and a half.

Poultry, large and small, 18 *shillings*, or 3½ dollars the dozen.

Water-creffes and herbage, a dollar the sack.

Potatoes, 2 dollars the English hundred cwt. of 105 *French* pounds.

When Captain *Chanal* was at *St. Helena*, in 1789, he learnt that, from the month of January to that of July of this year, eighty ships of all nations had anchored in the road, and nine were lying there at that very time: all of them had been supplied according to their wants, and yet the last comers found every thing that they had occasion for; poultry only were beginning to grow scarce; but the quantity necessary for each of the ships could yet be procured. When he returned thither 1792; the losses which the inhabitants had sustained, and the scarcity of provisions united to raise the price of those which the island could still furnish; and every thing was paid for at double the rate of 1789; a sheep 4½ dollars, a cwt. of potatoes 2½ dollars.

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\* *Histoire* 1  
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journals of the English navigators : GEORGE FORSTER has taken particular pains to describe the nature and the productions of the soil ; and THOMAS RAYNAL \* has collected into a single picture the principal passages scattered in the different works that I have quoted †. I mean only to present the island under general points of view, and to bring forward a few facts, a few particulars, some of which belong to history, some to general physics, and others to politics.

DON JOÃO DA NOVA GALEGO, a Portuguese Admiral, made the discovery of ST. HELENA on the 21st of May 1502, on the day of the saint of that name. - The Dutch, who, in the sequel, conquered the conquerors of INDIA, made themselves masters of the small settlement which the latter had formed on the island, whither they had already conveyed goats, hogs, and various kinds of poultry. ST. HELENA afforded a place for procuring refreshments, a safe roadstead to ships coming from ASIA, or the eastern coast of AFRICA ; but the Dutch thought proper to abandon it after Surgeon VAN-RIEBECK had, in 1650, induced their EAST-INDIA company to adopt the plan of a settlement much more important, that of the Cape of GOOD HOPE, a situation which the Portuguese had neglected, because they were not sensible of

\* *Histoire Philosophique des Deux Indes*, Vol. II. page 207 to 209. *Pellet's* 8vo. edition. Geneva, 1780.

† See page 179, Notes \*, †, ‡, in this Volume.

the advantage of it; a situation, on account of which ENGLAND has since always envied HOLLAND, which she has at length contrived to get possession of by surprize, and which the commercial nations must wish to see soon return under the domination of the trading company who, at the southern extremity of AFRICA, founded an European colony, and one of the most considerable towns of that part of the world.

The English eagerly seized on the Island of ST. HELENA, which the Dutch abandoned; but the latter could not see without jealousy, nor without uneasiness, their rivals in commerce occupy a post with the utility of which they were acquainted: they endeavoured to take it from them, solely that the former might not possess it; and, in 1672, they succeeded.

But shortly after, the same motive that induced the Dutch to wish to deprive the English of it, induced the latter to make an effort to retake it. Captain MUNDEN was intrusted with the expedition. He landed in a small cove, where it appears that the Dutch had not conceived that a debarkation was practicable, for they had neglected to erect there any sort of fortification; and, before the besieged suspected that a landing was effected, the English had already reached the summit of the hills that command the town; and, from these heights, they battered the little fort which soon capitulated and surrendered.

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Since that period, the possession of ENGLAND has not been disturbed.

The Island of ST. HELENA is situated three hundred and thirty leagues from Cape NEGRO\* of the Old Continent, and six hundred leagues from Cape SANT AGOSTINHO † of the New. It appears to be only the calcined summit of a large insulated mountain, the part of which that shews itself above water must, according to the dimensions assigned to it in the journal of Cook's first voyage, be twelve leagues in length, by six in breadth ‡; and nothing

\* Western coast of *Africa*, in about 16° south latitude.

† Coast of *Brazil*, in about 8° 40' south latitude.

‡ I am very far from vouching for the accuracy of these dimensions; I report them out of respect to the name of *Cook*, such as they are to be found in *Hawkefworth's Compilation, Cook's First Voyage*, Vol. III. p. 391; they differ greatly from those which several charts have given to this island.

If there be an error, as I think there is, it is far from being proved that the error belongs to *Cook*, whose exactness is known; but we cannot have the same confidence in the compiler, who is frequently found in fault.

What might induce us to imagine that the dimensions given in *Cook's* journal are greatly exaggerated, is that it is there mentioned, that, while the *Endeavour* lay in *James Town Road*, *Mr. Banks* "improved the time in making the complete circuit of the island, and visiting the most remarkable places upon it." I observe that the ship anchored on the 1st of May at noon, and that she sailed again on the 4th, at one o'clock in the afternoon: supposing that *Mr. Banks* employed, in his excursion, the three whole days, and that, during these seventy-two hours, he took no rest, this time will still appear insufficient for making the circuit of the *St. Helena* of *Cook's* journal, and visiting the remarkable places upon it; for an island that is supposed to be

*twelve.*

nothing announces that it has belonged to a chain of high lands which has been swallowed up by the waters; for, at a very small distance all round the island, the sea is unfathomable: and although, for three hundred years past, the part of the ATLANTIC OCEAN where it is situated, has been ploughed and crossed in every direction, by ships of all the nations that frequent this sea, no other island has been met with, on a circumference of two hundred and thirty leagues, radius of which ST. HE-

*twelve* leagues long by *six* broad, and whose form differs little from that of an oblong square, must be *thirty-six* leagues in circumference, without reckoning the sinuosities which must still lengthen it.

George Forster, (Vol II. page 570 of his journal) says that the greatest extent of the island is nearly *eight miles*, and the circuit above *twenty*: these dimensions are so far from agreeing with those assigned to it by Captain Cook's journal, that I should be almost tempted to suppose that Mr. Forster, who is a German, meant *German miles* of fifteen to a degree; the eight miles of extent would, in that case, answer to 10 $\frac{1}{2}$  French and English leagues of twenty to a degree; and the *twenty miles* in circuit, to 26 $\frac{1}{2}$  leagues. If it were supposed that Mr. Forster had expressed himself in *marine miles* of 60 to a degree, the length of the island would be only 2 $\frac{1}{2}$  leagues: this is that which the charts of the Dutch who, formerly possessed *St. Helena*, as well as some French and foreign charts, have given it; but I think this length too little.

Dampier (*a Voyage Round the World*, Vol. I. p. 544) merely says that *St. Helena* is *nine or ten leagues* in length: this navigator always expresses himself in *marine leagues* of 20 to a degree: these dimensions would come near to those given it by Cook's journal.

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LENA would be the centre, that is to say, on a space of near fourteen hundred leagues in circuit.

It may be remarked that *south* of the equinoctial line, in the ATLANTIC OCEAN, all the islands are *solitary*, scattered, and placed at too great distances from each other for it to be possible to suppose that they belong to the same chain; while *north* of the line, in this very ocean, the islands are disposed in *groups*, known by the names of the CAPE DE VERD Islands, the CANARY Islands, and the AÇORES or Western Islands. The contrary is seen in the GREAT OCEAN to the west of AMERICA; it is *south* of the equator that are situated all those archipelagoes of low islands and high islands, with the situation of which modern voyages have brought us acquainted; and *north* of the line, with the exception of the archipelago of the SANDWICH Islands, all the islands are *solitary*, and thrown at great distances from each other: it is only at the MARY ANNE Islands, situated two hundred leagues to the eastward of the PHILIPPINES, the northern part of the great archipelago of ASIA, that the islands begin to form a chain, or to be grouped. To what physical cause is to be attributed this difference between the disposition of the Islands of the ATLANTIC OCEAN which separates EUROPE and AFRICA from AMERICA, and that of the Islands of the GREAT OCEAN which separates the latter from ASIA? Why, on the one hand, are the scattered islands, and on the other, the grouped islands,

islands, to be found in opposition, in the two Oceans, with respect to the equator, although situated on parallels nearly equidistant from this circle, and under this same torrid zone, comprehended between the two tropics, the region of the trade-winds throughout all the circumference of the globe? Why, with circumstances that are the same, do not the similar masses correspond with each other, if, in both hemispheres, their formation be the effect of the same cause? If, as it might be presumed, some great convulsion of Nature, by sinking some lands under the waters, has brought to view others, and has preserved of the former, only a few summits, a few pinnacles which indicate the direction of the chains of their mountains, we must then suppose that, in that part of the ATLANTIC OCEAN situated to the south of the equator, and in that part of the GREAT OCEAN situated to the north of this same circle, immense vallies occupy the spaces where at this day are seen those small islands, which, in ancient times, must have been lofty mountains, insulated on those vast regions; while, in the parts of both seas respectively opposite, some high lands whose elevation extended over long spaces, have, by the summits of their great mountains, formed the large islands which we see united in groups. Can we suppose that the masses in opposition in the two oceans, separated between them by half of the circumference of the earth, and placed at distances

distances south, and north of the equator, are not the effect of the same cause? But the hypothesis appears, since the seventy years that the present was supposed to be situated under it, has never seen a few natural islands of their cloths, the hypothesis, the generality of the take on this thrown, and it seems that its formation knowledge on the contrary of time, which scarcely suffice the chaos, from universal Power his action and that eternal, only once mover, who to man to content himself explain them.



distances nearly equal on the one hand to the south, and on the other, to the north of the equator, are necessary for the balance of the globe? But the necessity of this equilibrium has disappeared, since navigation, pushed by Cook beyond the seventy-first parallel south, has demonstrated that the pretended SOUTHERN CONTINENT which was supposed necessary for balancing the great lands situated under the Arctic polar circle and beyond it, has never existed but in the imagination of a few natural philosophers, who, from the recesses of their closets, wish to submit to their little hypothesis, the grand system of Nature and the universality of her means. At every step that we take on this terraqueous globe, alternately overthrown, and perhaps both by fire and by water, it seems that, instead of elucidating the theory of its formation, instead of acquiring some certain knowledge respecting its primitive state, we see, on the contrary, darkness thicken: and the night of time, which envelops the infancy of the world, scarcely suffers us to get a glimpse of the image of the chaos, from which it has been drawn by that universal Power who has placed immensity between his action and the limit of human conceptions; that eternal, immutable cause, which has acted only once for ever; sole principle, invisible mover, whose springs, no doubt, it is not given to man to know, and whose effects he must content himself with admiring, without pretending to explain them.

I return

I return to SAINT HELENA of which the digression that I have indulged myself in, has made us lose sight.

Although solitary in the midst of the SOUTH ATLANTIC OCEAN, the Island of ST. HELENA announces that it owes its origin to the same cause to which is attributed the formation of the islands that compose the groups situated north of the equator: it presents, throughout, a picture of ruins: every thing there indicates the action of a subterraneous fire, of an eruption, of an earthquake that has overthrown its surface, and decomposed its whole mass. Although separated by large vallies, the opposite hillocks exhibit one same aspect, shew the same strata placed at the same heights, and have the same direction; while the stones, especially those which are found in the bottoms, are calcined and nearly reduced to ashes. The navigator who makes the land on the windward side of the island, at first perceives nothing but a heap of broken rocks, separated by precipices, the height of which the eye cannot measure. Captain Cook says that, "in sailing along the shore, he came so near the huge cliffs, that they seemed to overhang the ship, and the tremendous effect of their giving way, made him almost fear the event"; and, no doubt, it will

\* *Hawkefworth's Compilation. Cook's First Voyage. Vol. III. page 392. 4to edition.*

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they have founded a colony entirely English, whose population amounts to two thousand individuals, including in this number, about five hundred soldiers, of whom the garrison of the island is composed, and six hundred slaves employed in different labours. If the colony has not risen to the degree of prosperity to which it might aspire, it is on the sovereign company alone that the reproach ought to bear: in reserving for themselves or for their agents, the greater portions of the productive ground, which are left in pastures for the rearing of the cattle intended for victualling their ships on their passage, they have, by these reserves, limited the progress of industry, which would have employed those very grounds in the cultivation of corn, wines, legumes, and nutritious roots. The activity of the colonists derives the most advantageous benefit from the small quantity of land that their hands are permitted to turn to account; and as the sole traffic that is tolerated by the monopoly of the company, is the sale of fruits, herbage, and other refreshments fit for shipping, the inhabitants must have applied themselves to the only kinds of culture which can insure them some profit. Accordingly all the free lands are assiduously cultivated; and if the crops of the island are not proportioned to the fertility of the soil and to the temperature of the climate, they are at least commensurate to the portion of the productive surface which avarice

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consents to leave to industry: for, as VIRGIL says,

*" Labor omnia vincit*

*" Improbis, et duris urgens in rebus egestas\*."*

Thus it is that the indefatigable Maltese labouriously extends over the rock which he inhabits, a stratum of vegetable earth that he brought from SICILY; and contrives to convert into a garden of HESPERIDES, a soil which Nature seemed to have condemned to eternal sterility.

Two rocks have, by their situation on the globe, deserved to fix the attention, and excite the jealousy of trading nations: the first, which I have just described, thrown into the middle of the ATLANTIC OCEAN between the Equinoctial Line and the south tropic; the second, placed for commanding the strait that separates two parts of the Old World, and connected by a tongue of land to the continent of EUROPE, which it terminates to the south. In both, the labours of art have surpassed the work of Nature; in the former, in order to fertilize a few portions of land; in the latter, in order to convert an insulated promontory into an impregnable fortress against which, and rather recently too, the combined arms of

\* " Then all those arts that polish life succeed,

" What cannot ceaseless toil, and pressing need?"

WARTON.

two great powers have miscarried. Both these important posts are occupied by the same nation: the one, by affording to its rich fleets from ASIA, about the middle of their voyage, a port, a place for procuring refreshments, facilitates the immense trade which it carries on with that part of the earth; the other, by giving up to it the gate of the MEDITERRANEAN, puts it in a situation to open or shut, according to its interests, the sources of the commerce of the Levant to the nations that have not possessions on this sea; to fetter, at its pleasure, the operations of its competitors; and, in case of war, to oppose the junction of the enemy's fleets which might be assembled partly in the ports of the Levant, partly in those of the west coast of FRANCE: at the same time that, by the maritime forces to which it affords a shelter, it presents an imposing mass, ever ready to repress the uneasy activity and check the sudden equipments of the Barbary powers, who, not carrying on any trade themselves, and not being able to enrich themselves, but by piracy, are skilful in creating pretexts for declaring war against the nations whose ships are called by trade into the MEDITERRANEAN\*.

The

\* Some of the Northern powers, in order to maintain peace with the *Barbary* States, and save the expense of giving convoys to their shipping in case of war, have, long since, determined to pay to the regencies on the coast of *Africa* and to the King of *Morocco*, a subsidy, or rather an annual tribute, which

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is always the fund friendship with the tributing to the fi appear, we cannot which have though with pirates, a tra thing to lose; we a not to increase thei pillage.

The rocks of ST. HELENA and GIBRALTAR would lose all their importance, if, as in past times, the former were possessed by the Dutch, and the latter re-attached to the kingdom of SPAIN, from which it was dismembered by a surprise, prepared by treachery. But what weight they acquire in the political scale of EUROPE, when they are united under the power of a nation the most enterprising, of a nation governed by principles inimical to the prosperity of every other, to which, neither mutual convenience, nor the law of nations, nor a respect for property, are obstacles to encroachment and invasion; and which, by force, by artifice, or by corruption, attempts to establish itself wherever some apparent benefit calls its commercial speculations! Have we not seen it contrive to consolidate, by treaties, the settlements which it had usurped on the MUSKITO shore, and in the Bay of CAMPEACHY; and under the idle pretext of the necessity of cutting, for its manufactures, the wood that grows on those parts of the New Continent, mask the real object of its

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is always the fundamental clause of every treaty of peace and friendship with those states; this is what may be called *contributing to the fire*. However humiliating this sacrifice must appear, we cannot but approve of the conduct of the nations which have thought proper to submit to it: in fact, in a war with pirates, a trading people has nothing to gain, and every thing to lose; we are forced to purchase their friendship in order not to increase their insolence by triumphs, and their power by pillage.

demands, the preservation, in the centre of the Spanish possessions, of those marts for smuggling, which insure it both the introduction of its merchandise, and the issue by the same channel of a part of the rich produce of the mines of MEXICO and POTOSI? Have we not seen it ready to run the chances of a war, in order to preserve the contested possession, or rather not to make the restitution of those barren islands, situated in the latitude of the MAGELLANIC LAND, of which it hoped to make an emporium of trade in the austral seas, and a point of support and a refreshing-place, when-ever it should wish to carry war to the west coasts of AMERICA? And when EUROPE was scarcely informed that, in the province of SONORA, at CINEGUILLA, at CINALO, and in other regions which extend to the northward of CALIFORNIA, the Spaniards had found new mines that surpass in richness all those which had hitherto been discovered in the New World, already this same nation had directed its ships towards the coasts that border on those countries; already a settlement, which announced itself as having no other object than a temporary traffic for furs, was rising on those lands scarcely known, and threatened SPAIN with a smuggling trade, the more difficult to check, as a greater distance must more easily conceal from the vigilance of the Viceroy of MEXICO and his lieutenants, such clandestine operations, which never fail to be promoted by the sub-

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altern superintendants whom it is not difficult to corrupt by interesting them in the success of the fraud. SPAIN has succeeded in disconcerting this new project of the British government; but let us not imagine that it is relinquished: we might rather foretel that it will be resumed with ardour, and prosecuted with perseverance, as soon as more favourable circumstances can insure its execution \*. In short, we see at this day the same nation treacherously avail itself of the troubles that agitate a republic not long since its friend, but which, weary of the yoke of an ally, become its master, returns to the liberty to which she was indebted

\* The treaty which *Spain* concluded with *England*, after the dispute relative to the settlement of *Nootka*, is, properly speaking, only a palliative. The immense extent of the Spanish possessions in *America*, the difficulty which their distance opposes to defence, the means of attack which a power entirely maritime has always at its disposal, no doubt, determined the cabinet of *Madrid* to accede to proposals of peace. The embarrassment of the moment allowed not of casting an attentive look to the dangers of the future: the Spaniards wished for peace; they made it. But this treaty which gives the English the liberty of establishing themselves and of navigating from *Cape Mendocino* to *Nootka* Sound, over a length of a hundred and fifty leagues of coast; this treaty which goes so far as to permit them to approach, within the distance of ten leagues, the coast subject to the domination of *Spain*, is for *England* a step towards the execution of other projects which are ripening in the bosom of silence. *Spain* is not, perhaps, sufficiently convinced that, in respect to commerce, the English are less formidable as enemies during war, than dangerous as neighbours during peace.]

for the rank she held among the great powers of EUROPE, we see it invade, both the important settlement of the Cape of GOOD HOPE, and the Island of CEYLON, still more important from its harbour of TRINÇAMALAY, the only safe port, in all seasons, that the Indian seas can afford to European ships; seize on the valuable islands that produce the spices; perhaps, at the time I am now speaking, ravage the opulent city of BATAVIA, if the insalubrity of its climate, formidable to strangers, and conducive to its safety in these circumstances, has not protected it from attack and plunder: and shortly, no doubt, we shall see it, after having expelled the Batavians from the seas of ASIA, direct its Indian fleet and army against the PHILIPPINES, which, in their ordinary state of nakedness, leave little hope that they can oppose a long resistance to an enemy encouraged by the facility of his successes, and strong from the weakness of the means that can be opposed to him.

So many conquests, added to the immense domains which ENGLAND, under the name of her East-India Company, already possesses on the continent of ASIA, compose for her an ultramarine empire, whose territorial surface is more than double that of her three kingdoms in EUROPE, and thus transmit into the hands of her privileged company, all the rich productions which the east of

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the Old Continent barter for the metals of the New World\*.

I shall not speak of the Island of TRINADAD, which she has recently acquired by right of conquest: we must expect that she will set it at a very high price, if ever she resolve to restore it; because, being situated at the head and to windward of a part of the coast which spreads over an extent of twenty leagues, and joins to the English settlements in the Bay of CAMPEACHY, that island will, in her hands, become the emporium of an immense smuggling trade, which, introducing itself by all the points of that long coast, will penetrate, through innumerable channels, to the very centre of the Spanish possessions.

As for her trade with the Portuguese colonies, it is well known that she is not reduced to seek oblique means for succeeding in it: she leaves to the ships belonging to PORTUGAL the care of importing to AMERICA the produce of the English manufactories, and of thence exporting to ENGLAND the produce of the mines of BRAZIL.

Those who have read history, and have reflected on reading it, cannot be mistaken respecting the plan which GREAT-BRITAIN has formed, and towards the execution of which, since she has

\* It is proper to remark that, at the time this part of the original work was printed, neither was the conquest of *Egypt* achieved by the French, nor had the English made themselves masters of *Seringapatam* and the *Mysore* country.—*Translator*.

occupied

occupied a place in the annals of EUROPE, we see her incessantly aiming, sometimes openly and by a rapid course, more frequently in the dark, and by a winding and imperceptible progress. To her, trade is all in all; and this too is the god to which she has always sacrificed, to which she will sacrifice every thing, even her very friends and allies: the universality of commerce which she attributes, and would wish to appropriate, to herself; commerce without participation; this is what was, at all times, the object of her meditations, the regulator of her enterprises, the aim of her attempts: and the four quarters of the earth are scarcely adequate to her cupidity and ambition—EUROPE is witness of this! And all EUROPE, petrified in a manner, by enchantment, does not in a mass take up arms against the usurpation of the commerce of the world! And the Northern Powers leave their useless ships moored in their ports! They all seem to tremble before that terrific giantess, more imposing than real, who overhangs the frail and too narrow base on which she stands; who has none of her great means within herself; whose political existence is, in some measure, only a prolonged illusion; and whom it will be sufficient to attack in her navy which constitutes her strength, in her trade which constitutes her wealth, in her Asiatic possessions which nourish both, to see her descend again to the inferior rank which the confined extent of her  
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European territory, and the weakness of her population, have assigned to her by the side of the great powers that divide the continent. It has been said poetically, and a thousand times has it been repeated; but, without a figure, history proves it by the experience of ages, that

*Le trident de Neptune est le sceptre du monde.*

Let all the nations that are called to share the empire of the seas, then awake at last to their own interest; let them, in order to break this iron sceptre form a maritime coalition, formidable from its mass, just in its object; let them unite their flags and their efforts, in order that the OCEAN, which Nature meant to be the property of all, may cease for ever to be the domain of one alone, and that, shortly, we may see every nation of the continent participate, in proportion to its territory and population, in the general commerce, in the free commerce of the two Worlds\*.

But it is time for us to rejoin the SOLIDE in the road of ST. HELENA. Captain MARCHAND staid there no longer than was absolutely necessary for providing himself with water, and procuring such refreshments as the island was in a condition

\* The subject of the *Northern Confederacy* having now been fully and publicly discussed, we suppress our observations on the above passage, which we should, otherwise, have thought it our duty to submit to the reader.—*Translator.*

to furnish to his ship. He had cast anchor on the morning of the 4th of June; and on the 5th, at half past ten in the evening, he set sail for EUROPE. On the 7th, at noon, in latitude  $14^{\circ} 53'$ , he still perceived the island to the southward; he must then have been at the distance of about twenty-one leagues from it.

A passage across the ATLANTIC OCEAN, from the Island of ST. HELENA, to the Strait of GIBRALTAR, can present no particulars that deserve to be mentioned: I shall confine myself to a few remarks relative to navigation.

On the 20th of June, at four o'clock in the morning, the SOLIDE crossed the line at the twenty-fifth meridian west from PARIS.

At this period, Captain MARCHAND began to perceive that the currents set to the northward, as had been experienced, the preceding year, north of the line, in passing from the CAPE DE VERD Islands to CAPE HORN; and he expected that, when he could determine the longitude by astronomical observations, he would find that the same currents set also to the westward, as had been in like manner experienced in the former passage.

It was not till the 10th of July that he was convinced of it; and he had already got into the latitude of  $32^{\circ} 23'$  north. In this parallel, four sets of observations of distances of the sun and moon, the mean result of which we reduced to noon, announced that the ship had reached the longitude

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longitude of  $46^{\circ} 27'$  west, that is to say, that since her departure from the Island of ST. HELENA, situated in  $8^{\circ} 9'$ , the progress towards the west had been  $38^{\circ} 18'$ : and as it was only  $35^{\circ} 21'$ , according to the dead reckoning, it was thence concluded that, in the interval of thirty-four days and a half, the currents had carried the ship to the westward beyond her apparent progress,  $2^{\circ} 57'$ , which may be estimated at fifty-three leagues that the reckoning was *astern* of the ship's true position.

But, at the same time that the currents had driven the ship to the westward, they had also driven her to the northward. Their direction towards this latter quarter had not been constant till the ship had reached the equator; they sometimes set to the southward, and particularly between the parallels of  $3^{\circ}$  and  $1^{\circ}$  south of the line: here they set towards that side, sixteen miles in twenty-four hours, for two successive days; but, from the equator to the parallel of  $32^{\circ} 23'$  north, their tendency towards the north was constant, and their effect was sometimes twenty-one, twenty-two, and twenty-eight miles in twenty-four hours; quantities which the real progress of the ship in latitude was in excess beyond her apparent progress. The sum of all the errors towards the north, deducting the errors towards the south, is one hundred and ninety-eight miles or sixty-six leagues: and, in combining the sixty-six leagues with

with the fifty-three leagues of the excess of the real progress towards the west beyond the apparent progress, it will be found, that, in the interval of thirty-four days and a half, the ship had been carried in the direction of north-west  $6^{\circ}$  north (which differs little from that which she had followed) eighty-five leagues that must be added to her apparent run, in order to have her real run. It may be concluded, from a mean term, that the daily increase of her run owing to the effect of the currents, was seven miles four-tenths in twenty-four hours\*.

Fresh lunar observations were, however, made on the 23d, and their mean result, reduced to noon, placed the SOLIDE in  $34^{\circ} 32'$  west longitude: her latitude, at the same moment, was  $41^{\circ} 42'$  north. According to this position, she was one degree and some minutes to the westward of the meridian of the Islands of CORVO and FLORES, the most western of the AÇORES †, and on a parallel more northerly by two degrees than that of those islands.

\* See Note LXXV.

† According to the observations made on board the *Isis* in 1769 with a time-keeper:

South point of the Island of <i>Corvo</i> . . . . .	$33^{\circ}$	$32'$	$32''$	west.
North-west point of <i>Flores</i> . . . . .	33	26	34	
South point of ditto . . . . .	33	32	26	

*Voyage de l'Isis à différentes Parties du Monde, en 1768 et 1769, pour éprouver les horloges marines de Ferdinand Berthoud. Paris, Imprimerie Royale, 1773, 4to. Vol. I. page 574 to 576.*

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† See Note LXXXV



The observations of this day shewed that the currents which, from the 6th of June, the day on which the departure was taken from ST. HELENA, till the 10th of July, had set to the northward and westward, had not ceased to set to the northward, between the 10th and the 23d of July; but that, in the same interval, they had set to the eastward; that their compound direction had been north 32 or 33° east; and that their effect on the ship's run might be estimated at three miles in twenty-four hours\*.

The observations of the 24th confirmed the direction of the currents towards the east †.

Others of the 27th, made at twenty-six minutes after four in the evening, gave 25° 32' of west longitude for noon, and the latitude observed at the same instant; was 41° 13' ‡.

On the 2nd of August, at five o'clock in the morning, our navigators had the first sight of the land of EUROPE, in the vicinity of Cape ST. VINCENT; it extended from north by east to south by west. The haze did not allow of their distinguishing even the extremity of the cape; but yet they might conclude that their distance from the coast was not more than four leagues.

At noon, they had a distinct view of it, and Cape ST. VINCENT, which the observations of

\* See Note LXXXVI.

† See Note LXXXVII.

‡ See Note LXXXVIII.

BORDA, in 1776, have fixed in  $37^{\circ} 2' 20''$  north latitude, and  $11^{\circ} 21' 36''$  west longitude\*, bore east half south, at the distance of two leagues and a half estimated by the eye. The SOLIDE's latitude was therefore, at that moment,  $37^{\circ} 3' 5''$  (it was observed on board the ship  $37^{\circ} 2'$ ) and her longitude  $11^{\circ} 30' 56''$ . In comparing this position with that which would have been given by the dead reckoning, deduced from the observations made at sea on the 27th, it will be found that, in the interval of six days, the movement of the waters carried the ship, beyond her apparent progress,  $1^{\circ} 26'$ , or about sixty-six miles to the eastward, at the same time that it carried her thirty-two miles to the southward. On approaching the Strait of GIBALTAR, Captain MARCHAND expected to experience the effect of an easterly current; but the movement of the waters towards the south has a very different cause: if we recollect that it was then the beginning of August, perhaps we shall be inclined to attribute this accidental current towards the south, to the melting of the snow and ice of GREENLAND, ICELAND, LAPLAND, NORWAY, &c†.

The sight of Cape ST. VINCENT having made known the true position of the ship, Captain MAR-

\* Determinations taken from a manuscript communicated by him.

† See Note LXXIX.

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CHAND directed his course for the Strait of GIBRALTAR.

On the 4th, at five o'clock in the morning, Cape SPARTEL on the coast of AFRICA bore south-east, at the distance of two miles and one-third, estimated by the eye. This cape, according to the observations of BORDA, made in 1776, is situated in  $35^{\circ} 47' 20''$  north latitude, and  $8^{\circ} 14'$  west longitude: the SOLIDE's latitude was therefore  $35^{\circ} 49'$  and her longitude  $8^{\circ} 16'$ . If this position be compared with that indicated by the dead reckoning from the 2nd at noon; it will be seen that, in the interval of one day and seventeen hours, the ship had been carried to the eastward, beyond her apparent progress towards that side, 37 minutes, or thirty miles, and, consequently, at the rate of seventeen miles and a half, or near six leagues in twenty-four hours\*.

The current towards the east runs here with its greatest force: confined between the lands of EUROPE, which, from Cape ST. VINCENT, stretch from west-north-west to east-south-east, and those of AFRICA, which, from Cape CANTIN, extend from south-west to north-east, the waters discharge themselves into the wide mouth of a sort of funnel, the orifice of which is the Strait of GIBRALTAR; and in the Strait itself, the current acquires the rapidity of a great river flowing majestically into

\* See Note LXXX.

the **MEDITERRANEAN**, and whose velocity augments or diminishes, according as the oscillation of the tides raises the waters or lowers them: and, indeed, it is not uncommon for ships, without being assisted by the wind, sometimes even with a wind contrary to the course, to be carried, in no great space of time, from the **ATLANTIC OCEAN** into the **MEDITERRANEAN**.

At six o'clock in the morning, the **SOLIDE** entered the Strait with eight other vessels which were steering the same course: the currents carried her rapidly into the **MEDITERRANEAN**; and at half past ten, she was running up it with a free wind. In ten days, she reached the coast of **FRANCE**; and on the 14th, at half past five o'clock in the evening, she came to an anchor in the inner road of **TOULON**, and happily terminated her **VOYAGE ROUND THE WORLD**.

The last run of the **SOLIDE**, from the Isle of **RÉUNION** to **EUROPE**, which is about three thousand five hundred leagues, by the log, was made in one hundred and fifteen days, including a day and a half spent at anchor off the Island of **St. HELENA**: thus, we may reckon that the ship's mean rate of sailing, during this run, was thirty leagues and a half in twenty-four hours.

Captain **MARCHAND**'s voyage is remarkable from the short space of time which he employed in circumnavigating the globe, directing his route by **Cape HORN**, and returning by **CHINA**. The

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total duration of the voyage, or the absence of the ship from the ports of FRANCE, was twenty months or six hundred and eight days: but if we deduct from this number the sum of the days employed in his stay in port at LA PRAYA, LA MADRE DE DIOS, TCHINKITANAY, MACAO, and at the Isles of FRANCE and of REUNION, and at St. HELENA, amounting together to one hundred and ten; and about ten other days lost, whether off the REVOLUTION Islands, in examining them, or off the SANDWICH Islands, in procuring refreshments there; whether in lying to, or in standing on and off on the coast of QUEEN CHARLOTTE'S Islands, while with the long-boat, Captain CHANAL was visiting CLOAK Bay, COX'S Channel, and the harbours and coves comprehended between this northern part of the islands and RENNEL'S Channel; whether, in short, at anchor in the CHINA Sea, in GASPAR'S Strait, and in that of SUNDA, to stop tide, when its direction was contrary to the route which it was intended to hold; there will remain only four hundred and eighty-eight days, or sixteen months and eight days for the duration of the voyage; and in this space of time, the ship, according to the log-book, sailed fourteen thousand three hundred and twenty-eight marine leagues; which gives, for the mean day, twenty-nine leagues four-tenths.

I observe that the ship was not what seamen call a *prime sailer*: built for resisting the fatigues

of a long voyage, and struggling against the waves in bad weather, she was SOLIDE in reality as well as by name; but she possessed not the qualities that constitute a fast-sailing ship; and her masts and yards were not in proportion to the body which her sails had to move: and, indeed, in closely examining the log-book, we see but a very small number of days in which, with a fair wind, and carrying a press of sail, the ship's run exceeded forty leagues. It is not then to the swiftness of her sailing that we must attribute the shortness of her voyage; but that having always made direct courses, in order to repair from one place to another, the itinerary length of each run was materially shortened. We may suppose, without straining the calculation, that, under the same circumstances of weather, a fast-sailing vessel would have obtained a mean swiftness of thirty-three leagues in twenty-four hours, and that, in the space of four hundred and thirty-four days, she would have run the same distance of fourteen thousand three hundred and twenty-eight leagues, for which the SOLIDE was obliged to employ four hundred and eighty-eight.

It may be remarked that, although Captain MARCHAND made, as I have said, all his runs by direct courses; although, by means of astronomical observations which guarded him against errors in the route, he was enabled to sail with safety from one place to another by the shortest line,

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Aug. 1792.]

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yet he was obliged, in order to circumnavigate the globe, whose circumference at the equator is only seven thousand two hundred leagues, to traverse fourteen thousand three hundred and twenty-eight: that is to say, that he traversed, very nearly, the equivalent of twice the circumference of the earth.

When we have made this remark, and we cast our eyes on the map of the world, we see that, if the labour of man, or one of those great convulsions which have separated CALPE from ABYLA, ENGLAND from FRANCE, and perhaps to the northward, AMERICA from ASIA, should ever, on the one hand, cleave the isthmus which joins the great peninsula of AFRICA to the mass of the Old Continent, on the other, that which of the two AMERICAS makes one continued land, the Voyage *round the World* would be shortened by one half; and the time required for the circumnavigation of the globe would not exceed seven or eight months;

And we should be wrong to suppose that to open a passage by water across both continents, if not to shipping, at least to merchandise, is a work above human power, and the means of which it is given us to dispose. The unanimous testimony of the historians of antiquity and that of the Arabic authors permit us not to doubt that there has existed a canal, by which the MEDITERRANEAN and the NILE communicated with the ARABIAN

GULF OF RED SEA \*. And why should not this communication be again opened? Who can now be

\* The ancient communication of the *Mediterranean* with the *Red Sea* has frequently been an object of inquiry among historians and geographers. We find in the *Mémoires de l'Académie des Sciences* (of the year 1702, pages 83. and following of *l'Histoire*) that M. *Boutier*, Consul of *France* in *Egypt*, in examining the disposition of the *Delta* at the beginning of this century, remarked the end of a canal issuing from the eastern branch of the *Nile*: and this observation was seized by the learned *Guil-laume Delisle* who judged that this end of a canal must have been that which anciently formed the communication of the *Mediterranean* and the *Nile* with the *Red Sea*.

“As this ancient communication (says *Fontenelle*, the Historian of the Academy), which M. *Delisle* established for an unquestionable fact, is unknown at this day even to several of the learned, they were very glad to see the proofs that he had of it; and he gave them so clear, and taken from places so well known, that all the difficulty is to ascertain why every one has not remarked them?”

We have, perhaps, more reason at this day than they had in the year 1702, to be very glad to see these proofs: there are circumstances which, by a series of comparisons, give things the most ancient the attraction and interest of novelty: we have a curiosity to know what has been done at another time, when we are anxious to know what might still be done.

*Delisle* has drawn from the historians of antiquity and the Arabic authors the proofs which he gave to the Academy of Sciences; I take them from the *History* of that Society; and it will be sufficient to mention the principal ones.

*Herodotus* (Book II) says that there was in the plain of *Egypt*, a canal cut a little above the city of *Bubastis*, and below a mountain that ran towards *Memphis*; that this canal extended very far from west to east; that afterwards it turned off to the south, and extended to the *Red Sea*. According to him, this work

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be made to believe that the Moderns cannot accomplish what it was possible for the Ancients to perform?

begun and abandoned by *Nechos*, son of *Psammetichus*, was resumed and completed by *Darius* son of *Hystaspes*: two galleys could pass there abreast. (*Psammetichus* ascended the throne 670 years before Christ, and reigned 55 years: *Darius*, 522 years before Christ.)

*Diodorus* (in the first book of his *Bibliotheca*) gives a description of the canal, which agrees with that of *Herodotus*, from which it differs only in his causing the canal to be left imperfect by *Darius*, to whom some very unskilful engineers represented that the *Red Sea*, being higher than *Egypt*, would inundate it, and in his causing it not to be finished but by *Ptolemy Philadelphus*: he adds that the canal could be opened and shut according as it was necessary for navigation. (*Ptolemy* began to reign 285 years before Christ.) We shall not here enter into a chronological discussion: the canal has existed, the two historians agree on this point; but at what time, or under what reign was it finished? This is rather a matter of indifference as to the question on which we are occupied.

*Strabo* (1st Book of his *Geography*) agrees in all points with *Diodorus*. He informs us, besides, that at the point of the gulf which is called the *Red Sea*, were two cities *Heroopolis*, and *Arfuoe*, also named *Cleopatris*; and, speaking of the expedition made into *Arabia* by *Aelius Gallus*, the first governor of *Egypt* for the Romans, he says that *Gallus* caused vessels to be built near an ancient canal branching from the *Nile*.

*Elmancius*, an Arabic author (Book I. Chapter III) says that, under the Caliph *Omar*, about the year 635 of the Christian Era, a canal was made for the conveyance of corn from *Egypt* into *Arabia*; and it is probable that he did no more than repair the old one, the navigation of which might possibly have been abandoned in the decline of the Roman Empire. But, in the year 150 of the Hegira (735 of the Christian Era) *Abugiasar Almanzor*, the second caliph of the *Abbasides*, caused the canal to be stopped up towards the sea.

perform? ASIA may again be approximated to EUROPE, from which the discovery of the Cape of GOOD HOPE seems, as it were, to have increased its distance: commerce may again open ancient routes, the track of which is not so effaced that we cannot find it again; its operations may acquire an activity which they will never obtain while that long circumnavigation of AFRICA to which they are subject, shall be the only practicable route by which we can maintain commercial communica-

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“ After this,” says the historian of the Academy, “ we may dispense with some authorities which have also been mentioned by M. Delisle. Every one is acquainted with the intention which some princes had had of establishing a communication between the *Mediterranean* and the *Red Sea*; every one knows that it was overfet by the chimerical fear of an inundation; and as if most readers had been struck by the same fear, they have not seen in authors the entire execution of the canal. If ever this junction be renewed, the face of the world would be changed; *China* and *France*, for instance, would become neighbours; and we should lament the destiny of those barbarous ages in which Europeans were obliged to make the tour of *Africa* in order to go to *Asia*.”

J. J. Oberlinus, who has given a complete Treatise on the junction-canals of rivers and seas in all ages, mentions and learnedly discusses every thing that relates to the canal of *Ptolemy*, and dispels all the doubts which may ever have arisen respecting the ancient communication from the *Mediterranean* and the *Nile* to the *Red Sea* (see *Jungendorum Marimum Flavio-riorumque omnis Aevi Molinina. Auct. Jer. Jua. Oberlinus, &c. Argentorati. 1775, 4to edition, pages 33 to 47.*)

The reader may also consult the *Description de l'Egypte* by *Maillet*.

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*Militaires*. No. I.

tions between the contiguous lands of the east and west parts of the Old World\*.

On the side of the New, we shall not require a cut to be made in the mountains which form the isthmus of DARIEN, that bridge of communication between the two AMERICAS; we have lost both the secret of HERCULES and that of HANNI-

\* The following passage, which we have taken from that much-admired publication, the *Précis des Evénemens Militaires*, must dissipate every existing doubt as to the situation of the canal between the *Red Sea* and the *Nile*, and convince the reader that, should the French retain possession of *Egypt*, nothing, within the compass of human ability, will be left unattempted to restore the long-lost communication between the *Red Sea* and the *Mediterranean*.—*Translator*.

“ The solution of this problem, the existence of the canal, which had joined the *Red Sea* to the *Mediterranean*, particularly occupied *Buonaparte*; towards the end of November, 1799, he had detached under the command of General *Bon*, a corps of 1500 men, which had taken possession of *Suez*; on the 26th of December, he went thither in person, accompanied by *Monge* and *Berthollet*; he first took a very particular survey of the town, and adjacent coast, ordered the construction of some new works, provided for the defence of this important post, and made various arrangements favourable to commerce.

“ In order to remove the remaining doubts, *Buonaparte*, having ascended the north coast, discovered the entrance of the canal, and followed it for the space of four leagues. Then passing through *Fort d'Algerand*, crossing the desert, and returning by *Belbeis*, he again found, in the *Oasis of Honoreb*, the vestiges of the canal of *Suez*, at its entrance into the cultivated and watered lands of *Lower Egypt*: having thus indisputably ascertained the two issues, he charged *Peyre*, engineer of bridges and highways, to take the level of it, beginning his operations at *Suez*.” (See the *Précis des Evénemens Militaires*. No. IX, pages 213 and 214.)

BAL; but, on the inspection of the lands which are situated about thirty leagues to the north-west of this rocky isthmus, and on the supposition that the coasts of this part of the continent, as well on the east sea as on the west, are disposed and fashioned as the Spanish charts represent them to us, it is not speaking at random, perhaps, to say that if skilful engineers were at liberty to put in practice the means which the study of hydraulics and mechanics afford them, they would contrive to render navigable the river SAN JUAN, the mouth of which is situated on the east coast of the Province of NICARAGUA, on the ATLANTIC OCEAN, and which communicates by its source with the great lake of that name, which itself communicates with the WEST SEA or the GREAT OCEAN, by the fork of RIO PARTIDO (the *divided* River) a branch of which appears to have its mouth in the Gulf of NICARAGUA, and the other in that of EL PAPAGAYO, which belongs to the great sea\*. And

\* The project of the junction of the two seas, by the river *San Juan* and the lake of *Nicaragua* has presented itself at all times to those who have cast an observing eye on the continent of *America*; and if the Spanish government have not attempted the execution of it, undoubtedly it is not because they have not a knowledge of it of a date as old as their possession of the country. Their attention must have been roused anew by the instructive Memoir which a French citizen, *Martin de la Basside*, published in 1791, under the title of *Mémoire sur un Nouveau Passage de la Mer du Nord à la Mer du Sud* (*Paris Didot*), and in which he has like an intelligent man, and with the zeal of conviction, discussed

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it may even be presumed that the labours which would be required by the direction of a canal, in order to effect, in this part, the junction of the two oceans that surround the two continents, would not surpass, would not equal perhaps, those which our *Riquet*\* executed so skilfully for crossing

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discussed the possibility and the advantages of a communication between the two oceans. The Memoir was not favourably received by the cabinet of *Madrid*, and this might well be expected. Every man who takes an interest, from any motive whatever, in the facility and extension of navigation and commerce, must offer up prayers that the author of the advertisement, which precedes the memoir, may have rightly judged when he says, that "it is impossible that *Spain* can longer resist the necessity of opening a communication between the two seas; and that if her own interest be not capable of deterring her, the instances of all nations must end by compelling her to it." Let us accept the augury; but let us not wait for circumnavigating the globe, till the project be executed, otherwise we might be condemned never to circumnavigate it at all.

\* Justice here demands from us a candid observation. *F. Andriossy* was the first who conceived the idea of the Canal of *Languedoc*, which was not only planned by him, but entirely completed under his immediate direction. He communicated his plan to *Riquet*, who presented it to the great *Colbert*, and, as soon as it had received the sanction of *Louis XIV*, became the contractor for all the works of that celebrated undertaking, which he did not live to see finished. However, in this, as in many other instances of the like nature, *Riquet*, not content with thence deriving every advantage of honours and emolument, greedily snatched from the original projector the meed of fame, so justly merited by the unremitting labour of thirty long years. Of the truth of these facts we have the proofs now before us,

in

FRANCE by the canal that joins the MEDITERRANEAN to the ATLANTIC OCEAN; nor those which the Swedes have undertaken, for establishing an interior communication between GOTHENBURG and STOCKHOLM, between the CATTEGAT and the BALTIC; nor those which PETER THE GREAT and his successors have partly terminated, partly begun, for making a communication between the CASPIAN Sea, the BLACK Sea, the BALTIC, and the WHITE Sea: and the expense of these labours, for ever useful, would, no doubt, be inferior to that occasioned by a single war in EUROPE, which destroys by the sword a million of its inhabitants, and reduces a still greater number to wretchedness.

But it is not Nature that would oppose the greatest obstacles to these enterprizes calculated to render the age illustrious, and do honour to the governments to which all nations should owe such a benefit. The obstacles, in the Old World, are connected with the difficulty, perhaps insurmountable, of carrying the canal that should communicate from the NILE to the RED SEA, across those unfortunate regions, alternately laid waste by despotism and anarchy, which are placed at too great a distance from the Sublime Porte, for the looks of a Sultan, if ever he look, to be able to reach

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in a work entitled *Histoire du Canal du Midi*, recently published, and obligingly communicated to us by a friend of the author, General *Andreoffy*.—*Translator*.

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them, and for the firmans of his Highness to be carried into execution; and in which we see the numerous chiefs who share, if not the property, at least the enjoyment of them, often in rebellion against the supreme authority, and always rivals among themselves, disputing with each other who shall impose the heaviest tax on the merchandise which, on the backs of camels, successively traverses the different districts that each of the oppressors, in his turn, causes to feel the weight of his avarice and tyranny\*. In the New World, a different cause produces a similar effect: the suspicious policy of the power that possesses exclusively the mines of MEXICO and PERU will never allow the commerce of other nations to open itself a road through possessions, the knowledge of which it would wish to conceal from every eye: in those countries, the presence of a stranger is considered as a national peril.

If political disorder which reigns on the one hand, if uneasy jealousy which watches on the other, seem to refuse that our globe should be circumnavigated from east to west; Nature, on her side, has not chosen that it should be so from south to north, either in the ATLANTIC OCEAN between GREENLAND and LAPLAND; or in the GREAT BOREAL OCEAN, between AMERICA and ASIA by

\* The reader will readily perceive that the French were not in possession of Egypt when this passage was written.—*Translator.*

**BEERING'S Strait.** Every one is acquainted with the fruitless attempts, begun upwards of three hundred years past, abandoned and resumed at different periods, to open, by the *north-east* and *north-west*, a passage whence it was supposed (which, however, is problematical, at least in regard to the north-east side) that ships might repair to **CHINA** and the **EAST INDIES** by a shorter route than that of the **Cape of Good Hope** or that of **Cape Horn**: but perpetual ice obstructs the seas which border on either pole; and all human industry, all efforts are unavailing against this obstacle.

Let us resolve then to traverse fourteen or fifteen hundred leagues, in order to sail round the world, since it has pleased the architect of worlds to give it only seven thousand two hundred leagues of circumference; we shall return to the project of shortening the route, if ever men, brought back to the principle of Nature, and considering themselves as one great family whose common habitation is our globe, at length consent to a community of territory, and to a universal and perpetual peace; but the philosopher who studies mankind, and meditates on their history, will not expect that this pleasing dream of the good **Abbé de SAINT-PIERRE** can ever be realized.

I shall not conclude this account of **Captain MARCHAND'S** voyage, without paying to his memory the tribute of praise that is due to him,

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on more accounts than one, for his whole conduct in the expedition which he directed as a commander, and in which he was ably seconded by the intelligence and talents of Captains MASSE and CHANAL, by the zeal and activity of the rest of his officers, by the good-will, subordination, and diligence of all the seamen employed under his orders. Merchants and ship-owners would have reason to congratulate themselves, and might be easy as to the success of their undertakings, if the captains to whom they intrust their interests, acquitted themselves of their employment, like those belonging to the SOLIDE, with the vigilance which foresees dangers without fearing them; the prudence which calculates and prevents accidents; the experience which knows how to repair them; and the perseverance which ends by mastering obstacles: yet, unfortunately, it is but too common to see unskilfulness and carelessness expose, at once, both the fortune of the employer and the safety of the crew.

The run of three thousand five hundred leagues, which Captain MARCHAND made, in the space of four months, from the Isle of FRANCE to TOULON, without putting into any port on the route (for we cannot reckon such a stay of thirty-six hours at ST. HELENA), is an example to present to our captains, who, for the most part, would think that they could not repair directly from INDIA, or the ISLE of FRANCE, to a port in EUROPE without touching

touching at the Cape of GOOD HOPE, where the desire of procuring a wine in high request in FRANCE, the agreeableness of the place, the charms of society, and the picture of plenty, detain them beyond the time required by the wants of the ship; without reflecting that, to stay in a foreign port, is to pay a voluntary tribute to the nation to which it belongs. I shall also quote to them the first run of four thousand three hundred leagues, from MARSEILLES to the MARQUESAS DE MENDOÇA, the duration of which was six months, and in which the voyage was interrupted only by a stay of seventy hours in LA PRAYA Bay, in order to procure water and refreshments.

• Commanders less zealous might object that humanity dictates the necessity of often putting into port and allowing seamen frequent opportunities of repose; and that it is unavoidable, in the course of long runs, for the crew to escape the attacks of the scurvy, the progress of which it is so difficult to stop, when it has once found its way into a ship. I know that, in fact, the ancient navigators have had a melancholy experience of this; and that the wish, so natural to man, to endeavour to be acquainted with the different parts of the globe which he inhabits, has cost a great number of its inhabitants their lives; but I know too that, when in the age in which we live, we see a similar calamity renewed, it can be attributed only to the carelessness of the captain who has neglected the prefer-

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preservation of his companions of fortune, or to the avarice of the owner who has not supplied his ship with those antiscorbutics, at this day so well known, with those efficacious preservatives, the use of which Doctor PRINGLE in ENGLAND, and Doctor POISSONNIER in FRANCE, have introduced on board ships, with a success which to them has been the most grateful as well as the most honourable reward for their zeal and researches. It is with these aids, that Captain Cook preserved his crews in the longest runs, and in climates the most dreaded on account of the excess of the heat or the severity of the cold; it is with these same means, that LA PÉROUSE, after two years of the most laborious navigation, did not reckon a single sick man on board the two frigates employed in his expedition\*.

Nothing had been forgotten that could contribute to the well-being of the SOLIDE's crew, and destroy the germ of the disorder peculiar to seafaring people: in this respect, just encomiums and thanks are due to the firm of BAUX, of MARSEILLES, who, after having conceived the project of the first expedition which the trade of FRANCE directed towards the NORTH-WEST coast of AMERICA, had employed themselves with paternal sollicitude in providing their ship with all the prefer-

\* See Vol. I. pages 29 and 30 what has been said concerning the duration of these runs.

vatives calculated for protecting, from the destructive scourge of seamen, those valuable men, who, after having bravely defended the flag of their nation against its enemies, devote themselves during peace, to the profession more perilous than lucrative, of enriching their country by commerce. The beneficent views of the house of BAUX were perfectly seconded by Surgeon ROBLET, of whom they had made choice to watch particularly over the health of the ship's company: he joined to all the theoretical and practical knowledge of his art, that sentiment of humanity which renders a medical man skilful in making up for what he has not, in inventing means of relief, in creating remedies\*, and in insuring their success by a persevering

\* I have thought that it would be useful for the information of the officers of health who devote themselves to share the fatigues of seamen, to give an account of the treatment which Surgeon Roblet introduced, and employed with the greatest success, for stopping in a man belonging to the crew, the progress of the scurvy, which, when the *Solide* quitted the *Sandwich* Islands, had manifested itself in this individual, with the most threatening symptoms, so much as to announce a very speedy dissolution: already, at the mere approach of land, three of his teeth had suddenly fallen out. The treatment of which he made use and which succeeded, consists in the employment of the *sand-bath*, dry and hot. The dry baths were known to the ancients, who employed sand, salt, and millet-seed, *Cornelius Celsus*, of the *Cornelia* family, and physician to *Augustus*, has particularly treated of these sorts of baths (a). In our days, they are known and

(a) *Sudor etiam (says he) duobus modis elicitur, aut secco calore, aut balneo: siccus calor est et arena calida, et lavonici, et ellibani, &c. Fomenta quoque valida*

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vering vigilance in observing their effects. He obtained the reward due to his talents, his active sollicitude

and employed, on the coast of *Africa*, and in the *West India* colonies, for certain disorders of the negroes, who are buried up to the neck in sand which the sun has strongly heated. I have read in a manuscript memoir of *Rollin*, Surgeon-Major of the *Bonffole*, written in 1786, which, no doubt, will be printed at the end of the account of *La Pérouse's* voyage, that the Americans who inhabit the *north-west* coast, towards the latitude of  $58^{\circ} 40'$ , also employ sand-baths as the most efficacious cure for the venereal complaint which is common on that coast. The action of the oblique rays of the sun on the lands of *North America* not being sufficient to give to the sand the degree of heat necessary, and procure copious sweats, they heat, by means of artificial fire, the sand intended for the bath, as well as the pit dug to receive the patient, who, on coming out of the dry bath, washes himself in the sea or in a neighbouring river. But, till now, we have not heard of this kind of bath having been made use of on board ship, for treating, at sea, the seamen among whom the scurvy has attained its highest degree of malignity.

Surgeon *Roblet* wishing to try the effect of the dry bath on the scorbutic patient, nearly given over, as has been already mentioned, caused some sand to be heated in great boiler, and mixed with it a quantity of cold sand sufficient for moderating the heat of the former, and rendering it supportable. The patient was put into this bath, into which he sunk to the middle of his thighs. The weather was dry and fine; and at noon *Réaumur's* thermometer rose to 25 degrees. The patient was left but half an hour in the sand; his legs were at that time benumbed especially the tendons of the extensors, which Surgeon *Roblet* attributed to the irksome position that he had kept. He

*calida (addo he) sunt millium, sal, arena; quodlibet eorum calafatum et in linteum coniectum, &c. See A. Cornelii Celsi Medicina Libri octo, ex recens. Leon Targæ, &c. Lug. Bat. Luchimans 1785. 4to. lib. 11. parag.*

folicitude, and the constancy of his attention to the men with whose preservation he had been intrusted.

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made him lie down, recommending to him to keep himself sufficiently covered not to experience the action of the exterior air. After two hours' rest, the condition in which he found the patient, seemed to border on a miracle; no more swelling; no more stiffness, even in the tendons; the ecchymoses almost dispersed, and become yellowish; the soles of the feet, before very painful, no longer causing any sensation; in short, Surgeon *Roblet* had the satisfaction to see his experiment greatly exceed the hopes which he had conceived from it. A week's sand-baths, the second of one hour, and the others of two, were sufficient for effecting the most complete cure: all the symptoms of scurvy disappeared never to return; and the man who had been threatened with sinking, in a few days, under the attacks of the disorder, enjoyed, during the last ten months of the expedition, the most perfect health.

"It will be for experience," says Surgeon *Roblet*, "to make known the advantages which may be derived from this treatment of scorbutic disorders. Already every thing announces the greatest success: and if it answer, in all subjects, to my expectation, I see nothing more easy and less expensive, than to provide every ship with an iron bathing-tub, with a double bottom, in which can be introduced, without danger, the fire intended for drying and heating the sand, and which can contain the quantity sufficient for covering the legs and even the loins of the patient. Commanders of ships will take care, besides, to supply themselves with three or four casks of fine sand; and I think that that which has been washed by the sea-water, ought to be preferred to that of rivers, because it contains saline particles, which are tonic. I am persuaded," adds he, "that the use of the sand-bath can be extended with advantage to the swelling of the legs, which is the consequence of chronic disorders; to dropsies which are beginning, &c. &c."

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In the course of an expedition which lasted twenty months, in the midst of fatigues and privations, after

The successful trial which Surgeon *Roblet* made of these baths, in the treatment of a scorbutic patient in whom the disorder appeared to have attained the most alarming period, will, I doubt not, induce officers of health employed on board ships, to make use of a curative method which a decisive experiment, made by a good observer, must render worthy of imitation. But, at the same time, they will consider it only as an *additional* curative; and they will not neglect to associate to it, according as necessity shall indicate, those which have been already adopted in the practice of physic, and of which experience has also consecrated the use and proved the salutary effects: neither will they neglect the employment of the other aids which can exempt them from recurring to *curatives*; and surely they will judge that, to prevent the scurvy in long voyages, they ought to continue to employ the *preservatives* whose efficacy is tried; such as herbs and legumes pickled in vinegar, coffee, mustard, wort, lemon robe, &c. &c. &c. as well as spirit of vitriol, mixed in a slight degree in the water that serves for the drink of the crew. My object is not here to recall to mind all the *preservatives* known to professional men; but in treating of this article, I must not forget to place at the head of the list, the most powerful, the most efficacious of all, excessive cleanliness: I say *excessive*, because it must extend to the most minute particulars, and which might appear exaggerated, perhaps even ridiculous, to those who, breathing all their life the pure air of our country-places or of our cities, are ignorant to what a degree the cleanliness of a ship and of the men on board, aspersions of vinegar, fumigations, perfumes, ventilators, &c. are necessary, for maintaining in this floating house, at once, a store room of corruptible provisions, a pig-stye, sheep-pen, poultry-yard, and hospital, an air that is not mephitical, and does not carry with it a cause ever present, ever acting, of disease and destruction. It would be superfluous, no doubt, to recommend to seamen, to add to the *preservatives* and *curatives*, the use of legumes, herbs, fish, meats, and other

after having traversed every climate, and experienced every variation of temperature, the SOLIDE lost only one man out of fifty who composed her crew; and this man died of a species of apoplexy; in the ordinary state of society, more than one individual in fifty dies in the space of twenty months, supposing them to be thirty years of age, which is that we must reckon for the mean age of a ship's company\*.

The preservation of the people and the interest of the owners constantly shared the solicitude and care of Captain MARCHAND. The former object he accomplished, by the attention which he paid to the employment of every means that could contribute to maintain the good health of the companions of his labours; the latter he fulfilled, by employing himself assiduously, in concert with Captain CHANAL, in astronomical observations, which, by rectifying the errors unavoidable in the

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fresh provisions, whenever the opportunity, always wished for, presents itself of procuring them for the consumption of the crew.

\* It is proved, from the calculation of the probabilities of human life, founded on inquiries the most numerous and the most exact, that, out of five hundred individuals whose mean age is thirty, fifteen die in the space of twenty months: in following this proportion, out of fifty individuals of the same age, there must die, in the same space of time, at least one, and perhaps two, since the calculation gives one and a half. (Note communicated by Citizen *Duvillard*, associated member of the National Institute of Arts and Sciences.)

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dead reckoning, gave him the advantage of being able to shorten his runs, and the confidence of making the land with safety and precision at all the places at which he proposed to touch. Each of his land-falls may be quoted as a proof of the correctness of his operations, at the same time that, in order to determine the longitude, there is a necessity for making use of those means so long wished for, so long expected, of those new and invaluable methods, to which a further degree of precision is added by the concurrence of two observers, whose observations and calculations reciprocally control and rectify each other.

It may excite astonishment, that, in concluding, I should recur to a remark, which, at different periods of the voyage, I have taken care to bring forward; and, undoubtedly, there is no one who is not persuaded that seamen have been eager to promote and employ methods, the advantage of which is manifest, and which are results set within their reach, theories the most sublime and combinations the most ingenious. I would wish to have praises only to bestow; and it is painful, for a *Veteran of the Navy*, to have reproaches to make to those who are engaged in the profession: but I should merit them myself, if a culpable reserve induced me to keep silence. It is time to rouse French navigators from the humiliating apathy which keeps them in the shackles of an old *routine*, and prevents them from turning to account, for the success of

the enterprises that are intrusted to them, and for their own safety, the discoveries, which, for half a century past, geometry, astronomy, and mechanics, rivals in success as in labours, have added to the domain of the sciences, and the only object of all which is to insure and abridge the route of the navigator. Will it be believed that FRANCE does not reckon a hundred seamen (and I might reduce the number so much below the half) who know how to employ at sea, the observation of the moon's distance from the sun or stars; to make use of the machines proper for keeping, as in trust, the time of the place from which the departure is taken; and deduce, from either method, or from the two combined together, under what meridian, on a given day, the ship is arrived? What avails it that the Board of Longitude of FRANCE, like that of ENGLAND, calculates with all the precision required for the perfection of these great theories, the auxiliary tables which facilitate and abridge the calculation of the observations; and that these tables, consecrated, for the most part, to the use of our navigators, are published, for every year, several years in advance, in order that ships intended for distant expeditions, may, on their departure from EUROPE, be provided with them for the whole duration of the longest voyages? What avails it that FERDINAND BERTHOUD, by opening to the French artists a new career, by creating, for the navy, an art of clock-making, which may be called

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called *transcendent*, has found means to combine the most finished execution with the most subtle theory\*, and that LOUIS BERTHOUD, treading in the steps of FERDINAND, has, for the use of seamen, multiplied those ingenious machines, master-pieces of mechanism, with which they can daily, and several times a day, solve the problem of the longitude at sea, and, in a little time, correct or improve all hydrography? What avails it that BORDA has presented to the French navy, for observing at sea the altitudes and distances of the luminaries, an instrument which the smallness of its bulk renders as portable, as convenient for use, as the excellence of its principles renders it certain and exact in its results? What avails it, in short, that he and our geometricians have applied themselves to, and succeeded in, finding methods of

\* This artist, Member of the National Institute of Arts and Sciences, no less commendable from his disinterestedness than from the fecundity of his genius, has published, without reserve, at different periods, the results of his numerous researches and immense labours respecting machines calculated for measuring time, and those the special purpose of which is to determine the longitude at sea. In order to make the reader sensible of all the importance of this publication, it will be sufficient to say, that an artist, named *Armand*, constructed at *Copenhagen*, without any other assistance than the works of *Ferdinand Berthoud*, and the plates which he has annexed to them, time-pieces, of which *M. de Löwenörn*, Captain in the Danish Navy, a great proficient in astronomy, made use with success for finding the longitude at sea. (See *Observationes Astron. institutæ in Observatorio Regio Hånnienfi, &c. Auctore Thoma Bugge, &c. Hænniæ, 1784. Typis Aulæ Regiæ 4to. page XCVIII.*)

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simplification, by the help of which the business of computation that remains for the seaman to perform, after his observations for the longitude, becomes, as it were, only a manual operation, which requires no knowledge of the theories, which neither subjects him to a calculation more long nor more difficult than that which he daily imposed on himself, to learn by a coarse approximation the actual position of his ship, and to attain, by a lame process, an erroneous result? In the period at which we are arrived, the arts and sciences have left to the seaman to perform, for the purpose of regulating his navigation, only what it was not possible to do beforehand, in order to save him the labour of it. And the seaman remains insensible before these productions of genius, of which he was the object! And the admiration with which they ought to inspire him, can neither excite his zeal nor his vanity, nor awaken in him the sentiment of his interest! And the men of science and the artists, who have devoted themselves with equal success and ardour, to these laborious researches, are still to expect the only reward that they had annexed to their labours, the satisfaction of seeing that those to whom they were consecrated, should hasten to gather the fruits of them!

It is time that, in this respect, our humiliation should cease: the reign of ignorance is long since passed for seamen; it is no longer enough for them to be brave warriors, intrepid navigators; their

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honour, the national honour impose on them the obligation of knowing that of which it is no longer pardonable for them to be ignorant. If it were requisite for Frenchmen to be stimulated by the example of a rival nation; I should say to our navigators, that there is not a single English captain, employed in long voyages, who does not at this day make use of the new methods for determining the longitude of his ship; I should say to them that it is with this help, that the navigation of our enemies boldly embraces the two hemispheres; and that every point of the globe at which an English ship touches, now acquires a determined situation with respect to the other points of the earth, which ten centuries of a navigation of routine would never have succeeded in fixing. In speaking to seamen, I shall not add to views of general utility, the particular motive of their own preservation; I know too well that, from principle and habit, they despise danger; I know that, in the height of a storm, when the sea threatens to swallow them up, at the sight of the shoal against which the plank that separates them from the briny abyss may be split in pieces, wholly occupied with the safety of the ship intrusted to their charge, one thought alone of the future can be associated in their mind with the rapid combinations which require the present effort of all their faculties: *Hec olim meminisse juvabit*; they love to prepare for themselves recollections. But let them learn to be satisfied with the conflicts which

which the revolted elements cease not to wage with the navigator who wishes to conquer them: let their indifference not make them disdain the helps that are offered for rescuing them from the dangers which it is possible to avoid, which it is not glorious to brave: what! will not adverse fortune always reserve to herself too many for exercising nobly the courage of our Argonauts, and filling the page of naval history with the account of those terrible events, which insure to the superior genius who masters them, the applause of the present age, and a long remembrance in ages to come?

Paris the 20th Germinal, year V. of the French era.

(April 9th, 1797.)

*P. S.* Captain CHANAL's journal, having closed on the arrival of the SOLIDE in the harbour of Toulon, could not give an account of the success of the expedition as a commercial speculation; but some notes subsequently communicated to me by the firm of BAUX, have made known the final result of the adventure. The plan had been perfectly well conceived; and if the prohibition issued at CHINA, which could not be foreseen, had not thwarted it in the outset, the ship sheathed with copper, and copper-fastened, built and equipped, in every respect, for keeping the sea for three or four years, without needing any other repairs than those which accidents might necessitate, provided with four complete suits of sails and four sets of

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rigging, with an immense stock of provisions, and an assortment of articles for trade sufficient for a long series of operations \*, might, after her first touching at MACAO at the end of eight months,

\* The house of *Baux*, wishing to be certain that all the works of our manufactories which they intended to be employed in traffic with the Americans of the *north-west* coast, should be well-conditioned and of the first quality, thought that they could do no better than intrust the house of *Guilliand* father and son, Manufacturers at *St. Etienne*, trading to *Lyon*, and holders of a share in the *Solide's* expedition, with the fabrication of all the articles of hard-ware, arms for the savages, tools, and different implements, which the experience of preceding voyages had indicated as proper to be admitted with most facility and advantage in the fur-trade. The house of *Guilliand*, in executing this commission, exerted all the intelligence of very well-informed and enlightened merchants, and all the zeal with which they were inspired by the importance of the expedition, the object of which was known to them. But a considerable demand for halberets and other offensive arms, the fabrication of which employed several workshops scattered through the country, could not but throw an alarm among ignorant, suspicious, and restless men, whom liberty had just suddenly armed, and who thought they saw, in this collection of arms, counter-revolutionary preparatives and means. It was not without infinite pains on the part of the house of *Guilliand*, nor without repeated danger to their persons, that after seven or eight months opposition on the one hand, and perseverance on the other, the municipalities of *Lyon*, *St. Chamont*, and *St. Etienne*, to whom the object and the destination of the arms were perfectly known, and who wished to see them dispatched, at length succeeded in calming the agitated minds of these men; and, with the support of a corps of twelve hundred men which was passing through *St. Chamont*, sent off from this commune and directed towards *Marseilles*, those terrible halberets, of the kind used by our parish-beadles, the sight alone of which had spread alarm in the town and its environs.

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have easily undertaken, before her return to FRANCE, two more voyages from CHINA to the coast of AMERICA: and our navigators would have had the certainty of getting the start, at both places, of all the vessels that might have been dispatched, either from EUROPE, or from the UNITED STATES, and of having for competitors none but those which, sailing from the Ports of ASIA, might have been engaged in a similar scheme. On her third voyage to CANTON, they would have converted into teas, silks, and the other productions of CHINA, the whole of the produce of her three trips: and it is impossible to estimate to what sum might have amounted the joint profit of these combined operations. Fortune ordained otherwise: the produce of the first trip not having been able to find vent, Captain MARCHAND gave up all thought of a second; every farther operation was necessarily stopped; and as a sole and wretched resource, the cargo of furs was brought to FRANCE. It was immediately sent to LYONS, where the commercial concerns of the place, and the favourable season might promise no inconsiderable advantages in the sale; but it arrived there only a few days before the period when that unfortunate city, torn by civil war, experienced all the horrors of a long siege: in the midst of fire and devastation, the furs belonging to the house of BAUX were seized; and, being forgotten under the seals, notwithstanding their remonstrances, which were rendered more  
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urgent by the danger of delay, they became a prey to the worms. But the owners of the SOLIDE, no less zealous for the prosperity of their country, than disinterested in their speculation, will think themselves indemnified for the loss of two-thirds of their capital, if the new path which they have opened to French merchants, who, no doubt, will take care to engage in it with prudence, and measure their operations by probabilities, can one day procure an additional outlet for the national industry; and, for the State, a mean of forming, in those long voyages which exercise courage and ripen talent, seamen who join to the intrepidity that braves dangers, the experience that teaches to avoid them.

CORRESPONDING WORDS IN THE LANGUAGE OF WAHITAKŌ:

ENGLISH WORDS.	FRENCH PRONUNCIATION.		ENGLISH PRONUNCIATION.	
	CHANAL.	ROBLET.	COOK.	R. FORSTER.
PARTS OF THE HUMAN BODY.				
A Man.....	.....	.....	Tette.....	Tette.
A Woman.....	.....	.....	Vé'hehé.....	Vahéine.
The act of intimate union of the Sexes.....	Ouka-houka.	Ouka-Ouka.		
The Head.....	.....	é-Houpoco.	.....	Oôpo.
The Hair.....	.....	é-Houhoho.	.....	Oôwho.
The Forehead.....	Hæ*.			
The Eyebrows.....	Toukchaë*.			
The Eyes.....	Matta.....	Mata.....	{ Matta or Mattacca. }	Mattâ.
The Nose.....	{ Hôni (c) .. Hihou (M) }	{ é Hihou. .. }	.....	Eiyoo.

The

The Mouth.....	Noutou. . . . .	é-Noutou . . . . .	Môtoo.
The Tongue.....	Aëio. . . . .	é-Aheho.	
The Teeth.....	Niôh. . . . .	é-Niho. . . . .	E'neho.
The Chin.....	Cohouhahi	é-Cohouhai.	

<i>The Nose</i> . . . . .	{ Hōni (c) . . . } Hihou (M) . . . }	é Hihou . . . . .	Éiyōa . . . . .
<i>The Mouth</i> . . . . .	Noutou . . . . .	é-Noutou . . . . .	Mōtoo . . . . .
<i>The Tongue</i> . . . . .	Aëio . . . . .	é-Aheho . . . . .	
<i>The Teeth</i> . . . . .	Niōh . . . . .	é-Niōh . . . . .	E'neho . . . . .
<i>The Chin</i> . . . . .	Cohōuhahi . . . . .	é-Cohouhai . . . . .	
<i>The Beard, a Beard</i> . . . . .	. . . . .	. . . . .	Oōmec . . . . .
<i>The Ears</i> . . . . .	Pouhāhina . . . . .	Bohouahina . . . . .	Poneenohōc . . . . .
<i>The Neck</i> . . . . .	Hokaki . . . . .	é-Kaqui . . . . .	
<i>The Body or the Shape</i> . . . . .	Ehouma** . . . . .	é-Houma . . . . .	
<i>The Neck or Breast</i> . . . . .	Houma** . . . . .	é-Houma . . . . .	
<i>The Breasts</i> . . . . .	Hōu . . . . .	é-Hou . . . . .	
<i>The Arms</i> . . . . .	{ Mataio (c) . . . } e-Hima (M) . . . }	é-Ima . . . . .	
<i>The Elbows</i> . . . . .	{ Touka- . . . } hima** . . . }	é-Touca- . . . . . hima . . . . .	
<i>The Hands</i> . . . . .	{ Mana, Ma- . . . } naina . . . }	é-Mana, . . . . . Mana . . . . .	{ Eōomy . . . . . } Hēēma . . . . .

CORRESPONDING WORDS IN THE LANGUAGE OF WAHITAHÔ.

ENGLISH WORDS.

PARTS OF THE HUMAN BODY.

FRENCH PRONUNCIATION. CHANAL. ROBLET.

ENGLISH PRONUNCIATION. COOK. R. FORSTER.

<i>The Nails</i> .....	{	Mattécou(c)	é-Mayou-		
		Mayouhou	hou.		
		(M) .....			
<i>The Belly</i> .....		Poppou....	é-Coppou..	.....	Ôpoo.
<i>The Navel</i> .....		Pito.....	.....	{	<i>Pecto or Pee-</i>
<i>The sexual Parts of Woman</i> .....		Hômo.....	é-Homo.		to'ai.
<i>The genital Member</i> .....		Titou.....	é-Houhou.		
<i>The Genitals</i> .....		Comaï** ..	é-Comaï.		
<i>The Buttocks</i> .....		Poutétou-	é-Poutétou-		
		tahi**...	lahé.		

<i>The Anus</i> .....	Quakého**.	{	é-Houha-
			kého.
<i>The Thighs</i> .....	Pouhá.....		é-Pouha.
<i>The Knees</i> .....	Mouhō.....		



CORRESPONDING WORDS IN THE LANGUAGE OF WAHITAHÓ.

ENGLISH WORDS.	FRENCH PRONUNCIATION.	ENGLISH PRONUNCIATION.
—	CHANAL.	COOK.
DRESSES,	ROBLET.	R. FORSTER.
ORNAMENTS, &c.		
<i>Glass-Beads</i> .....	Pippi.....	Pippi.
<i>Punéures</i> or <i>Tattooing</i> .....	Tâou.....	E'patoo.
<i>Looking-glass</i> .....	Ouhatta.	

ARMS, TOOLS, IMPLEMENTS, &c.

<i>Piké</i> .....	Tôto (c).
	{ é-Cahahou
	(M).
<i>Sabre, dagger, sword</i> .....	{ Pahouha (c)
	{ Cohé (M)..
	{ é-Cohé.

<i>Lance</i> (the same word is used for a <i>Musket</i> with the <i>Bayonet fixed</i> ).....	Cahahou.
<i>Cannon, or any fire-arms what</i> .....	Pouhi.....

Sabre, dagger, sword..... }  
 Pahouha (c) } é-Cohé.  
 Cohé (M)..... }

Lance (the same word is used for a Musket with the Bayonet fixed.) .....	.....	Cahahou.
Cannon, or any fire-arms what ever .....	Pouhi.....	Pouhi.
Sharp-edged Tools, and Shells employed for the same use..	.....	é-Ouhi.
Stone with which their Tools are tipped.....	Tôki **...	Toki.
Whet-stone.....	Pounah **..	Pouh-nah.
Hatchet .....	.....	.....
Nail.....	Pappâh....	Pappa.
Fish-book.....	Éppâh.....	é-Pah.
House, Cabin .....	.....	.....
Canoe.....	Évakâh ...	é-Vaka....
European Ship or Boat .....	Hapai *.	E'vâa.....
		te-Whârre.
		Whââ.
		Tôéc.

CORRESPONDING WORDS IN THE LANGUAGE OF WAHITAHÓ.

ENGLISH WORDS.	FRENCH PRONUNCIATION.	ENGLISH PRONUNCIATION.
ANIMALS, TREES, PLANTS, &c.	CHANAL. ROULET.	COOK. R. FORSTER.
Hog.....	{ Bouhaka... Pouhaka... }	{ Booa ..... Boohā.
Name which the Natives gave to a Cat.....	Pouhîhó.	
Cock or Hen.....	Môha.... é-Moha...	Môa.
Fish.....	{ Éatou (C)... é-Hika (M) }	{ é-Hika.... Eëiyā.
Shell-fish.....	Pouhé**...	Pouhé.
Bread-fruit.....	Mâhié.....	Mâieé..... { Oôroo, Mâieé..... } Mâieé.
Cocoa-nut.....	Aéhié.....	é-Ahéhi. .. Nêéoo.
Plantain.....	.....	Mâieé a..... Maïa.

Sugar-cane..... Nohou\*\*.. é-Nohou.

REMARKABLE OBJECTS.





CORRESPONDING WORDS IN THE LANGUAGE OF WAHITAHÓ.

ENGLISH WORDS.	FRENCH PRONUNCIATION.	ENGLISH PRONUNCIATION.
TITLES, &c.	CHANAL. ROBLÉT.	COOK. R. FORSTER.
Chief.....	{ Othou, } { Otou.... }	{ ..... } { A-ka-ái. }

*Title given to Captain Marchand by the Natives.*

Friend or Friends.....	{ Tāyo and } { Tāyé. } io.	Tayo or Tai- io.
Handsome, very handsome.....	Mai, Dai*.	
Small.....	.....	.....
I, me.....	.....	.....
Thou, thee, you.....	.....	.....
		Éctec.
		Wou.
		Oë.

VARIOUS EXPRESSIONS.

Come, approach.....	Hāo**	Hahécho.
Come with me, follow me.....	Máhi**	Mahi.

VARIOUS EXPRESSIONS.

<i>Come, approach</i> .....	Haëo **	Hahého.
<i>Come with me, follow me</i> .....	Máhi **	Mahi.
<i>Go, go about your business</i> .....	Tahi **	Tahi.
<i>Wait, presently, directly</i> .....	Heppo	e-Poh.
<i>Do you consent?</i> .....	{ Eh? ( <i>very</i> <i>open</i> )	
<i>Silence, hold your tongue!</i> .....	Mouiton *	
<i>To kill, and also killed, dead or</i> <i>merely wounded</i> .....	Matté	Matté.
<i>A thing prohibited</i> .....	Tábou	
<i>To drink</i> .....		'Aenoo
		Áinoo.

NUMERICAL

Tbou, tbee, you .....

.....

.....

## CORRESPONDING WORDS IN THE LANGUAGE OF WAHITARÓ.

ENGLISH  
WORDS.NUMERICAL  
TERMS \*.

	FRENCH PRONUNCIATION.		ENGLISH PRONUNCIATION.	
	CHANAL.	ROBLÉ.	COOK.	R. FORSTER.
<i>One</i> . . . . .	a-Tâhi . . . . .	Tahi . . . . .	Attá'haee . . . . .	bo-dāhāi.
<i>Two</i> . . . . .	a-Houāh . . . . .	Houah . . . . .	A'ēea . . . . .	bo-hoōā.
<i>Three</i> . . . . .	a-Tōhou . . . . .	Tohou . . . . .	A'totoe . . . . .	bo-dō-oo.
<i>Four</i> . . . . .	a-Fah . . . . .	Fah . . . . .	A'faa . . . . .	bo-hā.
<i>Five</i> . . . . .	a-Hima . . . . .	Hima . . . . .	A'éema . . . . .	bo-heēmā.
<i>Six</i> . . . . .	a-Hōno . . . . .	Hono . . . . .	A'ono . . . . .	bo-nā.
<i>Seven</i> . . . . .	a-Fitto . . . . .	Fitou . . . . .	A'whetee . . . . .	bo-hiddoo.
<i>Eight</i> . . . . .	a-Vāho . . . . .	Vahou . . . . .	A'wāoo . . . . .	bo-wāhoo.
<i>Nine</i> . . . . .	a-Hīva . . . . .	Hīva . . . . .	A'éeva . . . . .	bo-heēvā.

\* They have no numerical terms beyond TEN; but, as they reckon the Tens with their fingers, they can count as far as a HUNDRED.

Ten . . . . . } a-Onohō-  
hou . . . . . } Onohouhou. } Wannahoo,  
or Wan- }  
na'hooc . . } bo-nahoo.



CORRESPONDING WORDS IN THE LANGUAGE OF WAHITAHÓ.

ENGLISH  
WORDS.

NAMES OF THE  
ISLANDS.

Second Bay { *Soub Cove* . . . . . a-Pátóni . . .  
*Norib Cove* . . . . . a-Náléváho.

*La Madalena* . . . . . } It is not known what names  
*Hood's Island* . . . . . } the Natives give them.

FRENCH PRONUNCIATION.

CHANAL. . . . . ROBLET.

ENGLISH PRONUNCIATION.

COOK. . . . . R. FORSTER.

VOCABULARY

I HAVE  
sent,  
which C  
we are  
and thof  
ROBLET  
The re  
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that part  
which the  
rent man  
to fix the

(OR

LA

VOCABULARY  
OF  
W A H I T A H Ō,  
(OR MENDAÑA'S SANTA CHRISTIANA.)  
ONE OF THE  
ISLANDS OF THE ARCHIPELAGO  
OF  
LAS MARQUESAS DE MENDOCA.

---

I HAVE thought that it would be useful to present, in a comparative table, the Vocabulary which Captain Cook has given us, that for which we are indebted to JOHN REINHOLD FORSTER, and those which Captain CHANAL and Surgeon ROULET have severally compiled.

The reader will remark, in the words which are common to the four vocabularies, the differences that partly depend on the different manner in which they were heard, and still more on the different manner in which they were written in order to fix their pronunciation. I have deemed it expedient

pedient to preserve them such as each vöyager has represented them, with the articles and the other signs that he has employed for indicating the sounds which he means should be emitted in pronouncing them.

The vocabulary of Captain Cook is taken from the Table of comparison of the languages of the islands of the GREAT OCEAN, which he has given us in the second volume of his second voyage, page 364.

He apprizes us that the double vowels in italics, *oo*, *ee*, are to be sounded as one: for the French, *oo* represent the diphthong *ou*, and *ee*, the long vowel *i*.

The *diæresis* vowels, that is to say, accented with two points, are to be pronounced separately: thus, in *üe* English, which is *üi* for the French pronunciation, each of the vowels is to form a syllable.

The accent placed *before* the word indicates that the chief stress in pronunciation is to be laid on the first letter or syllable of the word; but if the accent be *over* the first letter, or *over* another letter in the course of a word, the stress is to be laid on the syllable which immediately follows the accent.

A *comma* (or what, from its form, we should call an acute accent), placed in the middle of a word, either signifies that it is compounded of two words, or that the same syllable repeated forms the word: in both cases, a small pause is to be

made in  
accent.)

A Fre  
be under

Cook's v

there an

O to O—

Y to AI.

REINH

cabulary,

letters in

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they are s

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Cook's ve

divined\*.

Captain

the Latin

ble, over

sides, give

accent, and

phy, their

one is acq

are to be

French, an

Most of

\* See J.



made in the place indicated by the *comma* (or accent.)

A Frenchman who wishes to pronounce, so as to be understood by a Mendoçan, the names written in COOK'S vocabulary, must observe that *A* English there answers to *A* French—*AI* to *Ê*—*E* to *Î*—*O* to *O*—*OO* to *OU* diphthong—*OU* to *ÏOU*—*Y* to *AI*.

REINHOLD FORSTER has employed, in his vocabulary, accents and other signs placed over the letters in order to signify how he wishes they should be pronounced; but he gives no explanation of these signs. I have preserved them as they are seen in the original, without choosing to venture to explain them: I think, however, that, by the assistance of what is said in regard to COOK'S vocabulary, FORSTER'S intention may be divined\*.

Captain CHANAL has made use of the sign of the Latin prosody, which indicates that the syllable, over which it is placed, is long: he has, besides, given to the acute accent, to the circumflex accent, and to the *dieresis* of the French orthography, their ordinary function with which every one is acquainted. The words of his vocabulary are to be pronounced as if they were written in French, and all the *H*'s are to be aspirated.

Most of the words, which he has there inserted,

\* See *I. R. Forster's Observations*, &c. page 284.

were collected separately by Captain MARCHAND and himself: the words respecting which they have agreed (and this is the greater number) bear no mark; but those concerning which they have differed, are written in the two ways in which they heard them; and each word is followed by the initial letter of the name of the observer: those which are marked with a \* were collected by Captain CHANAL, and those accompanied by \*\*, by Captain MARCHAND.

The vocabulary of Surgeon ROBLET is accented for the French pronunciation, and must be read as if the words were French, but all the *H*'s must be aspirated.

It must be observed, that the Mendoçans, in speaking, most commonly place an *A* or an *E*, and sometimes, but more rarely, an *O*, at the beginning of a word; frequently too they suppress it: these vowels, thus employed, appear to perform the office of an article; and it is a custom rather general in all the languages spoken by the natives of the islands of the GREAT OCEAN, to place before words, and particularly proper names, some one of the three vowels, *A*, *E*, *O*: thus in the name O-TAHEITEE, one of the SOCIETY Islands, *O* is the article, and TAHEITEE the name of the island, &c.

It may be conceived from the Vocabulary, although so extremely concise, of the language of the Island of WAHITAHÔ, that the Mendoçans employ

employ  
guage,  
and the  
tomed  
and a fo

See Vc

employ no difficult articulation, and that their language, notwithstanding the frequent aspirations, and the vehemence with which they are accustomed to express themselves, possesses sweetness and a sort of harmony.

*See Vol. I. pages 206 to 211.*

## VOCABULARY

OF

## TCHINKITANAY,

ON THE NORTH-WEST COAST OF AMERICA, IN THE  
LATITUDE OF 57 DEGREES NORTH.

ALTHOUGH the Vocabulary, compiled by Surgeon ROBLET, differs very little from that drawn up by Captain CHANAL, it is not altogether useless to make them both known: every observer has his manner of writing words, and that depends on the manner in which he heard them.

Captain CHANAL, in order to indicate the *quantity* of some syllables, which are long, has placed above those syllables the indicative sign of the Latin prosody: "the others," says he, "are, for the most part, short; and some are doubtful. The G and the K, preceded or followed by an L, are pronounced with a trill, which cannot be expressed by any sign of French writing, and which it is impossible even to imitate, if the organ of speech have not been formed to it from infancy. The syllables *cha*, *tchi*, have been represented by *tcha*, *tchi*, because they are to be

"pron  
"is to  
forms us  
were com  
The l  
that the v  
by the s  
were not c  
before him  
so that he  
pronuncia  
he has don  
he has mark  
"tives of  
"pronuncia  
"which can  
"have ende  
"tion of th  
"but the T  
"almost im  
"ceived, fro  
"have been  
"acceptatio  
"that the l  
"copious."  
See Vol. I.  
N. B. Sour  
pronounce in  
middle of a w  
the terminated

“ pronounced as the Italians pronounce *ce, ci*, that “ is to say, *tche, tchi*.” Captain CHANAL also informs us that the words which are marked with a \* were communicated to him by Surgeon ROBLET.

The latter observer, on his part, informs us, that the words whose *quantity* he has not marked by the signs “ or “ of the Latin prosody; either were not collected by himself, or were pronounced before him, by different inhabitants of the country, so that he had it not in his power to represent the pronunciation of them with the same certainty as he has done in regard to the words whose *quantity* he has marked. “ In general,” says he, “ the natives of TCHINKITANAY have a very guttural “ pronunciation, making on the *G* a little trill, “ which cannot be expressed in our language. I “ have endeavoured to represent their pronun- “ ciation of the *C*, which is the *tche* of the Italians, “ but the *T* of which is conveyed to the ear in an “ almost imperceptible manner. It will be con- “ ceived, from the small number of words that I “ have been able to collect, and from the varied “ acceptations which the inhabitants give to them, “ that the language of TCHINKITANAY is very “ copious.”

See Vol. I. towards the end of Chapter IV.

N. B. Sound all the letters in both vocabularies; pronounce *in* final, or *in* at the beginning or in the middle of a word, as if they were written *inn*, or *ine* terminated by an *e* mute.

## CORRESPONDING TCHINKITANAYAN WORDS.

## ENGLISH WORDS.

## PARTS OF

## THE HUMAN BODY.

## ACCORDING TO CHANAL. ACCORDING TO ROBLET.

<i>The Hair</i> .....	Satkäg-hou.....	Kā chā kā ou.
<i>The Forehead</i> .....	Kakac.....	Kā kác.
<i>The Eyebrows</i> .....	Kātféré.....	Kātfý and Kě te fe rě.
<i>The Eyelids</i> .....	Kaouktāki.....	Kaout-taki.
<i>The Eyes</i> .....	Kāoufakiti.....	Kā hou hác.
<i>The Nose</i> .....	Kāfloukoutfch.....	Kā chě lou.
<i>The Septum of the Nose</i> .....	.....	Kās lou tchī.
<i>The Whiskers</i> .....	.....	Kākātāchā ṛgñ.
<i>The Mouth</i> .....	Katkāska.....	Kat kas ka.
<i>The Lips</i> .....	Kākraigz*.....	Kā kraigz.
<i>The Teeth</i> .....	Kāhou.....	Kā houng.

<i>The Tongue</i> .....	Kāflout.....	Kats loug.
<i>The Chin</i> .....	Kāty.....	Kā ũ.
<i>The Beard</i> .....	Kaktāāhi.....	

Kākaika	Kākraigz	Kākraigz	Kāhou	Kātsoug	Kāti	Kātōut	Kātty	Kātātāhi	Kākouk	Kātōta	Kākitt	Kātōa	Kākig	Kāffy	Kātchin	Kātchicou	Kātleck
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
<i>The Mouth</i>	<i>The Lips</i>	<i>The Teeth</i>	<i>The Tongue</i>	<i>The Chin</i>	<i>The Beard</i>	<i>The Ears</i>	<i>The Neck</i>	<i>The Gullet</i>	<i>The Chest</i>	<i>The Breasts</i>	<i>The Shoulders and the Arms</i>	<i>The Shoulder</i>	<i>The Arm</i>	<i>The Fore-arm</i>	<i>The Hand and the Fingers</i>	<i>The Hand</i>	<i>The Fingers</i>

{ Kē kou q̄c and Kag  
houg.

Kaft la ra.  
Kā chāi kāt choū cou.  
Kāt chē là.  
Kā ū ḡc.  
Kā ou cou.  
Kā tū sēi scou.  
Klāt hēr ḡc.

## CORRESPONDING TCHINKITANAYAN WORDS.

## ENGLISH WORDS.

## PARTS OF

## THE HUMAN BODY.

## ACCORDING TO CHANAL.

## ACCORDING TO ROBLET.

<i>The Fist</i> .....	.....	Kã thci koullia.
<i>The back of the Hand</i> .....	.....	Ka tchou tinc.
<i>The Nails</i> .....	.....	Kã rã kou.
<i>The Arm-pits</i> .....	.....	Ka hi ny.
<i>The Ribs</i> .....	.....	Katlong.
<i>The Stomach</i> .....	.....	Kaghougã.
<i>The Belly</i> .....	.....	Kã jou.
<i>The Navel</i> .....	.....	
<i>The natural Parts of Man</i> .....	.....	* Kãt gligz or Kãt liché.
<i>Ditto of Woman</i> .....	.....	Kougz.
<i>Hair of the Os Pubis</i> .....	.....	Kougã.

<i>The Posteriors (in general)</i> ..	.....	Kaguchã *
<i>The Buttocks</i> .....	.....	Katoukõtchi
<i>The Thighs</i> .....	.....	Kakatch
<i>The Knees</i> .....	.....	Kã oãrã
	.....	Kã gue hay.
	.....	Ka tou kot chi.
	.....	Kã oãrã



*The natural Parts of Man* .....  
*Ditto of Woman* .....  
*Hair of the Os Pubis* .....

Katghz .....  
 Kougza\* .....

*The Posteriors (in general)* ..  
*The Buttocks* .....

Kaguhai\* .....  
 Katoukotchî .....

*The Thigs* .....

Kakatch .....

*The Knees* .....

Kakiffakanoukôu .....

*The Legs* .....

Katfeyohâ .....

*The Feet* .....

{ Kâ gou sâtz gli and  
 Kahieftka.

*The Ankle-bones* .....

Katchouïtouk .....

*The Soles of the Feet* .....

Kakouïfak .....

*Tattooing (punctures or marks on the Skin)* .....

Kêïhkl .....

*Lip-ornament* .....

.....

*A male Child* .....

Kéfany\* .....

*The Son (with respect to the Father)* .....

Kâguit .....

*A female Child* .....

Sâguéfany\* .....

.....

## CORRESPONDING TCHINKITANAYAN WORDS.

## ENGLISH WORDS.

## NATURAL OBJECTS.

## ACCORDING TO CHANAL.

## ACCORDING TO ROBLÉ.

<i>The Sky</i> .....	Countchs.	Krä né.
<i>Fire</i> .....	Hill.....	Hill.
<i>Fresh water</i> .....	Kékle.....	Keit té.
<i>A Dog</i> .....	Tschāats.....	Tchafic.
<i>A Fish</i> .....	Tak-hā.....	Kā seis téné.
<i>An Ant</i> .....	Aā.....	Tak ha.
<i>A Moskito</i> .....	.....	Afs.
<i>Trees standing (Forest)</i> .....	.....	Krä gōū.
<i>A Tree cut down, felled</i> .....	.....	.....

*A Flower by its generic name, or a Flower* }  
*by its particular name*..... }  
 Youhātskoutq..... }  
 You hats kou.  
*Stones*..... }  
 Tēē..... }  
 Tchéc.

*A Flower by its generic name, or a Flower by its particular name.* } Youhâtskoutq..... You hats kou.  
*Stones.* } Tcë..... Tchéc.

WORKS OF THEIR OWN  
 HANDS, &c.

*Hut or Tent.* ..... Keite.  
*Canoe* ..... Yâcou.  
*Chest (of their own make).* ..... Ka ouk.  
*Fishing-rod or Line* ..... Tchakââ.  
*A Joiner's Plane or Cbifsel mounted to serve as a Hatchet* } Krôta..... Kro ta.  
*The bevee of a Hatchet.* ..... Aſſôſti.  
*A Fur-Cloak, and skins serving as clothing.* } Koun (Cloak)..... Kâ kou ou (Skins).

*A Hat*





1.8  
2.0  
2.2  
2.5  
2.8  
3.2  
3.6  
4.0

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## CORRESPONDING TCHINKITANAYAN WORDS.

## ENGLISH WORDS.

WORKS OF THEIR OWN  
HANDS, &c.

*A Hat*.....  
*A Jacket*.....  
*Coat Buttons*.....  
*A Ring*.....  
*A Present*.....

*Proper name of the Bay called, by the  
 Spaniards, BAYA DE GUADALUPA, and  
 NORFOLK SOUND by DIXON*.....  
*Exclamation, expressing consent or satisfaction* Ouoh!

## ACCORDING TO CHANAL.

Tfauhou.....  
 Koufsk\*.....  
 Kahicoutz.....  
 Kleftakiks.....  
 Stock.....

## ACCORDING TO ROBLÉ.

Thau fou.  
 Kou resk.  
 Kai kouts.  
 Klettaki.

## TCHINE KITANÉ.

TCHINKITANÉ.....

\* The word *Ko* likewise signifies a Jacket or Waistcoat at *Queen-Charlotte's Islands* (See Vol. I. Chapter V.)

NORFOLK SOUND by DIXON . . . . . )  
 Exclamation, expressing consent or satisfaction Ouh !

\* The word *Ko tzi* likewise signifies a Jacket or Waistcoat at *Queen-Charlotte's Islands* (See Vol. I. Chapter V.)

NUMERICAL TERMS.

<i>One</i> . . . . .	Clërg . . . . .	Kaïke.
<i>Two</i> . . . . .	Tërk . . . . .	Tërg.
<i>Three</i> . . . . .	Nõtchk . . . . .	Netx.
<i>Four</i> . . . . .	Tácoun . . . . .	Tacoung.
<i>Five</i> . . . . .	Kitchin . . . . .	Ke't tchiné.
<i>Six</i> . . . . .	Klétoûfchou . . . . .	Keï to'ï chou.
<i>Seven</i> . . . . .	Tákratoûfchou . . . . .	Trá to'ï chou.
<i>Eight</i> . . . . .	Nëfkatoufchou . . . . .	Neix cá to'ï chou.
<i>Nine</i> . . . . .	Koufchok . . . . .	Kou chác kou.
<i>Ten</i> . . . . .	Tchínkat . . . . .	Tchîne káte.
<i>Twenty</i> . . . . .	Clërr-kat.	
<i>Forty</i> . . . . .	Tërr-kat.	

ADDITIONS

See the manner of counting of the Tchinkitáhay-ans, towards the end of Chap. IV. Vol. I.



ADDITIONS  
TO THE  
NARRATIVE OF THE VOYAGE.

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*N. B.* THE impression of the preceding part of the work was completed before the end of the year VI. (1798); but that of the remainder having occupied a rather considerable portion of time, I avail myself of it in order to insert here some ADDITIONS that have been occasioned by the recent publication of two voyages of which I had not been able to obtain a knowledge when I was engaged in writing the NARRATIVE OF THE VOYAGE of Captain MARCHAND.

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FIRST ADDITION.

*For the INTRODUCTION.*

**I**N the *INTRODUCTION*, I have contented myself with giving a summary account of the expeditions to the NORTH-WEST coast of AMERICA, which are posterior to that of LA PÉROUSE; and I have announced that the British government had dispatched vessels to verify and complete the discoveries which had been made in these latter times  
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\* *A Voyage  
round the W  
1798, 3 vol*

between the 48th and the 60th parallels. The voyage of Captain VANCOUVER \*, published in LONDON towards the end of last year, 1798, and which did not reach us in FRANCE till the beginning of the year VII, (1799) has perfectly accomplished that object: and it may be said that this part of the coast of the New World is at present better known, in respect to geography, than have been, and than ever will be perhaps, parts of the Old Continent much more within our reach, and which the Europeans have frequented since they have applied themselves to navigation. The *INTRODUCTION* to the VOYAGE OF CAPTAIN MARCHAND may be considered as the introduction to the voyage of VANCOUVER: the latter must fix every uncertainty; and in perusing the epitome of the discoveries that have been made from the year 1537 to 1790, the reader will follow with curiosity and interest, on the valuable charts which accompany VANCOUVER'S narrative, the tracks that the ancient voyagers have scarcely pointed out to us; he will recognize the lands of which they had only had a glimpse; he will know what they would have wished us ever to be ignorant of; and, in admiring the immense progress made in the science of navigation, he will not refuse a tribute of praise to the learned men who have improved that science,

\* *A Voyage of Discovery to the North Pacific Ocean, and round the World, &c. by Captain George Vancouver, London, 1798, 3 vols. 4to. with an Atlas.*

and

and to the indefatigable navigators who have found means to derive from its improvement, so great an advantage in order to succeed in completing the discovery and description of the west coast of NORTH AMERICA.

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## SECOND ADDITION.

*For the Islands called LAS MARQUESAS DE MENDOÇA.*

TRAVELS in the UNITED STATES of AMERICA\*, published in PARIS, in the month of Ventose of the present year VII, (March 1799) gives us an extract of a voyage performed in 1792, in the GREAT OCEAN, by Captain ROBERTS, an American, commanding the ship JEFFERSON, of five hundred tons burden, which sailed from BOSTON, on the 29th November 1791.

The object of Captain ROBERTS's expedition was to trade for furs on the NORTH-WEST coast of AMERICA, and, as well as Captain MARCHAND, he put into the Bay of LA MADRE DE DIOS in the Island of WAHITAHÔ (or SANTA CHRISTINA) which he calls WHOANWOW. His intention in putting into this port was not only to procure water and refreshments, but also to construct a vessel of ninety tons, the frame of which he had

\* *Voyage dans les Etats Unis d'Amérique, fait en 1795*, 96, 97, par La Rochefoucauld-Liancourt. Paris, Du Pont, An, VII. 8 Vol. 8vo. Vol. III. pages 19 to 22.

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on board ready to be fet up, and which served him, in the sequel, to second the JEFFERSON in the fur-trade.

The extract which concerns the Islands called LAS MARQUESAS de MENDOÇA, occupies only three pages, although Captain ROBERTS staid four months at LA MADRE DE DIOS, and might have given us some very interesting details respecting the Island of WAHITAHÔ in particular, and some notions less uncertain than those which we have respecting the other islands of the group; but he speaks only of the inhabitants of the island where he had established himself, and even of them he says very little: Captain CHANAL to whom I have communicated this extract, finds, and justly, a great deal of incorrectness in the little that has been said; and I own that I have found in it nothing that ought to be added to the description, such as I have been able to give, of the island and of the inhabitants, from the materials which have been furnished us by the voyagers who had visited it before Captain ROBERTS.

According to the American Captain, the inhabitants of the MENDOÇA Islands, "have no other arms than stakes of extremely hard wood very sharp-pointed, and long slings, with which they throw large stones very far, and with much exactness."

I know not whether by *stakes very sharp-pointed* he means lances from nine to eleven feet long, and

and pikes or javelins of which they make use in war; but, independently of a sort of sabre, made of an extremely hard wood, in the form of the blade of an oar, he has omitted to make mention of the weapon the most formidable in the hand of a native of the MENDOÇA Islands, of the *casuarina* club, one of the ends of which consists of a large knob; and which they take a delight in ornamenting with carving. The use of the sling had been remarked by the French; they agree with Captain ROBERTS as to the great distance to which these islanders can throw a stone, but they do not in like manner admit of their address in hitting the mark. (See Vol. I. page 178.)

Captain ROBERTS, speaking of the attempt which the inhabitants of the neighbouring island (no doubt O-HIVAHÖA, or LA DOMINICA) made to carry off the anchor belonging to the small vessel which he had constructed, says that they presented themselves "with a flotilla of twenty canoes of *ninety feet* in length."

The French, on their arrival in the Bay of LA MADRE DE DIOS, were visited by fifty canoes which had come from O-HIVAHÖA: the length of the largest of those canoes did not exceed twenty-five or thirty feet at most (See Vol. I. page 176.)

The American Captain adds, that the inhabitants of O-HIVAHÖA are in a *continual state of war* with those of WAHITAHÔ: but the French found

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found them to live on terms of good understanding; and, on the first visit which they paid to the Bay of LA MADRE DE DIOS, the natives of the two islands, assembled and mingled together, seemed to form but one tribe. I would not, however, vouch that this harmony is never disturbed; for, after the first day, the French voyagers did not see them keep up on shore a communication with each other; but the canoes of the two islands paddled pell-mell round the ship, and no quarrels were ever seen to arise between the men of the two nations. The wounds which were perceived in several of the inhabitants of WAHITAHÔ attest, indeed, that they have wars to maintain, and it is probable that it is principally against those of O-HIVAHÖA, their nearest neighbours: the latter, in general, appear more warlike, less familiar in the intercourse of life than the former; and, as their island appears far from fertile, it may happen that sterility and the scarcity which is the consequence of it, induce them sometimes to make incursions among their neighbours, whom a land ever fruitful maintains in perpetual plenty; but it cannot thence be concluded that *the state of war* is the *habitual state* of the two tribes.

“Marriages,” says Captain ROBERTS, “last only as long as it pleases the married couple, especially the men, who preserve a great superiority over the women: *they never eat with them*. The same habitations frequently contain the fathers and

“ the children, even when the latter are married.”

The American Captain must have had more opportunities than the French Captain of ascertaining whether the inhabitants of WAHITAHÔ are acquainted with any rule in marriage; but, as I have said, to judge of them from their conduct, it might be imagined that every man is the husband of all the women, and every woman, the wife of all the men. (See Vol. I. pages 164 and 165.) As to the superiority of the men over the women, it does not appear that they have any other than that which Nature has given to the stronger; but the women are admitted to eat habitually with the men: Captain CHANAL who has frequently been present at their meals, has seen the men, women and children eat in common and feed on the same dishes. (See Vol I. pages 195 and 196.)

According to Captain ROBERTS, “ there is in this island a King, who is hereditary, and village-chiefs, who are likewise hereditary; there is also a certain inequality in the families, who all pay to the king and to the chiefs great marks of deference: property is acknowledged, and respected: the number of domestics and slaves is proportionate to this property. The stealing of productions, as well as of every other thing, is severely punished, and the punishment is ordered by the chiefs according to a sentence which they pass.”

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It has been seen (Vol. I. pages 197 to 201,) that neither the English, COOK and Messrs. FORSTER, nor the French, MARCHAND, CHANAL, and ROULET, were able to distinguish what is the form of government of these islanders; they all agree merely on one point, that is, that, if those who have sometimes the appearance of being chiefs, have indeed some authority, it is not manifested by any act; and that the pretended subjects or vassals appear to pay no respect to majesty or lordship, this is very different to those great marks of respect which, according to Captain ROBERTS, all the families pay to the king and to the chiefs: it may be said that, if, in the Island of WAHITAHÔ, there exist dignities, those who are invested with them take a pleasure in keeping *incog*. Those voyagers who preceded the American Captain did not perceive that inequality of conditions, which distinguishes masters, servants, and slaves; we have some difficulty in believing that, if this inequality were established, it would have escaped the observation of the English and French: wherever there is a master, he is eager to shew that he has servants and slaves to wait on him. As to that tribunal of chiefs for trying thefts, and inflicting the punishment of the offence, the criminal code of WAHITAHÔ must, since the departure of the SOLIDE, have been greatly improved; for it has been seen that the chief who caused Captain MARCHAND'S musket to be restored assembled not his council



to try the thief; he consulted only his club. (See Vol. I. pages 61, 200, and 201.)

Captain ROBERTS does not expatiate on the natural productions of the country; he says merely that, "Potatoes and sugar-canes are there cultivated; that poultry, which is far from being in plenty, and hogs of the *Chinese breed*, which are to be found in some quantities, are eaten *roasted*; and that fish is eaten *raw*."

I presume that the *potatoe*, mentioned in this extract, is the species of *sweet potatoe* which is spoken of in MARCHAND'S voyage (See Vol. I. page 123;) it is not there said whether this root be *cultivated* at WAHITAHÔ, or whether it be a spontaneous production of the earth. With regard to the *sugar-cane* Captain CHANAL assures us (See Vol. I. page 126,) that the natives are unacquainted with its value: it was not therefore cultivated there at the period of the voyage of the French.

This same Captain, whom I have consulted respecting the species of hog which is procured at the MARQUESAS DE MENDOÇA, does not think that it is of the *Chinese breed*. The *Cbina* hog has a body thick and round; and its legs, which are short and slender, are not in proportion to the body: the hog of WAHITAHÔ is, in general, of a small size, but it is proportioned like that of our climates. The flesh of the *Chinese hog* is so fat, that it is thence insipid, and soon cloy; whereas the flesh of that of WAHITAHÔ, although fat, is of an exquisite

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quisite taste: it is eaten with as much pleasure as that of the sheep, of which it has nearly the flavour: it is very superior to that of our sucking pigs, of which the skin only is esteemed. It is probable that the excellent quality of the hogs of this island is due to the quality of the fruits with which they are fed, the same as those that constitute the principal food of the men who according to Cook's account, admit the hogs to their table (*See* Vol. I. page 170); which, no doubt, is neither frequent nor general, and it may be imagined that hogs are admitted to their table, only as dogs are admitted to ours.

Captain ROBERTS, as well as the French, observed that the natives of the island eat fish raw: it has been seen (*See* Vol. I. page 172) that sometimes too they eat pork without having dressed it.

We should be little informed of the character and manners of the inhabitants of WAHITAHŌ, if we were no better acquainted with them than from the account of the American Captain: we find only in the extract of his voyage that “ during the four months which he staid at the island, he lived, in general, on very good terms with the natives, a great number of whom assisted him in his labours; but that one day they took a fancy to seize upon his little vessel which was only half put together, and that a considerable assemblage of these islanders, headed by their King, manifested so evidently their project of making an attack,

“ attack, that Captain ROBERTS says, he found  
 “ himself obliged to use force in order to repel  
 “ them; that with thirty-six men who composed  
 “ his crew, he fired on the natives, killed several,  
 “ wounded a great many others, and routed them  
 “ all; that the next day, they came to sue for  
 “ peace, and to bring him some of their wounded  
 “ to be dressed.”

It is by comparing all the known facts and the opinions of voyagers, that, in the narrative of Captain MARCHAND'S voyage, I have sketched the character of this nation, who, in many respects, might have to complain of the Europeans much more than the latter have to complain of them (*See* Vol. I. page 189.) What I have had it in my power to say of them will partly make up for the silence of the American Captain; but we must regret infinitely that, having staid four months on shore, having lived in habitual society with the natives of the island, he has not been more occupied in studying and making known to us a race of men who appear to be still in that period of civilization in which man is no longer savage, and in which he is not yet entirely civilized: what a rich harvest might have been made by a philosophic voyager!

Captain ROBERTS says that “ the fermented  
 “ liquor that the natives of WAHITAHÔ make  
 “ with a yellow root which they call *bary* (and  
 “ which Captain CHANAL thinks to be that of  
 “ ginger,

\* From  
*ava* of the  
 Europeans.

"ginger, (See Vol. I. page 174) is antiscorbutic, and that they employ it as a remedy against the venereal disease, which is very common in these islands since the first visits of the Europeans, and with which all the JEFFERSON'S people were infected\*."

It has been seen in the narrative of MARCHAND'S voyage (Vol. I. page 169,) that Surgeon ROBLET does not say that the island was infected at the period of that voyage; at least the symptoms of the disease did not shew themselves among the inhabitants: however, some made their appearance in a few individuals belonging to the SOLIDE after the ship had quitted the island; but Surgeon ROBLET thought he might attribute this as much to what they had brought as to what they might have received: a single year is then sufficient for this disorder to have made a frightful progress. What reproaches have the Europeans to make to themselves! What portion of the inhabited earth will be exempt from the scourge which they carry with them? But, on this point, we must not hope that they will ever amend, and the lesson of the past is lost for the time to come."

The American Captain appears not to have been so struck by the beautiful proportions of the in-

\* From what is said of it, this beverage is prepared like the *ava* of the Taheiteans, and in a manner equally disgusting to Europeans.

habitants of the MENDOÇA Islands as the Spaniards, the English, and the French have been: he says only, towards the end of the extract of his voyage, that "the race of the men and women is handsome."

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### THIRD ADDITION.

*For the Group of Islands to the North-west of the  
MARQUESAS DE MENDOÇA.*

CAPTAIN ROBERTS, on quitting the Island of WAHITAHÔ, made sail for the SANDWICH Islands.

"He affirms," it is said in the extract of his voyage\*, "that he discovered, on his route, a group of islands, not yet spoken of by any navigator, lying in 8° 40' south latitude, and 140° west longitude from GREENWICH (142° 20' west from PARIS): he reconnoitred them without landing, called the cluster WASHINGTON'S Group, and gave some of the islands the names of ADAMS, JEFFERSON, HAMILTON, &c. These islands had been seen the preceding year (1791) by Captain INGRAHAM of the ship HOPE of BOSTON; but he had done no more than perceive them and point out their situation. Captain ROBERTS says he

\* See *Voyage dans les Etats-Unis par la Rochefoucauld Liancourt*. Vol. III. page 23.

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landed in this archipelago, at NEWHEVE, which he named ADAMS's Island, latitude  $8^{\circ} 56'$ , an old man of seventy-five years of age whom he had found at RESOLUTION Bay (LA MADRE DE DIOS) in the Island of WOHANHOW (WAHITAHÔ), and who had been there for a long time. This old man was born in WASHINGTON's Group, at ON-HAWA which Captain ROBERTS called the Island of MASSACHUSETTS. He examined the coast of some of them\*."

It has been seen in the *narrative of Marchand's Voyage* (page 102 of this Vol.) that, while the SOLIDE lay in MACAO Road, Captain CHANAL was sent on board an American ship, the captain of which was ill, and that he learnt from him that, in the beginning of the month of May 1791, in standing from the MENDOÇA Islands to the NORTH-WEST coast of AMERICA, he had discovered to the north-west of that group, another group as extensive as

\* It is not mentioned at what period Captain *Roberts* examined these islands. In the extract from his voyage, there are no other dates than that of his departure from *Boston*, on the 29th of November 1791, and that of putting into an island in the GREAT OCEAN, on the 5th of July 1792, namely the Spanish Island *St. Ambrose*, in latitude  $26^{\circ} 13'$  south, where he staid two months and a half, and procured thirteen thousand seal-skins and a great quantity of oil. He must have arrived at *La Madre de Dios* about the beginning of September: and, as he there made a stay of four months, it may be supposed that it was about the latter end of December 1792, or the beginning of January 1793, that he perceived the north-west group of the *Marquesas de Mendoga*.

the former; that he had given names to the islands of which it is composed, but had not stopped there. It could not be doubted, from the latitude and the bearing which he indicated, that these were the same islands which Captain MARCHAND had discovered a month later; but we were ignorant of the name of this Captain who had seen them first without examining them: the extract of Captain ROBERTS's Voyage informs us that the former Captain is named INGRAHAM, and that he commanded the ship HOPE of BOSTON.

It is this very group which Captain ROBERTS reconnoitred towards the end of 1792 or the beginning of 1793, and which he named WASHINGTON'S Islands, at the same time not informing us whether this be the name which had been imposed on them by Captain INGRAHAM, when he made the first discovery of them in the month of May 1791. It is to be regretted that, in the extract of Captain ROBERTS's Voyage, which I have here given at length, no mention is made of the number of islands of which this group is composed.

But this extract makes known to us the names which the natives of the group give to two of their islands: NEWHEVE, and ONHAWA. At the first glance we recognize the name of NEWHEVE in that of NEEV-HEEVA, which is written on TUPIA's chart, (*Plate IV.*) next to the most western of the two southern islands of the archipelago which comprises the MARQUESAS DE MENDOÇA: and, when

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when we know how many different sounds the proper names of the Islands of the GREAT OCEAN obtain in passing through various European mouths, and what changes the different orthographies cause them to undergo, we are not far from recognizing O-HANEANEA, the name given by TUPIA to the most eastern of the two southern islands of the same archipelago, in the name ONHAWA, which Captain ROBERTS says is that of one of the islands which he examined. It may therefore be said that we know the names which TUPIA gave to five of the islands of the archipelago that comprises, to the south-east, the group of the MARQUESAS DE MENDOÇA.

I remark that these two last-mentioned names are applied, on TUPIA's chart, to two of the islands of the SOUTH-EAST Group, that of the MENDOÇA Isles, while we see by the account of Captain ROBERTS, that they belong to islands of the NORTH-WEST Group; and this may confirm what I had suspected, (See Vol. I. page 259, Note\*) that is, that in constructing the chart under the direction of TUPIA (and the mistake may proceed from himself) the names which belong to the SOUTH-EAST Group have been applied to the NORTH-WEST Group, and those of the NORTH-WEST Group, to the SOUTH-EAST Group: and, in fact, we have seen that the names of O-NITEIO, O-HIVA-HÖA and WAHITAHÖ, which are three names of the SOUTH-EAST Group or of the MENDOÇA Islands, have



have been applied on the chart to three of the islands of the NORTH-WEST Group, that which has been successively reconnoitred by Captains INGRAHAM, MARCHAND, and ROBERTS.

In *Plate III*, No. I. of MARCHAND'S Voyage, I have given the Plan of the islands which compose the NORTH-WEST Group, named by the French Captain, ILES DE LA RÉVOLUTION, as it was drawn by Captain CHANAL, who subjected it to the observations for the latitude and longitude and to the bearings taken on board the SOLIDE. We were then ignorant in FRANCE that in 1792, subsequently to the examination made by Captain ROBERTS, the NORTH-WEST Group had been visited by an English Captain, and that it was from the plan drawn by this latter navigator that ARROWSMITH had placed the group on his planisphere (*See* pages 104 to 107 of this Vol.) It was not, as I have already said, till the beginning of the present year (1799) that we saw VANCOUVER'S Voyage, published in LONDON towards the end of the year VI. (1798), and in which the English Captain gives an extract from the voyage of the DÆDALUS, under the command of Lieutenant HERGEST, in the course of which that navigator, after having put into the Bay of LA MADRE DE DIOS, in the Island of WAHITAHÔ, reconnoitred and visited the NORTH-WEST Group. The impression of the greater part of my work was completed for some months past, and the Plates were worked off, when I received

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ceived VANCOUVER'S Voyage; but I have added to *Plate III.* of MARCHAND'S Voyage, No. II. a chart which is a copy of that of the NORTH-WEST Group, constructed by Lieutenant HERGEST, and Mr. GOOCH the astronomer who accompanied him, and I shall now give a transcript of the Extract, which VANCOUVER has inserted in his Journal, of the part of that of HERGEST, which concerns the survey of this Group. At the end of this transcript, I shall present some observations to which the chart and the narrative of MARCHAND may give rise, compared with the account and the chart of HERGEST.

EXTRACT FROM THE JOURNAL OF LIEUTENANT  
HERGEST\*.

“ The DÆDALUS had anchored in the Bay of LA MADRE DE DIOS, on the 22nd of March 1792 †.”

“ In the evening (of the 29th of the same month) about five o'clock, she weighed and steered to the northward. At day-light the next morning, the 30th ‡ she came within sight of some islands, which appeared

\* *Vancouver's Voyage.* Vol. II. page 85 to 95.

† This date of the 22nd of March, which is to be found in page 85 of *Vancouver's Journal* (Vol II.) is remarkable, because, in the sequel of the Extract which he gives of the voyage of the *Dædalus*, there appear some evident mistakes respecting dates.

‡ The original (page 90 and '91) gives the dates of the 29th of *October* and of the 30th of *October*, which are very evidently the

appeared to Mr. HERGEST to be new discoveries. Those first seen were three in number, one bearing by compass\* north by east, the other north by west, and the third south-west by south. She fetched the south-west part of the easternmost, where a good bay was found with a sandy beach. Some rocky islets lie to the south-east of it; and, from a gully in the north-west part of the bay, there was an appearance of procuring a supply of water. To the east of the south point, there appeared another good bay; and along the western shore, shallow broken water. But, on rounding that point, and hauling to the north along the west side, the broken water was found to extend not more than a quarter of a mile from the shore. On this side there is neither cove nor inlet, only a rocky shore, with two small rocky islets off its northwest point. This island is about six leagues in circuit, and is in latitude  $8^{\circ} 50'$  south †: longi-

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the 29th and the 30th of *March*, since it appears in the narrative, that the *Dædalus* passed only a few days at anchor in the Bay of *La Madre de Dios*, where, as has been seen, she had anchored on the 22nd of March 1792.

\* *Hergest's* Journal makes no mention of the variation of the magnetic needle, but from the observations made on board the *Solide*, on the 21st of June 1791, in sight of *Ile Marchand* (*Hergest's* *Trevenen's* Island) it was  $4^{\circ} 32'$  east, See the *Journal of the Route* at the end of this Volume.

† The scale of the original chart which is to be found in *Vancouver's Voyage*, is marked, by mistake,  $80^{\circ}$  and  $90^{\circ}$  instead of  $8^{\circ}$  and  $9^{\circ}$ .

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tude 220° 51' east from GREENWICH (141° 29' 15" west from PARIS). It is inhabited by a tribe of seemingly friendly Indians, some of whom visited the ship in their canoes. In the vallies were a great number of cocoa-nut and plantain trees, and the whole island presented an infinitely more verdant and fertile appearance than those they had just quitted (the MARQUESAS DE MENDOÇA).

"From hence Mr. HERGEST stood over to the southernmost island, which appears at a distance like a remarkably high rock, with three peaked rocks close to it; these are about the middle of the island. The night was spent in keeping his station near it, and, in the morning, his course was directed towards its south-west point. As the shore was approached, the land was seen to be well cultivated and numerously inhabited. More than one hundred Indians were soon assembled round the ship in their canoes, disposing of cocoa-nuts, plantains, &c. for beads and other trifles, and behaving in a very friendly manner. At the south-west end of this island is a very good bay, with a sandy beach in its eastern part\*. Along the southern side are other bays; one in particular appeared to retire deeply in towards the south-east end of the island, having a small islet lying off it, not unlike in shape to the steeple of a cathed-

\* See what is said of this bay in the *Voyage of Marchand*, who caused it to be visited. Vol. I. pages 222 and 223.

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dral\*, and other rocks and islets. From the west point of this island, forming also the west point of the finest and deepest bay it affords, its shores trend round to the north-east; and, like the west side of the island he was at the preceding day (which received the name of **RIOU'S ISLAND**) are rocky, and bear rather a steril appearance. This island obtained the name of **TREVENEN'S ISLAND** †, it is situated in latitude  $9^{\circ} 14'$  south, longitude  $220^{\circ} 21'$  east from **GREENWICH** ( $141^{\circ} 59' 15''$  west from **PARIS**.)

“ In the forenoon of the 1st of April ‡, the south side of the third island was passed, which was named **SIR HENRY MARTIN'S ISLAND** §; immediately to the west of its south-east point, called **Point MARTIN**, is a deep, well-sheltered bay, bounded by sandy beaches: this obtained the name of **COMPTROLLER'S BAY**; it was not examined, but, on passing, had the appearance of a safe and commodious port. At its head was a break in the shores, supposed by some to be the mouth of a rivulet, but as it appeared too large for so small

\* This is the islet named *le Pic* (the Peak) by Captain *Marchand* (See Vol. I. page 220.)

† This is the *Ile Marchand* reconnoitred by the *Solide*.

‡ This date is the same in the original page 93: which confirms what I have said (pages 285 and 286, note †, of this volume) of the error of the two preceding dates, 29th and 30th October, instead of the 20th and 30th of March.

§ This is the *Ile Baux* of Captain *Marchand*.

an island to afford, Mr. HERGEST was rather inclined to believe it only a deep cove.

“ The *DÆDALUS* was here visited by many of the natives, paddling and sailing in their canoes, who behaved in a very civil and friendly manner. About two leagues to the westward of Point MARTIN is a very fine harbour, extending deep into the island, and bounded by a most delightful and fertile country. Mr. HERGEST, accompanied by Mr. GOOCH, went with the cutter to take a sketch and to examine the port, which he called PORT ANNA MARIA: It was found to be very easy of access and egress, without any shoals or rocks that are not sufficiently conspicuous to be avoided; the depth at its entrance twenty-four fathoms, gradually decreasing to seven fathoms, within a quarter of a mile of its shores; the bottom a fine sand, and the surrounding land affording most perfect security against the winds and sea in all directions. An excellent run of fine water flows into the harbour, which possesses every advantage that could be desired.

“ The country seemed to be highly cultivated, and was fully inhabited by a civil and friendly race of people, readily inclined to supply whatever refreshments their country afforded. The *DÆDALUS*'s people were induced to entertain this opinion from the hospitable reception they experienced on landing, from the chiefs and upwards of fifteen hundred of the natives who were assembled on the shores

shores of the harbour. On their return to the ship they found the same harmony subsisting there with the Indians, who had carried off and sold a supply of vegetables and some pigs\*.

“ MR. HERGEST renewed his route along the south side of the island to its south-west point, when he hauled his wind along the western side. This is a rocky iron-bound shore without cove or bay. It had a verdant appearance, but no great sign of fertility; nor were any habitations or natives perceived.

“ About sun-set, he discovered what appeared like a large rock to the north-westward, about six or seven leagues distant; and, during the night, they remained near SIR HENRY MARTIN'S Island; but, in the morning, not being able to fetch its north-east point, he quitted it; its north-west side appeared to contain some small bays; and towards its north-east extremity, the land turned, apparently, short round, forming a bay something similar to, but not so deep as COMPTROLLER'S Bay. Another rock just above water now shewed its head to the eastward, and to the northward of that before-mentioned. These rocks † Mr. HER-

\* Captain *Marchand* had met with a reception no less friendly at the island bearing his name, *Hergest's Trevenen's Island* (See Vol. I. pages 205, 231, and 232.)

† On the chart these are called *Hergest's Rocks*: they are the rocks named *Les Deux Frères* in the Journal and on the Chart of Captain *Marchand*.

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GEST represents to be dangerous; they lie about west by north, about six leagues from the western side of SIR HENRY MARTIN'S Island \*, which is about sixteen leagues in circuit. Its centre is situated in south latitude  $8^{\circ} 51'$ , longitude  $220^{\circ} 19'$  east from GREENWICH ( $142^{\circ} 1' 15''$  west from PARIS.)

“ After leaving this island, two others were discovered to the northward of them. On the morning of the 3d of April †, Mr. HERGEST bore up to the southward along the east side of the south-westernmost. This is the largest of the two, its shores are rocky, without any coves or landing-places; and, though its surface was green it produced no trees, yet a few shrubs and bushes were

\* This situation of the rocks, in regard to *Sir Henry Martin's* Island, such as the Journal indicates, is far from being conformable to that in which they are laid down on the chart that accompanies the extract from the Journal: on the chart the middle of the two *Rocks* is placed at the distance of eleven leagues between west by north and west-north-west, with respect to the north-west point of *Sir Henry Martin's* Island, the part of the Island the nearest to the *Rocks*; the distance is ten leagues one-third, if measured between this same point and the west coast of the *East Rock*; that is to say, at the shortest distance; and it is *twelve leagues and a half*, if measured between the point of the island and the west point of the *West Rock*. If the latitude and longitude of these rocks were inserted in the Journal, we should determine on the position which Lieutenant *Hergest* meant to give them with regard to the island; but the want of agreement between the Journal and the Chart leaves a great uncertainty respecting this position.

† This date is the same in the original.



thinly scattered over the face of the rocks; nor did it seem to be otherwise inhabited than by the tropical oceanic birds. These were in great numbers about it, and it seemed to be a place of their general resort. The north-west side, however, had a more favourable aspect, and, although its shores were also rocky, a number of trees were produced, as well on the sides of the hills, as in the vallies. This side afforded some coves where there is good landing, particularly in one near the middle: this, from the appearance of its northern side, was called BATTERY COVE. A little more than a mile to the north of this cove is a bay, which Mr. HERGEST and Mr. GOOCH examined. Good anchorage and regular soundings were found from eighteen to five fathoms water; the bottom a fine clear sand. An excellent run of fresh water discharged itself into the bay near a grove of cocoa-nut trees; here they landed, and found a place of interment, and a hut near half a mile from it by the side of a hill; but there were no people, nor the appearance of any having been recently there; although it were manifest that they did, on some occasions resort to the island. This induced Mr. HERGEST to forbear cutting down any of the cocoa-nut trees as he at first intended to do; and he procured by other means as many of the fruit as served the whole crew, with five to each person.

“ The landing was but indifferent on account of the surf; but water is easily obtained.

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“ After ascertaining the last-mentioned island to be eight miles long and two miles broad, and to be situated in south latitude  $7^{\circ} 53'$ , longitude  $219^{\circ} 47'$  east from GREENWICH ( $142^{\circ} 33' 15''$  west from PARIS) they took leave of these islands the next morning; and to the north-east of the last, at the distance of about a league they discovered another, nearly round and much smaller\*, with two islets lying off its south-west point; to this was given the name of ROBERTS'S Island.

“ Mr. HERGEST states that, during the time he was among these islands and at the MARQUESAS, they were subject to frequent heavy squalls and much rain.

“ He compares the inhabitants of this group to those of the MARQUESAS, in colour and size; but in manners, behaviour, dress, and ornaments, excepting that of their being less punctured, they more resemble the people of TAHEITEE and the SOCIETY Islands.

“ On the first information of the DÆDALUS having visited these islands, (says VANCOUVER towards the end of the extract which I have just given from Lieutenant HERGEST'S Journal) I concluded that they had not been seen before, and to commemorate the discovery of a very worthy

\* Here it appears that there is a transposition in point of time, for *Hergest* must have seen this latter island when he was ranging along the east coast of the former, and not when he had placed it between him and the latter.

though unfortunate friend \* and fellow-traveller in my more early periods of navigating these seas, I distinguished the whole group by the name of HERGEST'S ISLANDS. But I have since been informed, that these islands had been discovered and landed upon by some of the American traders, and that, in fine weather, the southernmost is visible from HOOD'S Island, the most northern of the MARQUESAS. Hence they are considered by some as properly appertaining to that group, although neither the Spanish navigator, MENDAÑA, who discovered the MARQUESAS, nor Captain COOK who visited them after him, had any knowledge of such islands existing."

The examination made by Lieutenant HERGEST, of the group of islands situated to the north-west of the MARQUESAS DE MENDOÇA, will serve me to rectify in some points that which had been made in the month of June 1791, by Captain MARCHAND.

1st. From the position which ARROWSMITH'S Planisphere had given to RIOU'S Island in regard to TREVENEN'S Island †, I might have supposed that his RIOU'S Island was the ILE PLATE of Captain MARCHAND; but it is seen, by HERGEST'S Chart, that RIOU'S Island is situated at the distance of

\* Mr. *Hergest* and Mr. *Gooch* were afterwards massacred by the natives of *Woahoo*, one of the *Sandwich* Islands.

† See pages 104 to 107 of this volume.

about seven leagues from coast to coast, and directly to the eastward of the middle of the eastern coast of SIR HENRY MARTIN'S Island (which is ILE BAUX in the SOLIDE'S Chart), and about ten leagues from centre to centre: Captain MARCHAND, from the course which he held, could not therefore perceive this RIOU'S Island, which appears less elevated than the others; he never was nearer to it than twelve leagues; and it was concealed from him by his ILE BAUX, when he passed to the westward of the latter.

On the SOLIDE'S chart must be added the RIOU'S Island of the DÆDALUS, the centre of which is to be placed ten leagues to the eastward of the centre of ILE BAUX, where it will be situated in  $8^{\circ} 54'$  south latitude, and  $141^{\circ} 56$  or  $57'$  west from PARIS.

2nd. Lieutenant HERGEST fixes the latitude of his TREVENEN'S Island, ILE MARCHAND of the SOLIDE, in  $9^{\circ} 14'$ , and its longitude in  $220^{\circ} 21$  east from GREENWICH, or  $141^{\circ} 59' 15''$  west from PARIS; and this position answers on his chart to the centre of the island; but according to the observations of MARCHAND and CHANAL in the SOLIDE, made at a very little distance from the most western point of the same island, and reduced to its centre, its latitude is  $9^{\circ} 21'$ , and its longitude  $142^{\circ} 19'$  (See Vol. I. page 148): the latitudes differ then by seven minutes, and the longitudes by twenty. It is not mentioned in the Extract from

HERGEST's Journal whether the latitude was by observation\*, nor by what means the longitude was determined. I observe that the longitude fixed by HERGEST makes the difference of meridian between the NORTH-WEST Group and that of the MARQUESAS, smaller by 20 minutes, or about  $6\frac{2}{3}$  leagues than the difference which results from the observations made on board the SOLIDE: for I suppose that HERGEST, as was done by MARCHAND and CHANAL, admitted the longitude of the Bay of LA MADRE DE DIOS in the MARQUESAS, such as it was deduced from the observations made in Captain COOK's second voyage †, and that it is to this longitude that he has reduced those of the Islands of the NORTH-WEST Group. Lieutenant HERGEST places on his chart the eastern coast of his TREVENEN's Island (ILE MARCHAND) in  $139^{\circ} 34'$  west from GREENWICH, or  $141^{\circ} 54'$  west from PARIS: but the west point of LA DOMINICA or (O-HIVAHÖA) of the MARQUESAS is situated in

\* It is possible that it was only by *account*; for it has been seen in page 293, of this volume, that *Hergest* complains of having met with "frequent heavy squalls and much rain," during the time he was among these islands.

† See Note XXX. But independently of the difference of meridians estimated from the dead reckoning, *Marchand* and *Chanal* determined by direct observations taken on the 22d and 24th of June, the longitude of *l'Île Marchand*, and that of the Northern islands (See the *Journal of the Route*); and the result of the dead reckoning differed not from that of the observations.

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141° 31' 15", (according to COOK's observations which place the middle of the island in 141° 22'); TREVENEN's Island therefore could not be eleven leagues distant, to the north-west, from the west point of LA DOMINICA: and can it be supposed that Captain COOK who, by his route, stood as far as this point of LA DOMINICA, and even a little without the point, would not have perceived a lofty island whose distance had not been eleven leagues? I am therefore of opinion that the longitude deduced from the observations and the dead reckoning of the SOLIDE, which carries the NORTH-WEST GROUP 10 minutes more to the westward than the longitude assigned to it by HERGEST's journal and chart, ought to be preferred to the latter which brings the two groups too near to each other.

If this proof did not appear sufficient for causing the longitude of ILE MARCHAND (TREVENEN's Island), as deduced from the observations made on board the SOLIDE, to be adopted in preference to that given to this island by the chart constructed on board the DÆDALUS, I should observe that Captain MARCHAND perceived the island which bears his name from the anchorage of LA MADRE DE DIOS (Vol. I. pages 214 and 215); and that, for two successive days, in the clearest weather, he perceived this island (or rather its loftiest peak) bearing between west-north-west and north-west by west, allowing for the variation. The latitude of the Bay

Bay of LA MADRE DE DIOS, according to the observations made in COOK'S Second Voyage, is  $9^{\circ} 55' 30''$ , and that of ILE MARCHAND, in its middle, is, from the observations made on board the SOLIDE,  $9^{\circ} 21'$ : the difference of latitude is therefore  $34\frac{1}{2}$  minutes, or  $34\frac{1}{2}$  miles. If, with this difference of latitude, and the angle of north-west by west ( $33^{\circ} 45'$ ) the oblique triangle be solved, it will be found that the difference of meridian between the two points whose latitudes we have, must be  $51\frac{1}{2}$  miles or  $52' 15''$ , (in the mean parallel of  $9^{\circ} 33'$ ): that which results from the longitude of MARCHAND'S Island, deduced from the observations made on board the SOLIDE, and compared to the longitude of LA MADRE DE DIOS, is only  $50' 5''$ ; it is therefore smaller by  $2' 10''$  than that given by the calculation of the triangle: it is not then too great, although it exceeds, by 20 minutes, the difference of meridian which the chart of the DÆDALUS has given between TREVENEN'S Island (ILE MARCHAND) and the Bay of LA MADRE DE DIOS: and it may be seen that the difference of longitude between the two points would be much greater still, if, in preserving the angle of bearing  $33^{\circ} 45'$ , observed from LA MADRE DE DIOS, we admitted the latitude of  $9^{\circ} 14'$  (in lieu of  $9^{\circ} 21'$ ) which Lieutenant HERGEST has given to TREVENEN'S Island (ILE MARCHAND); for then the difference of latitude between that island and LA MADRE DE DIOS, would be  $41' 30''$  (in lieu of

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34' 30"); and the difference of meridian would be 1° 3' (in lieu of 52' 15"); whereas the chart of the *DÆDALUS* (still taking for the longitude of *LA MADRE DE DIOS*, that of *COOK'S* second voyage) makes the difference of meridian only about half a degree.

I am therefore of opinion that we cannot hesitate to prefer, for *ILE MARCHAND* (*TREVENEN'S* Island), the longitude determined by the observations of the *SOLIDE*, to that assigned to it by the chart of the *DÆDALUS*, which is smaller than the former by 20 minutes: I should not even be astonished that, in the sequel, fresh observations should prove that we must rather increase the difference of meridian, in regard to *LA MADRE DE DIOS*, which was deduced from the observations taken on board the *SOLIDE* in sight of her *ILE MARCHAND*.

3. The Journal of the *DÆDALUS* gives for the situation of the centre of *SIR HENRY MARTIN'S* Island (the *SOLIDE'S* *ILE BAUX*) latitude 8° 51', and longitude 220° 19' east from *GREENWICH*, or 141° 1' 15" west from *PARIS*. According to the observations and bearings taken by Captains *MARCHAND* and *CHANAL* (Vol. I. page 249) the latitude of the middle of the island is 8° 54', and the longitude 142° 25': the difference between the determination of the *DÆDALUS*, and that of the *SOLIDE*, is therefore 3 minutes in the latitude, and 24 minutes in the longitude. The difference of meridian between



tween this island and the preceding would be only 2 minutes according to HERGEST, and it is 6 minutes according to MARCHAND and CHANAL; the latter deduced the difference of meridian of the two islands from bearings taken of both at the same time, and cross bearings; but I am ignorant by what means the former determined this difference, such as it is deduced from the relative situation given to the two islands in his Journal and on his Chart.

4. The west coast of the most western of HERGEST'S ROCKS (LES DEUX FRÈRES of the SOLIDE) is situated on the Chart of the DÆDALUS, in latitude  $8^{\circ} 37' 30''$ , and  $140^{\circ} 20'$  west from GREENWICH, or  $142^{\circ} 40' 15''$  west from PARIS \*, and on the SOLIDE'S chart, in latitude  $8^{\circ} 42'$ , and longitude  $142^{\circ} 55'$ : the difference of the latitudes is 4 minutes and a half, and that of the longitudes 15 minutes. From within sight of ILE BAUX (SIR HENRY MARTIN'S Island of the English), the SOLIDE stood directly for the Rocks named by the French LES DEUX FRÈRES; she passed, within a quarter of a mile, to the westward of the most western; and, from this position, Captain MARCHAND took the bearing of the rock in regard to the north-west point of the island: LES DEUX

\* For the comparison I employ the position which the Chart assigns to these Rocks; for it has been seen before, (page 291 note \*) that the position given to them by the Journal is very different from that in which they are laid down on the chart.

FRÈRES lie, with respect to each other, east and west. As no mention is made in the Journal of the DÆDALUS of the method employed for fixing the position of the rocks in regard to SIR HENRY MARTIN'S Island; and as their distance from that island such as it is given by the Journal is very different from that assigned to them on the Chart which accompanies it, I think that we ought to adhere to the position resulting from the route and the bearings of the SOLIDE.

5. The result of the observations for the latitude and longitude made by Captains MARCHAND and CHANAL on the 24th of June (Vol. I. page 249) combined with bearings taken of the land, places the middle of ILE MASSE, that is, the most southern elevated part of the little group of ROBERTS'S Islands in the English Chart, in latitude  $8^{\circ}$  or  $8^{\circ} 1'$ , and longitude  $142^{\circ} 52'$ : this same point is situated, on the English Chart, in latitude  $7^{\circ} 57'$ , and longitude  $140^{\circ} 13' 30''$  west from GREENWICH, or  $142^{\circ} 33' 45''$  west from PARIS: the difference between the two positions is therefore from 3 to 4 minutes in the latitudes, and  $18\frac{1}{2}$  minutes in the longitudes. It is seen that, on the French chart, the ILES MASSE and CHANAL occupy together 16 minutes in latitude; while the group of ROBERTS'S Islands, which represent the former on the English chart, there occupy only 10 minutes. They are placed on the SOLIDE'S chart according to a bearing (in which allowance is made for the variation of

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of the compass) taken on the 24th of June at noon, at the moment of the observation for the latitude, and inserted in the manuscript journal of Captain CHANAL as follows: ILE MASSE, from east  $30^{\circ}$  south to east 8 or  $10^{\circ}$  south, distant six leagues: ILE CHANAL, from east to east  $10^{\circ}$  north, twelve leagues. If it were wished to attribute to an error in the SOLIDE's bearings, the difference of 6 minutes that is to be found between the space which the group of these islands occupies in latitude on the one chart, and that which it occupies on the other, we must suppose that a much greater error has been committed with respect to the distance of six leagues at which the SOLIDE was estimated from ILE MASSE, which was the nearest to her. I therefore presume that the difference of the parallels between which the group is comprehended, must be larger than it is on the chart of the DÆDALUS. But I am, at the same time, of opinion, that the configuration and the disposition of these islands, such as they are seen on the English chart, is far preferable to those which are delineated on the French chart. Lieutenant HERGEST visited them and examined them minutely; whereas Captain MARCHAND saw them only in passing, and at a sufficient distance to leave a great uncertainty respecting any other determination than of the difference of latitude of the two extreme north and south points, and their relative position in regard

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to the **ILE BAUX** of the **SOLIDE**, the **Sir HENRY MARTIN's Island** of the **DÆDALUS**.

In recapitulating the differences which we have discovered between the two charts, it is seen that all the latitudes and longitudes of the English chart are smaller than those of the French chart; namely :

	in Lat.	in Long.
FOR ISLE MARCHAND, or TREVENEN's Island	7'	20'
FOR ISLE BAUX, or SIR HENRY MARTIN's Island	3	24
FOR LES DEUX FRÈRES, or HERGEST's Rocks	4½	15
FOR ISLE MASSE, the south part of ROBERTS's Islands	3	18

From the reasons which I have stated, I am of opinion that the English chart, by giving to the **NORTH-WEST Group** a longitude less westerly than that which results from the observations made on board the **SOLIDE**, brings this group too near to that of the **MARQUESAS DE MENDOÇA**. As for the latitudes, supposing that all those inserted in **HERGEST's Journal** were *by observation*, of which we are ignorant; the differences between those observed on board the **SOLIDE**, with the exception of the first which is 7 minutes, are so small that we may imagine they are owing to the difference of the instruments, to the manner of observing, &c. And we might take for the true latitudes, the mean between

between the results given by the two navigators; the more especially as they are not reduced to a determined point, such as a cape, a harbour, &c. but to the centre of each island.

If I wished to construct a chart of the group situated to the north-west of the *MARQUESAS DE MENDOÇA*, I would make use of the positions with which we are furnished by the *SOLIDE's* journal; but I would employ for the extent and the configuration of the islands, to which I would add *RIOU's* Island, those given them by the chart constructed in the voyage of the *DÆDALUS*; for, with the exception of *ILE MARCHAND* (the *TREVENEN's* Island of *HERGEST*), the others were not seen from the *SOLIDE* but at a distance which admits of presenting masses only; whereas they were mostly visited, and surveyed more minutely by the *DÆDALUS*. We are indebted to Lieutenant *HERGEST* for a knowledge of the excellent harbour, called by him *PORT ANNA MARIA*, on the south coast of *ILE BAUX*, or *SIR HENRY MARTIN's* Island, and of a bay situated on the same coast near its south-east point, which had the appearance of a safe and commodious port: it cannot but be considered as a fortunate circumstance to have discovered two good harbours in a populous and fertile island, in the midst of other islands which are equally so, and in a latitude where it was of importance to be acquainted with places of shelter which can furnish

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VOL. II.

furnish water and refreshments to ships crossing the GREAT OCEAN.

What we read, in the extract from the journal of the *DÆDALUS*, respecting the peaceable, friendly, and hospitable disposition of the natives of these islands, agrees perfectly with what has been related of them in the Narrative of MARCHAND'S VOYAGE (Vol. I. pages 225, 226, 231, and 232.)

It has been seen (pages 280, and 281 of this Vol.) by the extract from the voyage of the American Captain, ROBERTS, that the natives of the NORTH-WEST Group sometimes have a communication with those of the SOUTH-EAST Group, since that Captain met at LA MADRE DE DIOS in WAHITAHÔ, one of the MARQUESAS, an old man of seventy-five years of age, born at ONHAWA, one of the islands of the NORTH-WEST Group, to whom he gave a passage in his ship, and whom he landed at NEWHEVE\*, another island of the same group. It will not be supposed that an old man had embarked in a ship, with strangers, solely for the pleasure of rambling over the world, of which he could have no idea; it is probable that he intimated in some way to Captain ROBERTS, that he was born in a distant land whose situation in regard to WAHITAHÔ he pointed out; and that, on this

\* To judge from the latitude of  $8^{\circ} 56'$ , which Captain Roberts assigns to the Island of *Newheve*, (page 281, of this Vol.) this must be the *Ile Baux* of the *Solide*, the *Sir Henry Martin's* Island of the *Dædalus*.

indication, the American Captain proposed to him to take him on board his ship, giving him the hope that he would soon restore him to his native country. But Captain ROBERTS having met a native of the islands of the NORTH-WEST Group on an island of the SOUTH-EAST Group, does not prove that the communication from the one group to the other is habitual; the age even of this inhabitant of the NORTH-WEST Group, and the determination which he ventured to take of abandoning himself to strange men, who must have appeared formidable to him, but who promised to carry him back to his own country, seem to indicate that the means of communication from the one group to the other are as difficult to these islanders, as the opportunities of them must be rare: Captain COOK and Captain MARCHAND never saw at LA MADRE DE DIOS any other canoes than those which had come thither from O-HIVAHÔA, MENDAÑA'S LA DOMINICA.

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## FOURTH ADDITION,

*For the Island of TINIAN.*

IN the Narrative of MARCHAND'S VOYAGE (pages 51 to 80 of this Vol.), I have presented two very different pictures of the Island of TINIAN: that which RICHARD WALTER, Chaplain to Commodore ANSON, has drawn us of the state of the island in 1742; and that of the state in which it has appeared in later times: in 1765, to Commodore BYRON; in 1767, to Captain WALLIS; in 1787, to Captain PORTLOCK; in 1788, to Captain GILBERT and to Captain SEVER, separately. I ought likewise to have mentioned the description given of it by Lieutenant GEORGE MORTIMER, of the Marines, a passenger on board the brig MERCURY, commanded by Captain HENRY COX, who touched at TINIAN on the 12th of December 1789, and came to an anchor in that very road, off the south-west point of the island, where all the navigators of his nation who preceded him, had also anchored. I shall repair this omission, and make Lieutenant MORTIMER speak for himself\*.

\* *Observations and Remarks made during a voyage to the Islands of Teneriffe, &c.—North-west coast of America, &c.—Otaheite, &c.—Tinian, and thence to Canton.—In the Brig Mercury, commanded by I. H. Cox, Esq. By Lieut. George Mortimer of the Marines. London, 1791. 4to. pages 64 and following.*



“ On our arrival, a fine breeze setting off the land, saluted us with the most fragrant and delightful odours; and we were soon gratified with the sight of some beautiful white cattle, feeding and frisking about among the trees; which added greatly to the charming appearance of this island. The boats were hoisted out, and the captain with a party of us went on shore, where we expected to procure some fresh beef; but were disappointed, as the cattle retired among the woods the instant they saw us; and it would have been in vain to have pursued them for the underwood was nearly impenetrable: we therefore returned on board again, after having loaded the boat with wood, and gathered a quantity of fine limes.

“ The next morning we went on shore again, and landed further to the northward than we had done on the preceding day. Here we found several huts erected by the Spaniards who come here annually from their settlement at GUAM to procure beef for the garrison of that island. The Spaniards, or some other people, must have quitted TINIAN but a very short time before our arrival, as they had left a wild hog in a sty, that had died but lately, and a fine dog, which we caught, and carried on board with us. We were directed by a beaten path, about forty yards in length from the huts, to the well mentioned by Lord ANSON and Commodore BYRON; and though the water it contains is not the best in the world, it by no means deserves

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deserves the reproaches bestowed upon it by the Commodore, since we neither found it brackish nor full of worms, as he asserts it to have been\*. And here I cannot help observing, that this gentleman seems to have taken as much pains to depreciate this island, as Lord ANSON had been too lavish in his encomiums on it †; for, whatever may have been the state of TINIAN when his Lordship was there, future visitors may look about in vain for those delightful lawns, painted in such glowing colours by the author of his voyage.

“ Our people being set to work to cut wood for fuel, and other purposes, I set out from the huts where they were stationed, in company with our third mate and one of the seamen, in pursuit of game. We at first followed the traces of a path; but it soon failing us, we were obliged to force

\* Commodore *Byron* was at *Tinian* in the month of August, and Captain *Cox*, in the month of December, the difference of the seasons might probably occasion a difference in the state of a well: Captain *Gilbert*, in the month of August 1788, found it dry.

† It is difficult to pronounce between two voyagers, who both declare, *I saw it*; we must, however, remark, that all the navigators who have touched at *Tinian* since *Byron* described to us its present state, have confirmed what he has said of it.

The manner in which seamen view objects depends a little on the situation in which they find themselves when they land in a country: we are less difficult in proportion as we have more wants; the land has so many charms, when, for a length of time, we have been condemned to see nothing but sky and water!

our way through the thickets, in hopes, as we got into the interior part of the country, we should get clear of the trees and underwood: which we did, after having proceeded a considerable distance with great labour and fatigue; but we were still so much incommoded by a kind of wood that grew as high as our breasts, by the heat, and by an intolerable number of flies, that I quitted my companions, who wished to penetrate a little farther into the country, and made the best of my way back to the wooding party at the huts, where I did not arrive till late in the afternoon, being nearly exhausted with the fatigue of pushing through the bushes, and climbing trees, to see that I was going in a proper direction, which was a very necessary precaution, as I was at one time lost for upwards of two hours. I met with a great many wild hogs; and I had nearly stumbled upon an animal which, on being roused, darted through the thicket with such velocity, that I could not distinguish what it was; but suppose it to have been one of the guanacoes described by Lord ANSON, and which are said to abound in the neighbouring Islands of SAYPAN and AGUIGAN. I saw also some fowls in my ramble, and shot a pig. Our third mate, who returned about half an hour after me, reported, that soon after I had separated from him, he fell in with a herd of cattle, and shot one of them, a fine young bull; but, having only one man with him, and it being a considerable distance from the beach,

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beach, he was obliged to leave the carcass in the charge of his companion, who consented to remain with it all night; being apprehensive they might not have found the place again, had they both returned together.

“ Next morning, a party was sent to procure some of the animal; but, upon their arrival, the greater part of it was found to be tainted and entirely spoiled; however, some pieces were cut from the parts that were the least affected and brought on board, which furnished us with an excellent dish of soup, and some steaks, the meat being *very tender* and fine grained (we have no difficulty in believing it, *quid non fames!*) Wild hogs and poultry are in great abundance at TINIAN; and though the latter are shy and difficult to come at, on account of the underwood, it is pleasing to hear them crowing and cackling in every direction; so that it is difficult to divest one's self of the idea of being in the vicinity of some country village, or large farm-yard. TINIAN produces plenty of limes, lemons, guavas, some cocoa-nuts, custard-apples, and indifferent oranges, with a variety of beautiful trees, among which was the bramin and bread-fruit trees, but the latter had no fruit upon them; and the cotton shrub. In our different excursions on shore, we met with the remains of several of those curious edifices described by Lord Anson, and supposed to have been erected by the original inhabitants of the island. These build-

ings are of a most singular structure, and consist, in their present state, of two ranges of columns, either of stone or composition, and of a pyramidal form, having large semi-globes placed on their tops, with their surfaces upwards.

“ If these structures are really of stone, which I imagine them to be, it is astonishing how a rude and uncivilized people, unacquainted with any of the arts necessary for the purpose, and without proper tools, could have formed and erected them\*. We measured one of the pillars, and its semi-globe or capital, the dimensions of which were as follow :

	Feet	Inches.
Perpendicular height of the pyramid . .	14	0
Breadth at the base . . . . .	5	4
Diameter of the semi-globe . . . . .	5	10

“ Having got on board a sufficient stock of wood, and filled our empty water-casks, we got under way in the evening, and stood to the westward. The thermometer, while we lay in the road of TINIAN, kept, with little variation, at 83°; but the heat was considerably more intense on shore.”

\* We are less astonished at the circumstances, when we are acquainted with the *colossal statues* which the inhabitants of *Easter Isle*, full as destitute of implements and tools as those of *Tinian* could be, have erected, in ancient times, on the circumference of their island. (See the Voyage of the Dutch Admiral *Roggeween*.—See also *Cook's Second Voyage*.—*La Pérouse's Voyage*, &c.)

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It has been seen (page 64, note \* of this Vol.) that ANSON's historian was of opinion that the pillars and massive semi-globes by which they are surmounted, were formed of sand and stone cemented together, and covered with plaster: MORTIMER thought them of stone or composition. BYRON who caused the Island of SAYPAN to be visited, in 1765, tells us, that there were seen on it "many of those square pyramidal pillars which are to be found at TINIAN, and which are particularly described in the account of Lord ANSON's voyage;" but he does not say whether he himself saw any of them at TINIAN: in voyages more recent than that of BYRON, no mention is made of the monuments of the latter island; and this silence had led me to conclude that time had destroyed them. But it is seen, by the detail into which MORTIMER has entered, that they were still standing at the end of December 1789; and forty-seven years which had elapsed between ANSON's voyage and that of COX, appeared not to have affected them, which may be considered as surprising in works exposed to the injuries of the air, to heavy rains, and to excessive heats: it must be imagined that their construction was solid, and that excellent materials were employed in it; for it is well known that, when ANSON saw them for the first time, the Spaniards already regarded them as monuments of great antiquity.

Paris, 25 Floreal, year VII of the French Era.  
(14th May 1799.)

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## LATITUDE AND LONGITUDE,

*Made on board the ship SOLIDE, in the course of her Voyage round the World, serving to determine the changes occasioned by the Currents in the apparent course and rate of sailing of the ship, in the different tracts of sea which she crossed, as well as the error in the calculation of the dead reckoning in the interval of the observations, and at the period of each land-fall.*

**T**HE numerous observations for the latitude and longitude made on board the SOLIDE, in her Voyage round the World, have furnished me with the *data* necessary for estimating, with a correctness sufficient for the information of navigators, the effect which the ship experienced from the currents in the different tracts of sea that she crossed. I have thought that this effect might be known, at least by approximation, if the progress in latitude and longitude, such as it was announced by the results of the astronomical observations, was compared with the progress for the same intervals, such as it was deduced from the ordinary

(continued) calculation

calculation of the ship's run; and I have supposed that all the errors of the *dead reckoning*, indicated by the results of these comparisons, ought to be attributed to the unperceived action of the currents which had driven the ship out of her apparent course, and occasioned her to make, in a direction different from that she had appeared to follow, a progress, which, by the usual methods of keeping a reckoning, could not be estimated, either as to its length, or as to the degree of velocity with which it had been effected.

But, in order to admit that this supposition has conducted me to true results, two others must likewise be admitted: the former, that the errors of the dead reckoning depended solely on the effect of the currents; the latter, that the observations of the moon's distance from the sun or stars, gave results sufficiently certain for us to be able to deduce from them, as from fixed points, the results of the calculations of the dead reckoning. I do not therefore present, as strictly correct determinations, those which are founded on these suppositions; and it must not thence be concluded that the direction and degree of velocity impressed on the ship, in each tract of sea, by the action of the currents, were *strictly* those given me by the results of my calculations: still less must it be expected that, at all times, in the same tract of sea they will again be found the same. But my labour will indicate to navigators what useful employment they



they can make of lunar observations, for the purpose of improving this branch of hydrography, which, hitherto, has been too much neglected: for, if on the one hand, from the want of precision in the observations, and on the other, from the uncertainty of the dead reckoning, the errors of which may not always arise from the sole action of the currents, the determinations of the effect of the movement of the waters on the ship's course, such as I have deduced them, do not present themselves with the confidence of geometrical exactness, they may at least be considered as approximations, which cannot be very wide of the truth; and in their state of imperfection, they will still be of great utility to ships that shall traverse the tracts of sea which the SOLIDE crossed in her circumnavigation of the globe\*.

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\* The lunar method not being able to give the longitude at sea without an uncertainty of about half a degree, a precision sufficient when the question is to make the land after a long voyage, it cannot indicate with a precision of which we are certain, little differences of meridian; because the error of one of the two observations, the compared results of which indicate the progress in longitude, may sometimes exceed these little differences, and even indicate them in a direction contrary to the true one. This is not the case with the determinations which are obtained from astronomical watches and clocks, from *time-keepers* or *chronometers*: the smaller are the intervals of time, the greater is the precision of the result; because, in a small interval, the time-keeper has more certainly preserved the regularity of its rate of going.

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It will be remarked that, in general, in the parts of the ATLANTIC OCEAN and of the GREAT OCEAN that the ship crossed, the currents which set to the *Northward*, also set to the *Eastward*; while those which set to the *Southward*, set at the same time to the *Westward*: but the quantities with which they act in the direction of the latitude and in that of the longitude, are neither equal in themselves, nor constant; whence result degrees of velocity which differ more or less, and directions, which make angles more or less open with the Meridians or with the Parallels. When the directions, which at the same time partake of *Northing* and *Easting*, or of *Southing* and *Westing*, cease to have place, this change appears to be owing to

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We cannot too strongly recommend to navigators to blend the two methods; they will lend to each other mutual aid; the time-keepers will correct the results of the lunar observations, when it is required, in the course of a ship's run, to determine the little progresses in longitude, and to ascertain what has been the daily influence of the currents on the vessel's course; but, when drawing near the end of a long passage, it is of importance to know with certainty the true position of the ship with respect to the place where it is wished to make the land, the results of repeated lunar observations, compared with those given by the chronometer at the same periods, will shew whether the latter have not experienced some considerable derangement in its rate; and should there be found, between the two results, a difference which might exceed a degree, as it would not entirely belong to the error of the lunar observations, a mean should be adopted between the two results, in order to have a determination according to which the navigator might direct his course with safety.

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the particular disposition and configuration of lands not far distant from the ship's track, to gulfs, to channels or mouths of great rivers, which occasion accidental and extraordinary currents, the effect of which the navigator ceases to feel as soon as he has passed the space of sea to which their action is limited; and he soon finds again the general current, that which reigns in the offing, whose effect it is, no doubt, less difficult to determine on a ship which it masters, than to assign its cause.

If, at a future period, after the observations which navigators will find means to multiply for the advancement of science and for their own interest, we should happen to be convinced, that, in the parts of the two Oceans, crossed by the SOLIDE's track, the currents which carry a ship to the *Northward* carry her constantly to the *Eastward*, and that those which carry her to the *Southward*, carry her at the same time to the *Westward*, this certainty would afford a mean of guarding, in part, against the errors in the dead reckoning towards the *East* or the *West*, on such days as the state of the weather should not allow of making observations of the moon's distance from the sun or stars, or of having recourse to a time-keeper for determining the longitude: for if, by some one of those methods of which seamen are at this day in possession, the true latitude of the ship can be known, the difference between her real progress in the interval from one day of observation to the

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other, and the progress indicated by the dead reckoning for the same interval, will shew how much, and on what side, in the direction of the latitude, the ship has been driven out of her apparent course; and thence will be deduced, if not how much, at least on what side, she must have been deranged in the direction of the longitude: as to the quantity of this derangement, it may be presumed from the results of the observations that have been made on the preceding days in the tract of sea the nearest to that in which the ship is sailing.

But this apparent uniformity in the currents, this movement, which, in the SOLIDE'S voyage, presents to us so few variations, must not, however, be considered as invariable: a long series of observations can alone inform us how far, in what tracts of sea, and in what season, we may be permitted to consider it as nearly constant.

I have comprised in one Table, which terminates these *NOTES*, the results of all the calculations relative to the action of the currents, whose effect the SOLIDE experienced in the course of her Voyage round the World; and I am persuaded that those seamen who shall fix their attention on this Table, will wish that every navigator may assiduously employ himself in such observations as may, on his return from his voyage, furnish us with one similar: hydrographers who had before them this series of Tables, would there find the *data* necessary

cessary for constructing charts, in which might be specified in every tract of sea, the ordinary direction and strength of the currents; I say *ordinary*; for they may experience derangements in their direction and velocity, from the effect of accidental and unknown causes: and, perhaps, they even experience periodical changes: but if the changes be regular, it will be sufficient, in order to succeed one of these days in ascertaining the law by which they are governed, to have a series of observations made in the same tracts of sea in different seasons. Let navigators but multiply their observations, time and men of science will do the rest.

The precision with which the SOLIDE made all her land-falls, by regulating her course according to the result of the observations for the longitude, shews the degree of confidence that we may grant to the determinations of the *effects of the currents*, which has been deduced from these very observations in the course of the different runs. The precision of the land-falls proves, at the same time, what safety the methods which may be employed for determining the longitude afford to navigators. Their advantage cannot fail to be appreciated, if, at every period in which the ship touches at places whose geographical situation is determined, we compare the result of the observations with that which would have been given by the ordinary calculation of the dead reckoning; and I shall take

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care to place this comparison before the eyes of the reader at the end of each run: may it make our navigators sensible that the *dead reckoning* is no more than a subsidiary method, of which it is no longer allowable to make use but as a provisional supplement, and merely when it is not possible to find in the heavens, by the observation of the sun, moon, and stars, the position in which the ship must be on the globe!

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## FIRST RUN.

*From the Strait of GIBRALTAR to the CAPE  
DE VERD Islands.*

### NOTE I\*.

ON the 29th of December 1790, at eight o'clock in the evening, Cape SPARTEL (on the Coast of AFRICA) when the ship had cleared the Strait of GIBRALTAR, bore directly south †, distant 1½ leagues.

\* In the *Journal of the Route*, on the days specified, will be found the elements of the calculations and results which these *NOTES* present.

† In all the points of the compass mentioned in these *NOTES*, allowance is made for the variation of the magnetic needle, and they are reduced to the true north, unless it be expressly mentioned to the contrary.

The observations of BORDA, in 1776, have fixed the latitude of this cape at  $35^{\circ} 47' 20''$  north, and its longitude at  $8^{\circ} 14'$  west from PARIS\*.

Thus, the SOLIDE, in taking her departure from the bearing taken at eight o'clock, sailed from the latitude of  $35^{\circ} 52' 20''$ , and longitude of  $8^{\circ} 14'$ .

#### NOTE II.

On the 5th of January 1791, at three quarters past one o'clock in the afternoon, Captain MARCHAND got sight of the Peak of TENERIFFE; and it bore south  $6^{\circ} 30'$  east, at the distance of thirty-five leagues estimated by the eye.

From noon to three quarters past one, the ship had run 8 miles west south-west  $6^{\circ} 30'$  south.

Consequently, her latitude had diminished since noon, nearly 4 minutes, and her longitude had increased about 8 minutes.

The latitude observed at noon was  $30^{\circ} 8'$ : that of the Peak is  $28^{\circ} 17'$ : thus at this period, the ship was more to the northward than the Peak by  $1^{\circ} 51'$ .

At three quarters past one, this difference had diminished 4 minutes; consequently, the ship was then only  $1^{\circ} 47'$  to the northward of the Peak.

\* These determinations are taken from a Manuscript communicated by Borda.

In this situation, the Peak bore south  $6^{\circ} 30'$  east: the ship was therefore 12 miles, or about 14 minutes, more to the westward than the Peak.

The longitude of the Peak, reduced by the operations of BORDA\*, to that of the town of SANTA CRUZ, is  $19^{\circ}$ : thus that of the ship was  $19^{\circ} 14'$ .

And if it be wished to reduce it to noon, the 8 minutes progress to the westward, from that time to three quarters past one must be deducted, and it will then be no more than  $19^{\circ} 6'$ .

Let us at present compare this last-mentioned longitude with that of the point of departure, on the 29th of Dec. 1791, to the northward of Cape

\*The longitude of the town of *Santa Cruz* (at the Mole), reduced to that of the observatory at *Cadix*, is fixed at  $18^{\circ} 36'$  west from *Paris*, by a mean between the determinations given by the time-keepers of *Ferdinand Berthoud*, on board the *Ifis*, in 1769 (*Pingré* and *Fleurieu*) on board the *Flora*, in 1771, (*Verdun*, *Borda* and *Pingré*) on board the *Bouffole*, in 1776 (*Borda*): and several observations of the eclipses of Jupiter's Satellites, made, in 1774, by Father *Feuillée* (*Mém. de l'Acad. des Sciences*, 1776, page 135 to 146) and in these latter times by *Varela* (*Borda's MSS.*) and the correspondent ones of which have been had in the observatories of *Europe*, confirm this determination. Its latitude has been fixed by a great number of observations at  $23^{\circ} 28' 30''$  north.

The latitude and longitude of the Peak of *Teneriffe* were reduced to that of *Santa Cruz* by the operations of *Borda*, whose name is a sufficient voucher for the exactness of the operations and results: he has determined its latitude at  $28^{\circ} 17'$  north, and its longitude at  $19^{\circ}$  west from *Paris*. (*MSS.* communicated by *Borda*).



SPARTEL,  $8^{\circ} 14'$ ; we shall see that the real progress towards the west, from the 29th of December to the 5th of January (in seven days wanting 8 hours) was  $10^{\circ} 52'$ ; but, according to the dead reckoning, her apparent progress is  $11^{\circ} 32'$ ; thus, from the effect of some current, the ship was carried two-thirds of a degree towards the east, or (reducing the parts of the equator into marine miles, on a mean parallel between the two extreme parallels) 38 miles less towards the west than the reckoning indicated; which gives for the mean effect of the current towards the east,  $5\frac{1}{2}$  miles in twenty-four hours.

In comparing daily the latitudes observed with those which were deduced from the dead reckoning, it will be found that the ship was drifted by the currents, sometimes towards the south, sometimes towards the north, and, allowing for the quantities in contrary directions which do away each other, she was carried 9 minutes, or 9 miles, towards the south: in combining them with the 38 miles easting, we have for the imperceptible movement of the ship, 39 miles to the east  $13^{\circ} 30'$  south, and for the mean drift per day in that direction 5.8 miles: but it may be presumed that her progress towards the east was constant, as it should be, according to the remark of all the navigators who have experienced that the waters of the OCEAN set with a rather considerable velocity towards the Strait of GIBRALTAR, through which

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Vol. I. page 2

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they run into the MEDITERRANEAN, whose receipt from the rivers which discharge themselves into it, does not compensate for the expenditure that is made by evaporation\*.

I shall here make a remark accessory to the object of this NOTE.

\* In a run which I made in 1769, from *Cadix* to the Island of *Teneriffe*, by a direct course and with a steady breeze from north-east to east-north-east, I had an opportunity of ascertaining the constant effect of the current which sets to the eastward as long as a ship sails in the tract of sea situated to the westward of the Strait of *Gibraltar*, and at a little distance from it. Clear weather permitted me, during the four days employed in this run, to take daily observations for determining the longitude of the ship by the help of the time-keepers of *Ferdinand Berthoud*, of which I had been ordered to make a trial, and whose daily rate had been ascertained at *Cadix*; and in comparing, every day, the ship's progress towards the west deduced from the observations, with that indicated by the dead reckoning, I had the following results.

On the 1st day, the current had set to the eastward,  $11\frac{1}{2}'$ ; on the 2nd,  $12\frac{1}{2}'$ ; on the 3rd,  $9\frac{1}{2}'$ ; on the 4th,  $1'$ .

It is seen that, during the first three days, the movement impressed on the ship to the eastward, carried her towards that side,  $33\frac{1}{2}'$  or  $27\frac{1}{2}$  miles, and by a mean, about 8 miles in twenty-four hours.

But the action of the current ceased to be felt on the 4th day when the ship had reached the parallel of  $31^{\circ}$ : (See the *Voyage de l'Isis, en 1768 et 1769, à différentes parties du Monde, pour éprouver les Horloges marines, &c. Paris Imprim. Rl.* Vol. I. page 279.)

The quantities which the ship had been carried, in the same interval, towards the south or towards the north, had nearly counterbalanced each other:  $8\frac{2}{3}'$  to the southward,  $6\frac{1}{2}'$  to the northward. (See *Ibid.* Vol. II. page 290.)

The latitude observed, at noon, was  $30^{\circ} 8'$ : from noon to three quarters past one, the period at which a bearing was taken of the Peak, the ship's progress had been 4 minutes towards the south; thus, at three quarters past one, the latitude was no more than  $30^{\circ} 4'$ : and it was more northerly than the Peak, by  $1^{\circ} 47'$  or  $35\frac{2}{3}$  leagues. Captain MARCHAND had estimated by the eye that the distance might be 35 leagues: and the observation of latitude proves that the real distance differed very little from this estimation: it proves too, and this is what I wish to conclude from it, that in coming from the northward, as from every other part of the horizon, the PEAK OF TENERIFFE may be distinguished at the distance of 35 or 36 leagues, even when the weather is not perfectly clear: for we see, in the JOURNAL OF THE ROUTE, that, from noon of the 5th to noon on the 6th, the wind was to the northward, variable, and faint; and the weather *bazy*. Thus, when the bearing of the Peak was taken at three quarters past one on this latter day, the weather could not be perfectly clear; but it had been sufficiently so for taking the meridian altitude of the sun, and it was sufficiently so for the Peak to be perceived at the distance of thirty-five leagues, because its summit was not enveloped in clouds, but towered above them. In calculating from its elevation above the level of the sea, which the operations of BORDA, made in 1776, in his excursion to the

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loftiest point of the mountain, have fixed at 1905 toifes \*, we find that the distance at which the Peak is feen geometrically in a line with the horizon, regard being had to terrestrial refraction, is  $128\frac{3}{4}$  minutes of a degree, or about 43 marine leagues: and if we fuppofe the eye raifed from 20 to 25 feet above the level of the fea, this diftance may be increafed 2 or 3 leagues. But the upper part of the mountain, or the *PITON*, forms a truncated cone on an elevation of 500 feet; and the elliptical mouth of the crater which terminates it, and into which *BORDA* defcended, is not more than from 35 to 40 toifes in length in its great diameter, which inclines towards the fouth-fouth-eaft, and from 25 to 30 only in its fmall diameter: it may therefore be prefumed that the mountain of the *PEAK* is not eafily diftinguifhed in the horizon, except when the bafe of the *PITON* begins to make its appearance there; therefore it may be admitted

\* Two barometers were placed on the higheft edge of the crater; the one rofe to 18 inches, the other to 18 $\frac{1}{2}$  lines, *Reaumur's* Thermometer to  $8\frac{1}{2}$  degrees above the freezing point. On comparing thefe quantities to thofe which the barometers of comparifon had rifen, at the fame hour, at the fea-fide, and on applying, for the correftions to be made, the rule of *M. de Luc*, we find the height of the peak above the level of the ocean, to be 1929 toifes. The trigonometrical meafure, taken with all the precautions that could infure its exactnefs, gave 1905 toifes; and it is feen that the height indicated by the barometer differs from the true only by 24 toifes. (Thefe meafures are taken from a Manufcript communicated by *Borda*.)

that the greatest distance at which the PEAK OF TENERIFFE can be perceived from a ship's deck, is 42 or 43 leagues; I say nothing of the little differences which depend on the variation of terrestrial refractions, which varying according to the temperature and the state of the atmosphere, change the apparent height of mountains.

According to these measures which no one will contest, we may judge how greatly voyagers have exaggerated, who have told us that they had perceived the PEAK OF TENERIFFE *sixty* and a *hundred* leagues off at sea\*.

### NOTE III.

In comparing the longitude given by two sets of distances of the sun and moon, observed on the 9th, at three quarters past three o'clock in the afternoon, and reduced to noon of that day, with that which had been deduced, on the 5th, from the bearing of the PEAK OF TENERIFFE, it is seen that, in the interval of four days, the progress towards the west, had been  $2^{\circ} 40'$ . In reducing, in like manner, to the bearing of the PEAK the longitude given by the dead reckoning on the 9th at noon, it will be found that the progress indicated by the reckoning, from the 5th to the 9th of the month, was  $3^{\circ} 34'$ : thus, the ship had again

\* See the *Histoire générale de Voyages* by Prévost, Vol. II. page 239, 4to edition.

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been carried towards the east 54 minutes, or about 49 miles, on the mean parallel between the two extremes.

The observations of latitude shewed that, in the same interval, she had been carried 12 minutes, or 12 miles, to the southward, beyond the sum of the progress by account.

It thence results that the currents had set her 50½ miles to the east 13° 45' south, at a mean rate of 12½ in twenty-four hours.

It is very usual, in the seas which the SOLIDE had crossed, for ships to be carried to the eastward by the movement of the waters: and, most commonly, they are at the same time carried to the southward.

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NOTE IV.

On the 14th, at noon, the south point of MAYO, one of the CAPE DE VERD Islands, bore north, distant one league.

By a mean between the results of the observations which were made on board the *ISIS*, in 1769, and on board the *FLORE*, in 1771, the latitude of this point is 15° 4' 30" north, and its longitude 25° 28' 30" west\*.

Lat. north. Long. west.

* According to the observations made			
on board the <i>ISIS</i> .....	15°	3'	25° 27'
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The ship's place whence the bearings were taken at noon was on the very meridian of this point, and 3 minutes more southerly; thus, at that period, the latitude of the ship should be  $15^{\circ} 1' 30''$ , and that which was observed was conformable to it: her longitude was that of the south point of MAYO,  $25^{\circ} 28' 30''$ .

On comparing this longitude with that which had been observed on the 9th at noon, we find that, in the interval of five days, the ship's progress towards the west was  $3^{\circ} 42' 30''$ . According to the dead reckoning, it ought to be only  $3^{\circ} 9'$ : thus the ship was carried to the westward  $33\frac{1}{2}$  minutes, or  $30\frac{1}{2}$  miles (reducing the parts of the equator into marine miles by a mean parallel.)

The observations of latitude shewed that, in the same space of time, she was drifted to the southward, 18 minutes, or 18 miles: thus, through the effect of the current, the ship was carried  $35\frac{1}{2}$  miles to the west  $30^{\circ} 45'$  south, at a mean rate of 7.1 miles in twenty-four hours.

The longitude by account, such as it was given by the dead reckoning deduced from the longitude of the point of departure, on the 29th of December within sight of Cape SPARTEL, was  $26^{\circ} 29'$ : and in comparing it to the true longitude,  $25^{\circ} 28' 30''$ , we find that the error of the reckoning, at the expiration of sixteen days, was, *abead* of the ship, 1 degree, which, on the parallel of the point arrived at, is equal to 58 miles. But it has been

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seen that a compensation had taken place in the errors: in the interval from the 29th of December to the 9th of January, the sum of the errors in the reckoning, *abead* of the ship, had been 87 miles or  $1^{\circ} 34'$ ; and from the 9th to the 14th, the error was 30.5 miles or  $0^{\circ} 34'$  *astern*.

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## SECOND RUN.

*From the CAPE DE VERD Islands to within sight of STATEN LAND.*

### NOTE V.

THE longitude of LA PRAYA, in the Island of ST. JAGO, was determined by the observations made with the help of the time-pieces of FERDINAND BERTHOUD, in 1769 on board the *ISIS*; in 1771, on board the *FLORE*, and reduced to the longitude of CADIZ\*: it is  $25^{\circ} 21'$  west from PARIS.

It is from this point that the *SOLIDE* sailed, on the 18th of January, in order to get under the

	Lat. North.	Long. West.
* <i>La Praya</i> {	Observ. on board the <i>Isis</i> $14^{\circ} 52' 33''$	$25^{\circ} 50' 00''$
	Observ. on board the <i>Flore</i> $14 43 40$	$25 51 30$
	Mean $14 53 06.5$	$25 50 45$

meridian



meridian of STATEN LAND, which Captain MARCHAND intended to make before he entered into the GREAT OCEAN, because it was possible, as really happened, that the contrariety of the winds might not permit him to get sight of Cape HORN.

No observation of longitude could be taken till the 6th of February: but the results of the observations of latitude compared to those of the reckoning shewed that, in the interval from the 28th to the 31st of January, the ship was carried to the northward 50 minutes beyond the run by account, that is, 16½ miles in twenty-four hours.

This great effect of a current coming from the southward took place between the parallel of 3° 36' and that of 2° 26' north, and between 20° 35' and 21° 29' west longitude. From the time of the departure being taken from LA PRAYA to this period, very inconsiderable differences only had been remarked between the latitudes by account and the latitudes by observation: during the first three days, there had been no difference: from the 21st to the 22nd, the ship appeared to have been carried by the movement of the waters, 4 minutes to the southward; but on the following days, she appeared to be set to the northward: from the 22d to the 23d, 3 minutes; from the 23d to the 24th, 4 minutes, and from the 24th to the 28th, 1 minute only.

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If the reader will cast his eye on the chart of the ATLANTIC OCEAN, he will see that, in the interval from the 28th to the 31st of January, during which the ship experienced the effect of a strong southerly current, she was sailing in the part of that ocean where the waters are confined between the two continents. It is well known that, on the coast of BRAZIL and GUIANA, from Cape St. ROQUE to the ANTILLES, the waters have a constant movement from the south to the north, declining more or less towards the west, according to the direction of the land.

As no observations were made for the longitude since the time of the departure being taken from LA PRAYA, it cannot be known whether the current which set to the northward, set at the same time to the eastward or westward; it might be presumed that its direction was rather towards this latter side, first, because it is well known that the waters, between the tropics, have a general tendency from east to west, and in the second place, because the observations which were made on the 6th of February following, indicated that, in the interval from the 18th of January to this latter day, the ship's progress towards the west had been greater by  $1^{\circ} 3'$ , or about 21 leagues, than that which was deduced from the dead reckoning.

NOTE

## NOTE VI.

The mean result of four sets of distances of the sun and moon, observed on the 6th of February, at forty-seven minutes past four o'clock in the afternoon and reduced to noon, gave for the longitude of the ship at that moment,  $27^{\circ} 58'$ ; and, on comparing it to that of LA PRAYA  $25^{\circ} 51'$ , it was found that, from the 18th of January to the 6th of February, in nineteen days, the ship's progress towards the west had been  $2^{\circ} 27'$ .

According to the dead reckoning, it had been only  $1^{\circ} 4'$ ; thus the ship had been carried to the westward, beyond the progress by account,  $1^{\circ} 3'$ , or 62 miles.

On comparing the sum of the progress in latitude deduced from observation, with that of the progress by account, it will be found that from the 18th of January to the 5th of February, the ship had been carried to the northward,  $1^{\circ} 34'$ , which are reduced to  $1^{\circ} 30'$ , because, from the 21st to the 22d she had been carried 4 minutes to the southward; and as from the 5th to the 6th of February, she had been also set to the southward, 9 minutes, her relative movement towards the north, in the interval from the 18th of January to the 6th of February, is reduced to  $1^{\circ} 21'$  or 81 miles.

Thus, after having combined the progress in latitude with that which was made in longitude, it is seen that the ship was carried to the north  $37^{\circ}$  west,

west, 103 miles in nineteen days; which gives a mean progress of 5.4 miles in twenty-four hours in that direction.

#### NOTE VII.

Fresh observations for the longitude made on the 7th, 8th, and 9th; namely; on the first day, two sets of distances of the sun and moon; on the second, two others; on the third, two more, gave for each of the days, a result which was reduced to their respective noon.

On comparing the progress towards the west in twenty-four hours, deduced from the observations, with that indicated by the dead reckoning, the following differences were found:

From the 6th to the 7th, the progress by observation was greater than that by account, by 8 minutes;

From the 7th to the 8th, less by 1 minute;

From the 8th to the 9th, greater by 23 minutes;

And in comprising the three days, from the 6th to the 9th, the progress towards the west was greater, according to the observation than according to the dead reckoning, by 30 minutes, or 29½ miles.

The progress towards the south, from the 6th to the 9th, was, daily, greater by observation than by account, by 3 minutes, and 9 minutes, or nine miles, for the three days.

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Thus, in that interval, the ship was carried 31 miles to the west  $28^{\circ}$  south; which gives a mean movement of  $10\frac{1}{2}$  miles in twenty-four hours in this direction.

If, on the 9th the absolute longitude by observation,  $31^{\circ} 8'$ , be compared with the longitude deduced from the dead reckoning, which is  $29^{\circ} 35'$  in reducing the calculations to the longitude of LA PRAYA, it is seen that after twenty-two days' navigation, the accumulated errors in the reckoning produced one of  $1^{\circ} 33'$ , or upwards of thirty leagues, *astern* of the ship's true situation.

#### NOTE VIII.

On the 12th, at nineteen minutes after four in the afternoon, four distances were taken of the sun and moon, and, at night, a set from the moon to  $\beta$  of *Pollux*. The mean between the five results, reduced to noon, gives for the longitude of the ship at that moment,  $33^{\circ} 41'$ ; and in deducting the latter from that of the 9th at noon, there remain  $2^{\circ} 33'$  for the ship's progress towards the west, in the interval of the three days.

This progress, according to the dead reckoning was only  $2^{\circ} 11'$ ; thus, the ship was carried to the westward 23 minutes, or 21.4 miles.

In the same interval, she had been carried to the southward 24 minutes, or 24 miles.

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On combining the movement, we find 32.2 miles to the west  $48\frac{1}{2}^{\circ}$  south; and for the mean drift in twenty-four hours,  $10\frac{1}{4}$  miles.

At the period of the 12th, the dead reckoning was in error respecting the longitude,  $1^{\circ} 55'$ , or about 37 leagues *astern*.

#### NOTE IX.

The mean result of two sets of distances observed from the moon to *Regulus*, and from the moon to *Aldebaran*, on the 15th, at half past eight o'clock in the evening, and reduced to noon of that day, shewed that, since the 12th, the ship's progress towards the west had been  $2^{\circ} 15'$ , but it was only  $1^{\circ} 42'$ , according to the dead reckoning: thus, the ship had been carried to the westward 33 minutes, or 31.5 miles.

In the same interval, according to the observations of latitude, she had been carried 29 minutes, or 29 miles, to the southward, beyond her progress by account towards that side.

On combining these two movements, we find that the compound movement was 42.9 miles to the west,  $42^{\circ} 30'$  south, and the mean drift, 143 miles in twenty-four hours.

#### NOTE X.

Fresh observations made on the 16th, at nine o'clock in the evening (two sets of distances from

the moon to *Aldebaran*, and one to *Regulus*), gave for the longitude reduced to noon,  $37^{\circ} 6'$ ; and consequently,  $1^{\circ} 10'$ , for the progress towards the west, from the 15th to the 16th.

According to the dead reckoning, this progress was only 44 minutes: thus, in twenty-four hours, the ship was carried to the westward, 26 minutes, or 24.5 miles.

According to the observation of latitude, she was at the same time carried to the southward 10 minutes, or 10 miles.

The compound movement was therefore 26.5 miles to the west,  $22^{\circ} 30'$  south.

It is seen that, in these twenty-four hours, the movement towards the west differs greatly, in regard to the movement towards the south, from the agreement that had been remarked during the preceding periods. This difference may be owing to the variation which the current had experienced in its direction and velocity; but it is more probable that it is occasioned by the error in the observations in one of the two days, or perhaps an error in both: it is well known that the *Lunar Method* cannot assign with sufficient precision small differences in longitude for the results that are deduced from them to be, in that case, considered as fixed terms of comparison\*.

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## NOTE XI.

On the 25th, six sets of distances of the sun and moon, observed at seven o'clock in the morning, gave for the longitude at noon,  $47^{\circ} 56'$ : by those of the 16th, at noon, it had been  $37^{\circ} 6'$ : thus the progress towards the west, according to the observations, had, in nine days, been  $10^{\circ} 50'$ .

According to the dead reckoning, it was only  $9^{\circ} 5'$ ; and thence it was concluded that, in the interval, the ship had been carried to the westward  $1^{\circ} 45'$ , or  $94\frac{1}{2}$  miles, beyond the apparent run.

The ship's movement towards the south, beyond the progress indicated by the dead reckoning, had been considerable during this period; according to the daily observations of latitude, it had amounted

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the 14th,  $10'$ ; from the 14th to the 15th,  $14'$ ; from the 15th to the 16th,  $10'$ : its effect in the direction of the latitude therefore experienced no great variations, especially during these last-mentioned days; and it might be supposed that the effect towards the west did not proportionably undergo more considerable ones. We would then say: if, from the 12th to the 15th, with a total effect towards the south of  $29'$ , the ship experienced an effect towards the west of  $33'$ ; with an effect of  $10'$  towards the south, what must have been the effect towards the west? We should find that the last term of this proportion is  $11\frac{1}{2}$  minutes, which must be added to 44 minutes, the ship's progress towards the west, according to the dead reckoning, from the 15th to the 16th: we shall have  $54\frac{1}{2}$  minutes for the presumed progress, smaller by 14 or 15 minutes than that indicated by the observations.



to 20 minutes, from the 17th to the 18th; to 14 minutes, from the 22d to the 23d; to 20 minutes, from the 23d to the 25th. The sum of these differences, relatively to the dead reckoning, was  $1^{\circ} 7'$ , or 67 miles, which she had been carried to the southward.

The combination of these movements for which the dead reckoning had not been able to account, towards the south and towards the west, gives  $115\frac{1}{2}$  miles to the west  $36^{\circ}$  south: and the ship had been carried in that direction at the mean rate of 12.8 miles in the twenty-four hours.

Observations for the longitude, made on the 26th (six sets of distances of the sun and moon, at eight o'clock in the morning), announced that, in the interval from the 25th to the 26th, the calculation of the dead reckoning agreed with the result of the observations.

But the observation of latitude shewed that, in the same interval, the ship had been carried 22 minutes to the southward.

At the period of the 26th, the longitude by account, deduced from that of LA PRAYA, at the expiration of thirty-nine days, was *astern* of that given by the observations,  $4^{\circ} 39'$ , or upwards of 78 leagues on the parallel of the point arrived at.

It may have been remarked that, from the 6th of February, the period at which the ship, having arrived at  $5^{\circ} 30'$  south of the line, had passed beyond

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yond the parallel of Cape ST. ROQUE, whence the eastern coast of SOUTH-AMERICA begins to trend towards the south-west, and extends in that direction as far as the STRAIT OF MAGELLAN, she was constantly carried to the south-west, declining sometimes towards the west, sometimes towards the south, and with degrees of velocity which kept increasing, in proportion as she increased her latitude.

If it be wished to ascertain what was, in the interval of the last twenty days, from the 6th to the 26th of February, the total effect of the setting of the currents on the course and rate of sailing of the ship, we may cast up the sum of the imperceptible progress towards the west, and of that towards the south, which the result of the observations indicated at different periods; it will be seen that the ship was driven out of her apparent course, 161 miles ( $2^{\circ} 41'$ ) towards the south; and 201.3 miles ( $3^{\circ} 47'$ ) towards the west; and on combining these two movements, it will be found that the unperceived mean movement of which these were no more than the decomposition, was 266.6 miles to the south-west  $7^{\circ} 45'$  west: which implies a mean drift, relatively to the duration of the period, of  $13\frac{1}{2}$  miles, in twenty-four hours in that mean direction.

## NOTE XII.

The mean result of four sets of distances of the sun and moon, observed on the 8th of March, at fifty-two minutes past three o'clock in the afternoon, and reduced to noon of that day, gave for the longitude of the ship,  $48^{\circ} 6'$ ; and on comparing it with that which had been obtained on the 26th of February by six sets of similar observations, and which was  $48^{\circ} 23' 30''$ , it will be found that, in the interval of ten days, the ship had *been driven back to the eastward*,  $17\frac{1}{2}$  minutes, or  $14\frac{1}{2}$  miles.

But, on decomposing the different courses which the ship had followed in this same space of time; and on calculating according to the apparent degrees of velocity with which she had run them, it will be seen that she ought to have advanced 173 miles, or  $3^{\circ} 29'$ , to the westward; and this is the difference which is to be found between the longitude *by account* of the 26th of February,  $43^{\circ} 44'$ , and that of the 8th of March,  $47^{\circ} 13'$ .

The sum of the apparent progress towards the west and of the real progress towards the east ( $3^{\circ} 40' 30''$ , or 187.5 miles) is the difference between the result of the observations made on the two extreme days of the period, and that of the calculations of the dead reckoning in the interval of the ten days.

The ship's progress in latitude towards the south was, in the same interval, according to the observations,

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ations,  $4^{\circ} 18'$ , or 258 miles, and that which the dead reckoning would have given, would, by the accumulation of its daily errors, have been greater than the observed progress, by  $1^{\circ} 20'$ , or 80 miles: but it was corrected by every observation of latitude; and the *true* latitude was daily employed as an element in the calculations of the dead reckoning.

If, with the real progress towards the south, 258 miles, and the estimated or apparent progress towards the west, 173 miles, if it be wished to ascertain what were the apparent course and rate of sailing of the ship, it will be found that she appeared to run 311 miles to the south  $33^{\circ} 45'$  west; while in reality, with the same progress of 258 miles to the southward, and the progress by observation of  $14\frac{1}{2}$  miles to the eastward, she advanced  $258\frac{1}{2}$  miles to the south  $3^{\circ} 15'$  east.

Thus, the effect of the currents, in ten days, occasioned an error of  $37^{\circ}$  on the angle of the course.

It occasioned another error of  $187\frac{1}{2}$  miles (or  $3^{\circ} 46' 30''$ ) in the ship's progress in longitude. This effect of the currents carried the ship only  $17\frac{1}{2}$ , or  $14\frac{1}{2}$  miles to the eastward of the position she was in on the first day of the period; because the action of the wind which drove her to the westward, nearly balanced that of the body of the waters which carried her to the eastward; and the  $14\frac{1}{2}$  miles express the excess of the strength of the

current beyond that of the wind, relatively to the progress in longitude; but its absolute strength, with respect to this same progress, or the error of the dead reckoning, is expressed by the whole of the 187 miles of difference between the sum of the progress by account each day of the period, and the real progress deduced from the observations made on the first and last day.

It has been seen that, while the ship was carried to the eastward, she was also carried to the northward, and that the sum of the daily errors of the dead reckoning with respect to the progress in latitude, gives a total error of  $1^{\circ} 20'$ , or 80 miles in excess, towards the south. If we combine the 80 miles which the ship was carried to the northward, with the  $187\frac{1}{2}$  miles which she was carried to the eastward, it will be found that, by an unperceived effect which must have escaped the calculations of the dead reckoning, the setting of the currents had caused the ship to make, in the interval of ten days, 204 miles in the direction of east  $23^{\circ}$  north. In dividing the number of miles by that of the days of the period, we shall have for the mean degree of velocity which the current impressed on the ship in twenty-four hours,  $20'.4$ , or upwards of  $6\frac{1}{2}$  leagues.

Thus, the currents which, from the 6th of February, when the ship had reached the latitude of  $5^{\circ} 40'$  south, and the longitude of  $28^{\circ}$  west, till the 26th of the same month, when she had arrived at

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at the latitude of  $32^{\circ} 30'$ , and longitude of  $48^{\circ} 20'$ , had constantly set to the southward and westward, from the latter day, set, with considerable strength, to the northward and eastward.

Although, in the course of this period, the SOLIDE had sometimes contrary and rather strong winds, at other times calms, and almost always a swell which came from the west and south-west; yet it is not solely to the difficulty of correctly estimating the course and rate of sailing of the ship in similar circumstances, that we may attribute the whole amount of the partial errors respecting the latitude, which the daily observations caused to be discovered, or the total error respecting the ship's progress in longitude, which the observations of the last day of this period brought to light. We must therefore seek another cause for these errors; and we find it if we cast our eyes on the SOUTH ATLANTIC OCEAN, and there set off the ship's place on the first and last day of this period.

On the 26th of February, in  $32^{\circ} 30'$  south latitude, the ship was in  $48^{\circ} 23' 30''$  west longitude, and on the 8th of March, in latitude  $36^{\circ} 48'$ , in  $48^{\circ} 6'$  longitude: thus, in her route, she had, within a few minutes, followed a meridian: she had run  $258\frac{1}{2}$  miles to the south  $3^{\circ} 30'$  east. The meridian on which the balanced effect of the wind and current had nearly kept her, is only about a hundred leagues distant from that of the vast mouth

mouth of the great River of LA PLATA, the middle of which is situated on the parallel of  $35^{\circ} 30'$ , and which occupies  $1^{\circ} 40'$  in latitude, if we measure this mouth between Cape ANTONIO, to the south, and Cape SANTA MARIA, to the north: now, from the 26th of February to the 8th of March, the ship had sailed between the parallels of 32 and 37 degrees; she therefore crossed the strength of the current whose effect, in issuing from the RIO DE LA PLATA, extends, like that of the MARAÑON, or River of the AMAZONS, to a great distance at sea; and as this current sets to the eastward, declining towards the north, it is not astonishing that the ship should have been carried in a direction analogous to that of the movement of the waters, and with a degree of velocity proportionate to that of the current, or rather to the excess of the strength of the latter beyond that of the wind which drove the ship in an opposite direction.

It might be imagined that the strength of the current for carrying the ship to the eastward, was greater on the last days of the period, than on the first, were we to judge by that with which she was driven to the northward; for it may be seen in the JOURNAL OF THE ROUTE, that, from the 5th to the 7th of March, her progress in latitude, according to the dead reckoning, ought to have been no more than 12 minutes towards the north, and that, according to the observations it was  $1^{\circ} 4'$ , which proves that, in two days, the

ship, by an imperceptible movement, had been carried 52 minutes, or  $17\frac{1}{2}$  leagues to the northward. But I remark that, on the 5th, the ship was, according to the observation of that day, in latitude  $37^{\circ}39'$ , that is, about  $1^{\circ}30'$  more southerly than the parallel of Cape **SANT ANTONIO**, the south point of the mouth of the **RIO DE LA PLATA**; and that it is from this position that, in the interval from the 5th to the 7th, as was shewn by the observation of this latter day, that she was carried by the movement of the waters, 52 minutes to the northward: which again placed her 25 minutes only to the southward of the parallel of Cape **SANT ANTONIO**: she had therefore passed beyond the parallels of the mouth of the river, when she experienced this second movement towards the north; and it is presumable that the great effect of the current of the **RIO DE LA PLATA** for setting to the eastward, must be principally felt when a ship is crossing the parallels between which its mouth is situated. This current towards the north might therefore be an accidental current, a consequence of winds from the southern quarter which had previously reigned, as the swell from the southwest seemed to indicate.

But the effect of the accidental current ceased on the 8th; for the result of the observation of latitude on the 9th, compared with that of the dead reckoning, proved that, from the 8th to the 9th, the ship had been set to the southward 26 minutes,



minutes, or  $8\frac{2}{3}$  leagues, beyond the progress by account: and from the 10th to the 11th, the error in the same direction was 38 minutes, or  $12\frac{2}{3}$  leagues.

Let us at present examine how the longitude by account according to the calculation of the ship's run from LA PRAYA, whence her departure was taken on the 18th of January, agreed, on the 8th of March, with the longitude deduced from the observations of that day.

It will be seen in the JOURNAL OF THE ROUTE, that the longitude by account which, on the 26th of February, was *astern* of the longitude by observation,  $4^{\circ} 39'$ , differs from it in the same direction, on the 8th of March, no more than 53 minutes. This approximation is the effect of the error of  $3^{\circ} 46'$  *abead*, which was committed in the dead reckoning in the interval from the 26th of February to the 8th of March; the diminution of the error is therefore the effect of a compensation which the opposite currents effected without the knowledge of the navigator; but it is not, on that account, less evident that the sum of the absolute errors of the dead reckoning, in the one direction or in the other, in forty-nine days, is nearly *eight degrees and a half*.

NOTE

## NOTE XIII.

The longitude deduced for the noon of the 10th, by four sets of distances of the sun and moon, observed in the afternoon, and two sets of distances from the moon to  $\beta$  of *Pollux*, observed in the evening, was, by a mean, found to be  $53^{\circ} 16'$ ; and in comparing it to the longitude observed on the 8th,  $48^{\circ} 6'$ , the ship's progress towards the west was, in the interval of the two days,  $5^{\circ} 10'$ .

It is only  $4^{\circ} 56'$ , by the dead reckoning: thus the ship was carried 14 minutes, or 11 miles, to the westward.

The ship's progress in latitude towards the south, in the same space of time, was greater by observation than by dead reckoning, by 29 minutes, or 29 miles.

On combining the difference towards the west with the difference towards the south, it will be found that the current which drove the ship out of her apparent course, carried her in the direction of south  $20^{\circ} 45'$  west, at the rate of 31 miles, in two days, or of  $15\frac{1}{2}$  miles in twenty-four hours.

By going through the same operation for the following days, and comparing the results of the observations with those of the dead reckoning, as well for the progress in longitude as for the progress in latitude, it will be found:

That, from the 11th to the 12th, the ship appears to have been carried 44 minutes, or 34 miles,

to the west, and 38 minutes, or 38 miles to the south; which gives south  $42^{\circ}$  west:

That, from the 11th to the 12th, she was carried 24 minutes, or 18.5 miles to the east; and 4 minutes, or 4 miles to the north; which gives 18.6 miles to the east  $12^{\circ} 30'$  north.

And that, lastly, from the 12th to the 15th, she was carried 1 minute, or 1.76 miles to the west, and 23 minutes, or 23 miles, to the north; which gives 23 miles to the north 1 or  $2^{\circ}$  west, and 7.6 miles as the mean drift in twenty-four hours.

The action of the currents, in the direction of the longitude, appears neither to have been considerable nor constant in the interval from the 8th to the 15th of March; for the sum of the differences towards the west, between the observation and the dead reckoning, is only 45.75 miles, 18.5 of which were done away by a difference of the same quantity towards the east; and there remain only 27.25 miles, or 35 minutes, for the excess of the sum of the differences towards the west. Lunar observations, made with sextants, as was the case on board of the *SOLIDE*, may leave an uncertainty of about half a degree respecting the correctness of the results: and, short of that term, we may be in doubt whether the error belong to the dead reckoning or to the observation.

But the action of the currents, in the direction of the latitude, is not doubtful, because the observations

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vations which determine it, leave not more than 2 or 3 minutes of uncertainty respecting their results: now, the currents acted in this direction with rather considerable strength, and in an inverse direction to each other. From the 8th to the 10th, they carried the ship 29 minutes, or 29 miles to the south, and from the 10th to the 11th, 38 minutes towards the same side: they afterwards carried her to the north, from the 11th to the 12th, 4 minutes, and from the 12th to the 15th, 23 minutes.

Here then, in the first three days, from the 8th to the 11th, is an unperceived movement of a degree, or 60 miles, towards the south; and I observe that, if we judge from the result of the observations compared with that of the dead reckoning in the same days, the ship was carried at the same time towards the west 58 minutes, or 45 miles: thus we here find again the setting of the currents such as we had previously remarked in the part of the SOUTH ATLANTIC OCEAN which the SOLIDE crossed, where the currents that set to the *southward* set at the same time to the *westward*, and where their tendency towards the former side, which it is easy to ascertain by the observation of the latitude, announces their tendency towards the latter, respecting which it is not so easy to determine their effect.

From the 11th to the 12th, their tendency was towards the north and towards the east, and the ship

ship was carried 4 miles on the former side, and 18.5 on the latter.

But, from the 12th to the 15th, their effect is nearly null in the direction of the longitude, and their action only carries the ship 23 miles to the northward.

The SOLIDE, on these last-mentioned days, and for some time past, was sailing at a distance from the land which did not exceed 100 leagues; she must have experienced all the variations of the current that depend on the winds which reigned or on those which are reigning, and on the action of the tides, combined with that of the particular currents of the coasts: for it is well known that, in the vicinity of lands, and especially of great continents, the currents vary infinitely in their velocity and direction; that those which are produced by the winds change their direction with them, without in other respects changing their extent and velocity; and that, in short, currents are met with setting in a contrary direction, which are occasioned by the horizontal oscillations of the open sea in the flux and reflux.

#### NOTE XIV.

From the 15th to the 22nd of March, the observations of latitude shewed that the ship was daily carried to the northward: the sum of these movements, contrary to the apparent course, amounted

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to  $1^{\circ} 12'$  on the 22d at noon, that is to say, after an interval of seven days: during the last three days, the movement had been 19, 21, and 12 minutes in twenty-four hours; but, on the 23d, it was discovered that, from noon of the day before, the currents had ceased to set to the northward; and that, on the contrary, they had set 12 minutes to the southward.

It was expected that, since the tendency of the currents had, in general, been to the northward with a rather considerable degree of velocity, they would have set at the same time to the eastward; and the result of the observations for the longitude which were made on the 23d at twenty-eight minutes past seven o'clock in the morning (a set of distances observed from the moon to  $\alpha$  of *Aquila*.) confirmed what had been prejudged from the experience of the run.

On comparing the result of the 23d to that of the 15th of the same month, it will be found that, in the interval of eight days, the progress towards the west was  $4^{\circ} 29'$ ; but, according to the dead reckoning, it ought to have been  $5^{\circ} 43'$ : thus the ship had been carried to the eastward by the setting of the currents,  $1^{\circ} 14'$ , or 58.4 miles.

It has been seen that, in the same interval, she had been carried by the same action, 1 degree, or 60 miles to the northward, deducing the 12 minutes which she had been carried to the southward on the last day of the period.

Thus the velocity of the movement which the current had impressed on the ship was 83.75 miles in eight days, in the direction of north  $44^{\circ} 15'$  west, and her mean drift in twenty-four hours, 10.4 miles.

#### NOTE XV.

Four sets of distances of the sun and moon, observed on the 25th at thirty-four minutes past eight o'clock in the morning, gave for the longitude at noon,  $63^{\circ} 23'$ : and as that of the 23d was  $62^{\circ} 15'$ , the progress towards the west, in two days, had been  $1^{\circ} 8'$ .

That which was indicated by the result of the dead reckoning, for the same interval, was only 18 minutes: thus the unperceived movement of the ship towards the west had been 50 minutes or 36 miles.

According to the observations of latitude, the ship had been carried, during the same time, 11 minutes, or 11 miles to the northward.

Thus the compound effect of the current had caused the ship to make 37 miles in the direction of west  $13^{\circ} 15'$  north, at the mean rate of 18.5 miles in twenty-four hours.

#### NOTE XVI.

By two sets of distances of the sun and moon, on the 27th at  $9^h 1' 40''$  A. M. and the result of which

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which was reduced to noon, it was found that, from noon of the 25th, the ship's progress towards the west had been  $1^{\circ} 25'$ .

According to the dead reckoning, it ought to be  $2^{\circ} 11'$ : thus, the currents had carried her 46 minutes, or 82.2 miles to the eastward.

The progress in latitude towards the south was greater according to the observation than according to the dead reckoning, by 2 minutes or 2 miles.

The effect of the current is therefore represented by 32.3 miles in the direction of east  $3^{\circ} 30'$  south; and the mean drift of the ship, in that direction, was 16.1 miles in twenty-four hours.

#### NOTE XVII.

The result of four sets of distances from the moon to the sun, and of one set from the moon to *Antares*, observed on the 28th and reduced to noon, shewed that, from the 27th to the 28th, the progress towards the west had been 20 minutes: it therefore was 24 minutes according to the dead reckoning: thus the difference was only 4 minutes or 2.5 miles.

The progress towards the south was smaller according to the observation than according to the reckoning by 5 minutes or 5 miles.

These differences are too small for us to be able thence to draw any conclusion relatively to the



effect of the currents: the result of the calculation merely indicates an unperceived movement in twenty-four hours of 5.6 miles to the north  $26^{\circ} 36'$  east.

#### NOTE XVIII.

On reducing to noon of the 30th the result of four sets of distances of the moon from the sun, and of one set from the moon to *Antares*, observed that same day, it was found that, since noon of the 28th the progress towards the west had been  $2^{\circ} 33'$ ; and that indicated by the dead reckoning was the same.

But the progress towards the south, in the interval of the two days was greater according to the observations than according to the dead reckoning, by 22 minutes, or 22 miles.

It thence results that the ship had been carried 22 miles in two days, or 11 miles in twenty-four hours.

It is seen that, from the 23d the setting of the currents and their effect on the ship's course, no longer indicate the same directions as those which had been remarked in the early part of the run, after the ship had reached the latitude of  $5^{\circ}$  south. But the irregularities which are observed at present will no longer occasion surprise, if we consider the disposition of the lands to the eastward of which the *SOLIDE* recently sailed: they here form a long gulf, at the southern extremity of which is situated the

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the STRAIT OF MAGELLAN; and to the eastward of this strait lies the archipelago of FALKLAND'S Islands which forms with the coast of the continent a channel eighty leagues in width. Since the 17th of the month, the ship had reached the 60th meridian west, and, on that very day, had begun to strike soundings in seventy fathoms: having arrived at this longitude, she sailed at too small a distance from the land, for her to feel the general effect of the currents which act in the open sea; and she must have experienced the irregularities, the variations of those which the oscillations of the sea impelled horizontally by the alternate motion of the flux and reflux, the little depth of the waters, the inequalities of the bottom, as well as the disposition and configuration of the lands, must necessarily produce in a tract of sea where so many causes of irregularity, which may either act separately or combine their effects, are thus united.

## NOTE XIX.

It had been observed that, from the 28th, the currents set to the *Eastward* at the same time that they set to the *Southward*: and the observations of the 30th having shewn that this tendency to the southward continued, it was judged that that which the waters had at the same time kept to the eastward might probably not cease while the ship was crossing the parallel of the mouth of the

STRAIT OF MAGELLAN: it was, in consequence, decided, that, in the dead reckoning till she came within sight of STATEN LAND which Captain MARCHAND intended to make, 15 minutes per day should be allowed for the effect of the currents, that is, that 15 minutes should be deducted from the daily progress to the westward which the calculations of the ship's run might appear to indicate.

On the 1st of April, at noon, STATEN LAND was discovered from the tops; but it was not till four o'clock in the afternoon that Captain MARCHAND very plainly distinguished Cape SAN JUAN, the most eastern point of that land, which bore south 1 or 2° west, at the distance of thirteen or fourteen leagues estimated by the eye.

On adopting the longitude of that cape, such as it was determined in Captain COOK's second voyage\*, 296° 13' east from GREENWICH, or 66° 7' 15" west from PARIS, that of the ship, according to the bearings, should not differ from it in a quantity to which it is necessary to pay attention; and we may consider the SOLIDE as being, at four o'clock, under the very meridian of Cape SAN JUAN.

From noon on the 30th of March till four o'clock on the 1st of April, the progress in lon-

\* See *The original Astronomical Observations made in the course of a Voyage towards the South Pole and round the World, &c.* by W. Wales, London, 1777, 4to. page 329.

gitude, such as it was indicated by the dead reckoning, uncorrected, was 43 minutes towards the east; and by deducting that quantity from  $67^{\circ} 41'$ , the longitude by observation of the 30th at noon, that of the 1st of April at four o'clock was  $66^{\circ} 58'$ ; but it ought to have been only  $66^{\circ} 7' 15''$ : thus the error on making the land was 504 minutes *abroad*, or about 10 leagues on the parallel which the ship had reached.

But if, regard being had, as was the case, to the correction relative to the effect of the currents, which the experience of the preceding days had indicated, we add 15 minutes for every twenty-four hours, that is, 30 minutes, from the 30th of March to the 1st of April, to the progress towards the east which the dead reckoning indicated, we shall have  $1^{\circ} 13'$  to deduct from the longitude by observation of the 30th at noon; and that of the 1st of April, at four o'clock, will be  $66^{\circ} 28'$ . Thus the error of this determination, compared with the longitude of Cape SAN JUAN, is only 204 minutes, or about 4 leagues: and, indeed, STATEN LAND was perceived at noon on the first of April, at the moment when the dead reckoning, corrected and deduced from the longitude by observation of the 30th of March, announced that it ought to be discerned.

If, in order to ascertain the effect of the currents in the interval from the 30th of March to the 1st of April, we compare the longitude by

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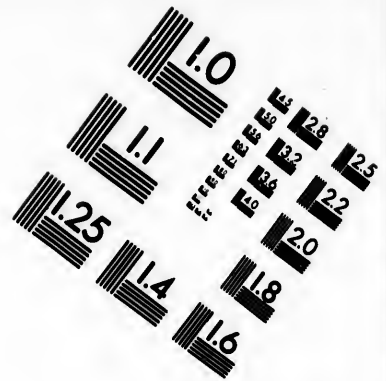
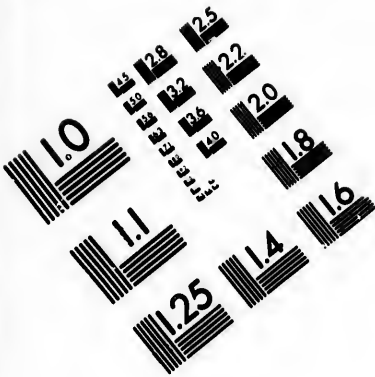
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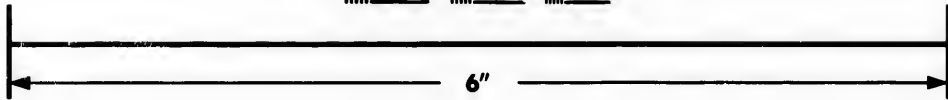
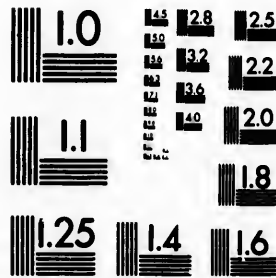
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observation of the 30th at noon,  $67^{\circ} 41'$ , with  $66^{\circ} 8'$ , the longitude of the 1st of April at noon, according to the bearings of Cape SAN JUAN, taken at four o'clock; it will be seen that the progress towards the east was  $1^{\circ} 33'$ : and according to the dead reckoning, it ought to have been only 42 minutes: thus the ship was carried, by the currents, 57 minutes, or 30.8 miles to the eastward.

On comparing with each other the latitudes by observation and those by account on these two days, we find that the ship was carried to the northward 1 minute from the 30th to the 31st, and from the 30th to the 31st, 11 minutes: in all 12 minutes.

Thus, in the interval of the two days, the movement of the waters caused the ship to make 33.25 miles in the direction of east  $17^{\circ} 30'$  north, at the mean rate of 16.6 miles in twenty-four hours.

It is seen that, from the 25th of March to the 1st of April, between the parallels of 44 and 54 degrees, and between the 63rd and the 66th meridian west, the direction of the currents was constant towards the east, declining sometimes towards the south, sometimes towards the north. If we wish to comprize in a single calculation this whole period, in order to know what was, pending its duration, the mean effect of the currents on the ship's course; it will be found that she was carried,  
in



in the interval of seven days, 7 miles to the southward, and 65.5 to the eastward: and on combining these two elements, it will be seen that she was carried 66 miles in the direction of east  $6^{\circ} 15'$  south, at a mean rate of  $9\frac{1}{2}$  miles in twenty-four hours.

The longitude by account, such as it was deduced from the calculation of the ship's run from LA PRAYA, whence her departure was taken, on the 18th of January, till she came within sight of STATEN LAND, on the 1st of April at noon, was  $66^{\circ} 45'$ : and if we thence deduct 1 minute for the progress towards the east from noon till four o'clock on this latter day, we shall have  $66^{\circ} 44'$  for the longitude by account at the moment of taking the bearings, which placed the ship under the meridian of Cape SAN JUAN, and consequently in  $66^{\circ} 7'$ . Thus the dead reckoning, at the time of making the land, was in error only 37 minutes, or about 7 leagues *abead*. But the following Table will shew that this exactness is not a proof that the ship's course and distance run were well calculated in the course of the run; it is solely due to compensations, by means of which, by a fortunate chance, great errors in one direction were done away by equal errors in an opposite direction.

After

After having deducted from the sum of the differences *plus*, or in excess, which is  $7^{\circ} 6'$ , that of the differences *minus*, or in defect,  $6^{\circ} 29'$ , the error of the dead reckoning on making the land is reduced, by the chance and effect of compensations \* to 37 minutes in excess, or *ahead* of the ship.

But the sum of the errors, in the one direction or in the other, was  $13^{\circ} 35'$  in the course of a run of seventy-three days. A time-piece or chronometer, such as those which are at this day to be procured in FRANCE, would not have left, at the close of this period, an uncertainty of a quarter of a degree respecting the longitude which it would have indicated: and in all cases, the error that may be apprehended from the method of distances from the moon to the sun or stars, commonly called the lunar method, will not amount to half a degree, if, in taking the observation, the navigator make use of BORDA'S reflecting circles.

I insist, and shall never cease to insist, on this comparison of the result of the common methods with that of the new: we cannot too frequently repeat, that if, at the end of the eighteenth century, when men of science and artists have employed themselves, with so much success, concerning the problem of the longitude at sea, seamen know not how to guard against great errors

\* See Vol. I. page 3, Note \*.

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[April 1791.

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# TABL

*Of the progress in Longitude  
by the Dead Reckoning  
STATEN LAND.*

PERIODS OF THE OBSERVATIONS.	La Ob St
1791.	o
January	At
From the 18	14
February	
to the 6th	5
From the 6th to the 7th	7
from the 7th to the 8th	8
from the 8th to the 9th	10
from the 9th to the 12th	16
from the 12th to the 15th	18
from the 15th to the 16th	20
from the 16th to the 25th	31
from the 25th to the 26th	32
from the 26th	
March	
to the 8th	30
from the 8th to the 10th	31
from the 10th to the 11th	40
from the 11th to the 12th	44
from the 12th to the 15th	44
from the 15th to the 23d	44
from the 23d to the 25th	44
from the 25th to the 27th	44
from the 27th to the 28th	44
from the 28th to the 30th	5
from the 30th	
April	
to the 1st	5
In	

# TABLE OF COMPARISON

of the progress in Longitude deduced from the Observations, with that given by the Dead Reckoning, in the Run from the CAPE DE VERD Islands to STATEN LAND.

PERIODS OF THE OBSERVATIONS.	Latitude by Observation SOUTH.	Longitude by Observation WEST.	Progress in Longitude in the interval of the Observations, according to OBSERVATION.	Progress in Longitude in the interval of the Observations, accord <sup>d</sup> . to the DEAD RECKONING.	Differences of the Progress towards the West accord <sup>d</sup> . to the D. Reckoning, compared to the Progress accord <sup>d</sup> . to the Observations.	Interval of the Observation.
1791. January from the 18	0 1 <i>At La. Saya.</i> 14 53 N.	0 1 <i>I. St. Jago.</i> 25 51	0 1	0 1	0 1	DAYS.
February to the 6th	5 38 S.	27 58	} 2 7 W.	1 4 W.	- 1 3	In 19.
from the 6th to the 7th	7 00	28 52		0 54 W.	0 46 W.	- 0 8
from the 7th to the 8th	8 55	29 48	0 56 W.	0 57 W.	+ 0 1	In 1.
from the 8th to the 9th	10 43	31 . 8	1 20 W.	0 57 W.	- 0 23	In 1.
from the 9th to the 12th	16 10	33 41	2 33 W.	2 11 W.	- 0 22	In 3.
from the 12th to the 15th	18 53	35 56	2 15 W.	1 42 W.	- 0 33	In 3.
from the 15th to the 16th	20 1	37 6	1 10 W.	44 W.	- 0 26	In 1.
from the 16th to the 25th	31 45	47 56	10 50 W.	9 5 W.	- 1 45	In 9.
from the 25th to the 26th	32 30	48 23	27½ W.	27 W.	0 00	In 1.
March						
to the 8th	36 48	48 6	0 17½ E.	3 29 W.	+ 3 46	In 10.
from the 8th to the 10th	38 44	53 16	5 10 W.	4 56 W.	- 0 14	In 2.
from the 10th to the 11th	40 3	55 51	2 35 W.	1 51 W.	- 0 44	In 1.
from the 11th to the 12th	40 48	56 28	0 37 W.	1 1 W.	+ 0 24	In 1.
from the 12th to the 15th	40 59	57 46	1 18 W.	1 17 W.	- 0 1	In 3.
from the 15th to the 23d	43 26	62 15	4 29 W.	5 43 W.	+ 1 14	In 8.
from the 23d to the 25th	43 55	63 23	1 8 W.	0 18 W.	- 0 50	In 2.
from the 25th to the 27th	47 3	64 48	1 25 W.	2 11 W.	+ 0 46	In 2.
from the 27th to the 28th	47 55	65 8	0 20 W.	0 24 W.	+ 0 4	In 1.
from the 28th to the 30th	51 6	67 41	2 33 W.	2 33 W.	0 00	In 2.
April to the 1st	53 56	66 8	1 33 E.	0 42 E.	+ 0 51	In 2.
	In light of Staten Land.					

PERIODS  
OF THE  
OBSERVATIONS.

1791.

August

From the 21<sup>st</sup> . . . . .  
to the 22<sup>n</sup>

September

From the 1<sup>st</sup> . . . . .  
to the 4<sup>th</sup>

From the 8<sup>th</sup> . . . . .  
to the 19<sup>th</sup>

From the 19<sup>th</sup> . . . . .  
to the 21<sup>st</sup>

From the 21<sup>st</sup> . . . . .  
to the 23<sup>rd</sup>

From the 23<sup>rd</sup> . . . . .  
to the 30<sup>th</sup>

From the 30<sup>th</sup> . . . . .

October

to the 1<sup>st</sup> . . . . .  
From the 1<sup>st</sup> . . . . .

to the 3<sup>rd</sup> . . . . .  
From the 3<sup>rd</sup> . . . . .

to the 4<sup>th</sup> . . . . .

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PERIODS  
OF THE  
OBSERVATIONS.

1791.

August

From the 21st . . . . .  
to the 22nd . . . . .

September

From the 1st . . . . .  
to the 4th . . . . .

From the 8th . . . . .  
to the 19th . . . . .

From the 19th . . . . .  
to the 21st . . . . .

From the 21st . . . . .  
to the 23rd . . . . .

From the 23rd . . . . .  
to the 30th . . . . .

From the 30th . . . . .

October

From the 1st . . . . .  
to the 3rd . . . . .

From the 3rd . . . . .  
to the 4th . . . . .

At four o'clock in  
meridian of the east  
of O. WYTHEE.

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THIRD

MARCHAND'S VOYAGE.

PERIODS OF THE OBSERVATIONS.	Latitude by Observation NORTH.	Longitude by Observation WEST.	Progress in Longitude in the interval of the Observations according to Observation.	Progress in Longitude in the interval of the Observations according to the Dead Reckoning.	Differences of the Progress towards the West, accord- ing to the Dead Reckoning, com- pared to the pro- gress according to OBSERVATION.	Interval of the Observations.
1791.	o /	o /	o /	o /	o /	DAYS.
August	In <i>Tchinkitanay</i> Bay.					
From the 21st . . . . .	57 4	137 59	} 0 49 W.	0 43 W.	- 0 6 W.	1.
to the 22nd	54 35	137 10				
September	In sight of <i>Queen Charlotte's</i> Isles.					
From the 1st . . . . .	52 56	135 35	} 4 55 W.	4 36 W.	- 0 19 W.	3.
to the 4th	49 1	130 40				
	In sight of <i>Berkley</i> Sound.					
From the 8th . . . . .	40 48	128 48	} 10 15 W.	12 3 W.	+ 1 48 W.	11.
to the 19th	30 58	139 3				
From the 19th . . . . .			} 2 30 W.	2 17 W.	- 0 13 W.	2.
to the 21st	29 46	141 33				
From the 21st . . . . .			} 2 14 W.	2 8 W.	- 0 6 W.	2.
to the 23rd	28 30	143 47				
From the 23rd . . . . .			} 5 40 W.	6 W.	+ 0 20 W.	7.
to the 30th	21 2	149 27				
From the 30th . . . . .			} 1 32 W.	1 33 W.	+ 0 1 W.	1.
October						
to the 1st	19 41	150 59	} 8 8 W.	8 00 W.	- 0 8 W.	3
From the 1st . . . . .						
to the 3rd	19 14	155 7	} 2 3½ W.	1 5½ W.	- 0 9½ W.	1½.
From the 3rd . . . . .						
to the 4th	19 6	157 10½				
At four o'clock in the afternoon, on the meridian of the east point of the Island of O. WHYHEE.						

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in their route, it is neither Science nor Art that we must blame, but the unpardonable indifference of those who are either ignorant of them, or call them in question.

## THIRD RUN

*From STATEN LAND to the Islands called  
LAS MARQUESAS de MENDOÇA.*

ON the 1st of April, at noon, the SOLIDE took her departure from within sight of STATEN LAND, in latitude  $53^{\circ} 56'$  south, and longitude  $66^{\circ} 8'$  west.

### NOTE XX.

On comparing to the longitude of the place whence the departure was taken that of the 11th at noon, such as it was deduced from two sets of distances of the sun and moon, observed at four o'clock in the afternoon, that is to say, on comparing  $77^{\circ} 3'$  to  $66^{\circ} 8'$ , we find that, in the interval of ten days, the ship's progress towards the west, was, according to the observations,  $10^{\circ} 55'$ .

But on sailing from the same longitude of the point whence the departure was taken, the sum of the ship's daily progress towards the west, calculated according to the dead reckoning, gives for the total progress,  $13^{\circ} 1'$ : thus the ship was carried to the eastward, and her perceived progress towards the west, diminished,  $2^{\circ} 6'$ , or 68.6 miles.

At

At the same time she was carried to the northward, beyond the progress by account towards that same side, 28 minutes, or 28 miles.

The movement of the waters therefore caused her to make, in ten days, 73.5 miles to the east 22° 30' north, at the mean rate of  $7\frac{1}{2}$  miles in twenty-four hours.

In the interval from the 1st to the 11th of April, the ship had doubled Cape Horn without going in sight of it, after having got nearly as high as the parallel of 60°.

NOTE XXI.

The result of the observations for the longitude made on the 19th (a set of distances from the moon to *Spica Virginis*), reduced to noon of that day, and compared to the longitude on the 11th at noon, gives for the ship's progress towards the west, in the interval from the 11th to the 19th 16° 16'; and that which was deduced from the dead reckoning, being only 14° 7' the difference of these two progresses, 2° 9', or  $71\frac{1}{2}$  miles, is the quantity which the currents had carried the ship towards the west beyond her perceived movement.

The comparison of the latitudes observed with those which were deduced from the dead reckoning, proved that, in the same space of time, the ship was carried to the southward, and the progress

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gress by account towards the north diminished  $1^{\circ} 10'$ , or 80 miles: and of this quantity, 36 minutes belong to the interval from the 11th to the 18th, and 40, to that from the 16th to the 18th.

The direction impressed on the ship by the current was therefore south  $41^{\circ} 45'$  west, and the distance run in that direction was  $107\frac{1}{2}$  miles; which gives a mean rate of 13.4 miles in twenty-four hours.

We here find again the setting of the currents the same as it was observed in the SOUTH ATLANTIC OCEAN, when the ship sailed at a sufficiently great distance from the land not to feel the action of the currents of the coast, or of accidental currents: we see that, from the 1st to the 11th of April, at the same time that they set to the *Eastward*, they also set to the *Northward*; and that, from the 11th to the 19th, when they set to the *Westward*, they at the same time set to the *Southward*.

It may be remarked that, from the 1st to the 11th of April, the ship's progress by account towards the west had been *too great* by  $2^{\circ} 6'$ , and that from the 11th to the 19th it is *too small* by  $2^{\circ} 9'$ : it results from this compensation that the longitude by account, deduced from that of Cape SAN JUAN IN STATEN LAND, was, on the 11th, in error  $2^{\circ} 9'$  towards the *West*; and that, on the 19th, it was in error 3 minutes towards the *East*:

thus

thus the chance of compensations brought the longitude by account to agree, very nearly, with that which was deduced from the observations.

## NOTE XXII.

Two sets of distances of the sun and moon, observed on the 24th at thirty-five minutes after eight in the morning, gave for the longitude of that day at noon,  $95^{\circ} 18'$ .

Two other sets observed the next day, at twenty-three minutes past nine o'clock in the morning, gave for the longitude of the 25th, at noon,  $96^{\circ} 9'$ .

It results from these observations, that the ship's progress towards the west had been  $0^{\circ} 51'$  in the twenty-four hours; and, according to the dead reckoning, this progress appeared to be only 5 minutes.

If, from the 19th to the 25th, the latitudes observed be compared with those which were deduced from the calculation of the courses which deviated little from the direction of north for a distance of 128 leagues in latitude, it will be remarked, that, with the exception of the interval from the 20th to the 23d, during which the ship was driven back to the southward, 17 minutes in three days, or  $5\frac{1}{2}$  minutes in twenty-four hours, the difference between the result of the dead reckoning and that of the observation, in all the other days

days of the period, was almost nothing; and it may be concluded that the currents, if any existed, acted but with little strength, and only in the interval from the 20th to the 23d: it may therefore be admitted too that, in that from the 24th to the 25th, when the difference between the latitude by account and the latitude by observation is only 1 minute, the currents, acted no more towards the east or towards the west, than towards the north or towards the south; and we are authorized to consider the progress by account of 5 minutes in longitude towards the west as nearly exact, and that of 51 minutes which the observations indicated, as much too great. But as it is not possible to discover whether the error belongs wholly to one of the observations, or whether both participated in it, we deem it expedient to take a mean between the result of the 24th and that of the 25th, admitting as exact the progress by account in longitude in the interval of the two days.

Thus, the longitude by observation of the 24th is  $95^{\circ} 18'$ , add to it the progress by account, 5 minutes, you will have, for the 25th, a first longitude deduced from the longitude observed of the 24th, and it will be  $95^{\circ} 23'$ : take a mean between the latter and that given by the observations of the 25th,  $96^{\circ} 9'$ ; you will have for the latter day, a corrected and mean longitude which will be  $95^{\circ} 46'$ .

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Now, if we compare this last-mentioned longitude with that deduced from the observations of the 19th at noon, we shall find that, in the interval from the 19th to the 25th, in six days, the progress towards the west had been  $2^{\circ} 27'$ : and if we compare with each other the determinations of the dead reckoning for the same days, we see that it indicates a progress of  $2^{\circ} 26'$  in the same direction: the difference therefore is only 1 minute, or two-thirds of a mile on the side of the dead reckoning: thus, it does not appear that, in the interval of these six days, the ship experienced, from the currents, a perceptible derangement in the direction of the longitude; but, in the same space of time, she was carried 17 minutes, or 17 miles to the southward; which indicates, for the direction of the current, south  $2^{\circ} 15'$  west, and for its effect on the ship in that direction, 17.02 miles or 2.84 miles a day.

The longitude by account, deduced from that of Cape SAN JUAN in STATEN LAND, continues, as is seen in the JOURNAL OF THE ROUTE, to agree, within 4 minutes, with that which resulted from the observations; but it is well known that this agreement is the effect of the fortunate compensation that took place, between the error of the former period, from the 1st to the 11th of April, and that which occurred in an opposite direction, in the latter, from the 11th to the 19th of the same month.

## NOTE XXIII.

Observations made on the 8th of May, at forty-eight minutes past eight o'clock in the evening, and reduced to noon of that day, gave  $96^{\circ} 44'$  for the longitude; and other observations made on the 9th at seven minutes after four in the afternoon, and, in like manner, reduced to noon, gave  $96^{\circ} 55'$ : thus, in the interval of twenty-four hours, the ship's progress in longitude was, according to the observations, 11 minutes towards the west. That which was deduced from the dead reckoning, for the same interval, was, on the contrary, 3 minutes towards the east.

As the progress in latitude according to the dead reckoning had differed only by 3 or 4 minutes, from the progress by observation from the 7th to the 8th, and from the 8th to the 9th, it was presumed that the action of the currents had been scarcely perceptible in the last two days of this period, and the progress by account of 3 minutes towards the east in the interval from the 8th to the 9th was admitted.

On applying this progress by account to the longitude by observation of the 8th at noon; which was the mean result of six sets of distances of the sun and moon, a fresh result, which was  $96^{\circ} 41'$ , was had for the longitude of the 9th at noon: then taking a mean between the latter and that of  $96^{\circ} 55'$  given by the observations of the 9th for

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for noon of that same day, we have  $96^{\circ} 48'$ , a mean result which partakes of the observations of the 8th and those of the 9th.

Now, if, by a proceeding similar to that which we have just employed, we compare this latter result with the longitude of the 25th of April,  $95^{\circ} 46'$ , we shall find that, from the 25th of April to the 9th of May, the ship advanced towards the west,  $1^{\circ} 2'$ . But, according to the dead reckoning, this progress ought to be  $3^{\circ} 0'$ : the error of the reckoning was therefore, in fourteen days,  $1^{\circ} 58'$ , or 93 miles *abead*, that is to say that, in this interval, the ship had been carried this latter quantity towards the east: and as the comparison of the latitudes by observation and those by account, announced that, during the same time, she had been carried to the northward a quarter of a degree, or 15 miles, it thence results that the current which had driven the ship from her apparent course, caused her to make  $95\frac{1}{2}$  miles in the direction of east  $9^{\circ} 15'$  north, at the mean rate of 6.8 miles in twenty-four hours.

#### NOTE XXIV.

Two sets of distances of the sun and moon observed on the 12th at twenty minutes past three o'clock in the afternoon, and two sets of distances from the moon to *Spica Virginis*, observed on the evening of the same day, both reduced

to noon, gave, by a mean,  $98^{\circ} 51'$  for the longitude.

On comparing it to that of the 9th at noon,  $96^{\circ} 48'$ , we find  $2^{\circ} 3'$  progress towards the west. The progress by account towards the same side, in the same interval, is  $1^{\circ} 55'$ ; the difference which is only 8 minutes, or 7 miles, would indicate that the ship was driven that quantity towards the west beyond her apparent run: and as the observations of latitude prove that she was, at the same time, carried 10 minutes or 10 miles to the southward, it may be concluded that the effect of the currents was  $12\frac{1}{2}$  miles to the south  $34^{\circ} 45'$  west, and 4 miles in twenty-four hours.

#### NOTE XXV.

On the 23d, a mean between the results of six sets of distances of the sun and moon, observed at thirty-one minutes past eight in the morning, gave for the longitude at noon,  $111^{\circ} 56'$ : that of the 12th at noon, was  $98^{\circ} 51'$ : thus, in the interval of eleven days, the progress towards the west, was according to the observations,  $13^{\circ} 5'$ .

According to the dead reckoning, it was only  $9^{\circ} 53'$ : thus the ship had been carried to the westward  $3^{\circ} 12'$ ; and the error of the reckoning *astern*, had been this quantity, or 173 miles, in the interval of eleven days.

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If we compare the latitudes observed every day with those indicated by the dead reckoning, we shall find that, in the same space of time, the ship was carried by the movement of the waters, 52 minutes, or 52 miles, to the southward.

On combining the 173 miles Westing with the 52 miles Southing, it will be seen that the effect of the current on the ship's course was 180.5 miles, or 60½ leagues, in the direction of west 16° 45' south; and the mean drift 16.4 miles, or about 5½ leagues, in twenty-four hours.

NOTE XXVI.

If we wish to make, for the following days, the 24th, 25th, 26th, and 27th, when sets of distances of the moon from the sun or stars were observed, the same calculations which we made for the 23d, the following results will be found,

From the 23d to the 24th	{ According to the Observations 1° 45' W. { According to the D. reckoning 1° 17' W.	} The ship was carried to the westward in 24 hours... 0° 28'.
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According to the observations of latitude she was carried to the southward..... 0° 16'

From the 24th to the 25th	{ According to the observations 1° 16' W. { According to the D. reckoning 1° 00' W.	} Carried to the westward 0° 16'
---------------------------	--	----------------------------------

According to the observations of latitude

To the southward ..... 0° 14'

From the 25th to the 26th { According to the observations  $0^{\circ} 41' W.$  } Carried to the westward ..  $0^{\circ} 6'$   
 { According to the D. reckoning  $0^{\circ} 35' W.$  }

According to the observations of latitude  
 To the northward .....  $0^{\circ} 2'$

From the 26th to the 27th { According to the observations  $0^{\circ} 56' W.$  } Carried to the westward ..  $0^{\circ} 8'$   
 { According to the D. reckoning  $0^{\circ} 48' W.$  }

According to the observations of latitude  
 To the southward .....  $0^{\circ} 4'$

The sum of the quantities which the ship advanced towards the west beyond the progress by account, from the 23d to the 27th, was  $0^{\circ} 58'$  or 54 miles, and that which she was carried to the southward 26 minutes, or 26 miles: on combining these two sums, we find that the action of the current carried the ship, in the interval of four days, 59 miles, to the west  $23^{\circ} 30'$  south; this is, at the rate of 14.75 miles, or about five leagues in twenty-four hours.

If it be wished to embrace a longer period, that from the 12th to the 27th, it will be found that, in the interval of these fifteen days, the ship was carried to the westward, beyond her apparent progress,  $4^{\circ} 10'$  or 228 miles; and to the southward,  $1^{\circ} 18'$  or 78 miles: and on combining these

two quantities, we find that the error of the course was 242 miles or  $80\frac{1}{2}$  leagues, to the west  $18^{\circ} 45'$  south; which indicates a mean effect of the action of the currents in that direction, of about 16 miles in twenty-four hours.

It is seen, that from the 9th to the 27th, between the parallels of  $30^{\circ}$  and  $19^{\circ} 30'$  south, the currents carried the ship constantly to the southward, at a rate which varied from 4 to 16 miles in twenty-four hours; and it will be recollected that, in the SOUTH ATLANTIC OCEAN, between the same parallels, we had found the same direction in the currents and a velocity which had varied from 10 to 18 miles a day.

It has been seen (Note XXII) that the longitude by account from the time of the ship being in sight of STATEN LAND; according to the calculation of her run, had, on the 25th of April, drawn near the longitude by observation, and, through the effect of compensations, differed from it no more than 4 minutes *astern*; from the 25th of April to the 9th of May (Note XXIII) the error of the reckoning had been  $1^{\circ} 58'$  *abead*, the longitude by account was at this latter period,  $1^{\circ} 54'$  *abead*; but the error having been 8 minutes *astern* from the 9th to the 12th of May (Note XXIV);  $3^{\circ} 12'$ , from the 12th to the 23rd (Note XXV); and 58 minutes, from the 23rd to the 27th; these accumulated errors in the same direction, deducting  $1^{\circ} 54'$  *abead*, produce, on the last day,

day, a total error of  $2^{\circ} 24'$  *astern* in the longitude by account.

#### NOTE XXVII.

On the 6th of June, the mean between the mean results of four sets of distances observed from the moon to the sun, and two sets of distances from the moon to *Spica Virginis*, reduced to noon of the same day, gave for the longitude of the ship, at that moment,  $127^{\circ} 10'$ : and on comparing it with that which had been deduced from the observations of the 27th of May, it is seen that the ship's progress towards the west, had been  $10^{\circ} 36'$ . That which was indicated by the dead reckoning, for the same interval, was  $10^{\circ} 23'$ : thus the difference was only 13 minutes, or 12.5 miles, which the ship appeared to have been carried to the westward beyond the progress by account.

On examining the ship's daily progress towards the north, according to the dead reckoning, and the progress according to the observations, we find that the sum of the former is equal to the sum of the latter: the differences in the one direction and in the other are exactly counterbalanced.

We may therefore conclude that, from the 27th of May to the 6th of June, the currents effected no perceptible change either in the ship's apparent course or rate of sailing: for the 13 minutes, or 12.5 miles, difference towards the west, might proceed

ceed from the observations as well as from the dead reckoning.

The same agreement between the results of the observations and the calculations of the reckoning continued for the two following days.

From the 6th to the 7th, the ship's progress towards the west, according to the observations was  $2^{\circ} 15'$ ; and  $2^{\circ} 14'$ , according to the dead reckoning:

From the 7th to the 8th,  $1^{\circ} 43'$  according to the observations, and  $1^{\circ} 52'$  according to the dead reckoning: the difference therefore is only 9 minutes, but in a contrary direction to those of the preceding days.

The progress in latitude deduced from observation, and compared with that given by the dead reckoning shews that the apparent progress of the ship, in this direction, differed little from her real progress: from the 6th to the 7th, the dead reckoning gives 3 minutes less towards the south than the observation, and 1 minute only from the 7th to the 8th.

It therefore appears that, in the interval of these last two days, the ship experienced no effect from the currents.

#### NOTE XXVIII.

The action of the currents was again felt from the 8th to the 10th.

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Eight sets of distances of the sun and moon observed on the 10th two sets of distances from the moon to *Regulus*, and two others from the moon to *Antares*, gave, by a mean between the three mean results, for the longitude of the ship, reduced to noon of that same day,  $135^{\circ} 52'$ ; and on comparing it with that of the 8th, we find that, in the interval of the two days, the ship's progress towards the west was, according to the observation,  $4^{\circ} 44'$ : it is only  $3^{\circ} 51'$ , according to the dead reckoning: thus, the ship was carried 53 minutes, or about 52 miles, to the westward.

From the 8th to the 10th, according to the observations of latitude, the ship was carried 7 minutes, or 7 miles to the southward: thus the current had caused her to make an imperceptible drift of  $52\frac{3}{4}$  miles to the west, 7 or  $8^{\circ}$  south, or 26 $\frac{1}{2}$  miles in twenty-four hours in that direction.

#### NOTE XXIX.

The observation of latitude of the 11th proved that, in the twenty-four hours which preceded the noon of that day, the action of the currents had again carried the ship 10 minutes to the southward. It had been almost constantly found in crossing the GREAT OCEAN, that, when they set towards the *South*, they also set towards the *West*, and in a more considerable quantity: and as our navigators, the next day, expected to discover the

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June 1791.] MARCHAND'S VOYAGE:

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Islands called LAS MARQUESAS DE MENDOÇA, they judged it expedient to add to the daily progress in longitude which the dead reckoning indicated towards the west, from the time of the observations of the 10th till they made the land, the quantity of 26 minutes in twenty-four hours, in order to compensate for the effect of the currents which they supposed must drive the ship towards that side, in the same proportion as they had carried her thither on the preceding days at the same time that they carried her to the southward.

On calculating the run according to this supposition, they expected to discover the MENDOÇA Islands towards noon of the 12th, and, in fact, at half past ten in the morning of that day, they began to perceive the Island of LA MADALENA, the most eastern and most southern of the group.

At noon, it bore south-west; and the Island of SAN PEDRO bore directly west at the distance of fourteen leagues estimated by the eye.

The longitude of this last-mentioned island, determined by the observations made in Captain COOK's second voyage\*, is 221° 9' east from GREENWICH, or 141° 11' 15" west from PARIS. If we take from this quantity 42 minutes, which

\* See the *Original Astronomical Observations made in a voyage towards the South Pole, &c.* Page 323.

are

are equivalent to the distance of 14 leagues estimated at the time of taking the bearing, we shall have  $140^{\circ} 29' 15''$  for the longitude of the ship which was exactly on the parallel of the island: on adding to the result of the observations of the 10th the progress by account towards the west since that period,  $4^{\circ} 23'$  ( $3^{\circ} 21'$ , according to the dead reckoning, plus 52 minutes for the effect of the current) it will be found that the presumed longitude on making the land was only  $140^{\circ} 15'$ : the error of this determination was therefore  $14\frac{1}{2}$  minutes, which answer to no more than  $4\frac{1}{2}$  leagues; but, according to the calculation of the ship's apparent course and distance, paying no regard to the foreseen effect of a current towards the west, the progress towards that side would, from the 10th to the 12th, have been only  $3^{\circ} 31'$ ; and on adding it to the longitude of the 10th, it would have made only  $139^{\circ} 23'$ : thus the error would have been  $1^{\circ} 6' 15''$  or  $21\frac{1}{2}$  leagues.

In regard to the latitude of SAN PEDRO, the observations of Captain Cook's voyage give for it  $9^{\circ} 59'$ : and this is exactly the same as that which was observed on board the SOLIDE.

Let us see what was the error of the dead reckoning in the interval of the last two days.

On comparing the longitude observed on the 10th with that of the ship at the time of making the land on the 12th, that is,  $135^{\circ} 52'$  with  $140^{\circ} 29'$ , it is seen that the real progress towards the west

west was  $4^{\circ} 37'$ ; but, according to the dead reckoning, it was only  $3^{\circ} 31'$ : thus, in two days, the currents carried the ship towards the west  $1^{\circ} 6'$ , or 65 miles.

The compound and unexperienced movement was therefore 67.25 miles to the west south, and  $33\frac{1}{2}$  miles in twenty-four hours.

Let us examine at present what would have been the error of the dead reckoning on making the land of the MENDOÇA Islands, if, from the time of her being in sight of STATEN LAND, our navigators had adhered to its results, and had not corrected them every day that the state of the weather allowed of determining by observation the longitude of the ship, and of ascertaining the errors which the action of the currents, or any other cause, had introduced in the direction which she appeared to have followed and the distance which she seemed to have run.

PERIODS OF THE OBSERVATIONS.	Latitude by Observation SOUTH.	Longitude by Observation WEST.	Longitude in the interval of the Observations according to OBSERVATIONS.	Longitude in the interval of the Observations according to the DEAD RECKONING.	Errors towards the West D. Reckoning compared to the Progress according to the OBSERVATIONS.	Interval of the Observations.
1791.	0 1	0 1	0 1	0 1	0 1	DAYS.
April	In sight of <i>Stavez Land</i>	66 8	10 55 W.	13 1 W.	+ 2 6	10
From the 1st to the 11th	53 56	77 3	16 16 W.	14 7 W.	- 2 9	8
From the 11th to the 19th	59 44	93 50	2 27 W.	2 26 W.	- 0 1	6
From the 19th to the 25th	52 33	95 46				
From the 25th to the 27th	46 8					
May						
to the 9th	30 12	96 48	1 2 W.	3 00 W.	+ 1 58	14
From the 9th to the 12th	28 25	98 51	2 3 W.	1 55 W.	- 0 8	3
From the 12th to the 23rd	23 5	111 56	13 5 W.	9 53 W.	- 3 12	11
From the 23rd to the 24th	21 54	113 41	1 45 W.	1 17 W.	- 0 28	1
From the 24th to the 25th	21 3	114 57	1 16 W.	1 00 W.	- 0 16	1
From the 25th to the 26th	20 22	115 38	0 41 W.	0 35 W.	- 0 6	1
From the 26th to the 27th	19 32	116 34	0 56 W.	0 48 W.	- 0 8	1
June						
to the 6th	12 10	127 10	10 36 W.	10 23 W.	- 0 13	10
From the 6th to the 7th	11 12	129 25	2 15 W.	2 14 W.	- 0 1	1
From the 7th to the 8th	10 18	131 8	1 43 W.	1 52 W.	+ 0 9	1
From the 8th to the 10th	9 54	135 52	4 44 W.	3 51 W.	- 0 53	2
From the 10th to the 12th	9 59	140 29	4 37 W.	3 31 W.	- 1 6	2

In sight of the *Ile of San Pedro*.

Sum of the errors towards the East..... 0°  
 Sum of the errors towards the West..... 4

Remainder in error towards the East or *after*  
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It is seen that the sum of the errors of the dead reckoning, towards the one side or towards the other, in the space of seventy-three days, is  $12^{\circ} 54'$ : and although some fortunate compensations had taken place, the error at the time of making the land is still  $4^{\circ} 28'$ , or  $87\frac{1}{2}$  leagues to the eastward, that is, *astern* of the true position of the ship: now it is well known that an error *astern* is always dangerous, since it is possible that a navigator may fall in with the land in the night, while he thinks himself still at a distance from it.

NOTE XXX.

The observations made in Captain COOK'S second voyage have given the following determinations for the Islands called LAS MARQUESAS DE MENDOÇA :

Latitude South. Long. west from Paris.

<i>Hood's Island</i> . . . . .	9 26 00 . . . . .	141 12 15
<i>San Pedro or O-Niteïö</i> . . . . .	9 58 00 . . . . .	141 11 15
<i>Santa Chriftiana or Wabi-tabô</i> , at the Harbour of <i>La Madre de Dios</i> . . . . .	9 55 30 . . . . .	141 28 55
<i>La Dominica or O-Hivaböa</i> . . . . .	9 40 37½ . . . . .	141 21 52½
<i>La Madalena</i> . . . . .	10 25 30 . . . . .	141 09 15

No observations were made for determining immediately the longitude of the harbour of LA MADRE DE DIOS in the Island of SANTA CRISTINA,

OBSERVATIONS.	PERIODS OF THE OBSERVATIONS.	Latitude by Observation SOUTH.	Longitude by Observation WEST.	Longitude in the interval of the Observations according to OBSERVATION.	Longitude in the interval of the Observations according to the DEAD RECKONING.	Interval of the Observations.	DAYS.
	0 / 0 / 0 / 0 / 0 / 0 /	0 / 0 / 0 / 0 / 0 / 0 /	0 / 0 / 0 / 0 / 0 / 0 /	0 / 0 / 0 / 0 / 0 / 0 /	0 / 0 / 0 / 0 / 0 / 0 /	0 / 0 / 0 / 0 / 0 / 0 /	
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TINA, to which the others are subjected: but on the days, which preceded, and on those which followed the RESOLUTION'S arrival at this port, Mr. WALES had taken several observations of the moon's distance from the sun, and he reduced them by calculation, and with the help of a *chronometer* to the position of the harbour of LA MADRE DE DIOS\*.

The meridian altitudes of the sun which were employed for determining the latitude of the same harbour, were taken on the 9th and 10th of April 1774 from a quicksilver horizon with a HADLEY'S sextant, and by the back observation: they gave for the latitude of LA MADRE DE DIOS, the former  $9^{\circ} 55' 15''$ , and the latter  $9^{\circ} 55' 45''$ †.

\* See *The Original Astronomical Observations made in a Voyage towards the South Pole, &c.* Pages 322, 323 and 82. The Longitudes are there reckoned from the Meridian of *Greenwich*; we have reduced them to that of *Paris*, admitting this city to be situated  $2^{\circ} 20' 15''$  to the East of *Greenwich*.

† See *The Original Astronomical Observations made in a voyage towards the South Pole*, page 81.

## FOURTH RUN,

*From the Islands called LAS MARQUESAS DE MENDOCA to the NORTH-WEST Coast of AMERICA.*

ON the 20th of June, at eleven o'clock at night, the SOLIDE took her departure from the Harbour of LA MADRE DE DIOS, in  $9^{\circ} 55' 30''$  south latitude, and  $141^{\circ} 28' 55''$  west longitude.

## NOTE XXXI.

On the 22d, in sight of ILE MARCHAND (MARCHAND'S Island) the longitude of the ship, reduced to noon, was determined by six sets of distances of the moon from the sun and two sets of the moon from  $\alpha$  of *Aquila* at  $142^{\circ} 27'$ : thus the progress in longitude towards the west, since the departure taken from LA MADRE DE DIOS, had been  $0^{\circ} 58'$ .

That given by the dead reckoning differed from it only 3 minutes or 2.96 miles in excess.

The latitude by account agreed with the latitude by observation.

It may be concluded from the result of these comparisons, that the currents which had set with a great velocity to the west  $18^{\circ} 30'$  south, while the ship was sailing to the eastward or to windward

of the MENDOÇA Islands, had not been felt while she was standing to the north-west or to leeward of them.

## NOTE XXXII.

Two sets of distances of the sun and moon gave for the longitude of the 24th at noon,  $143^{\circ} 10'$ . And on comparing it with that of the 22nd it is seen that, in the space of two days, the ship's progress towards the west was  $0^{\circ} 43'$ .

That which was indicated by the dead reckoning was only  $0^{\circ} 36'$ : thus it would appear that in two days, the ship was carried to the westward, 7 minutes or 6.9 miles.

According to the observations of latitude, she was carried, in the same space of time, 6 minutes or 6 miles to the southward.

The effect of the currents had therefore been 9.1 miles or 4.56 in twenty-four hours, to the west  $4^{\circ}$  south.

## NOTE XXXIII.

By the observations of the 25th, the longitude of the ship, at noon, was  $143^{\circ} 49'$ ; and her progress towards the west had been, since the 24th, 39 minutes.

It was only 21 minutes, according to the dead reckoning: thus, in twenty four hours, the ship had been carried 18 minutes or 17.8 miles to the westward.



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The observation of latitude shewed that, during the same time, she had been carried 12 minutes or 12 miles to the northward.

Thus her unperceived movement had been 21.5 miles to the west  $33^{\circ} 45'$  north.

At this period our navigators had lost sight of the ILES DE LA RÉVOLUTION (the REVOLUTION Islands), and were on a parallel more northerly by about  $2\frac{1}{4}$  degrees than the most northern part of the group.

#### NOTE XXXIV.

On the 20th of July, four sets of observations of the moon's distance from the sun gave, by a mean, for the longitude of the ship reduced to noon,  $156^{\circ} 2'$ : and on comparing it with that of the 25th of June, we find that, in the space of twenty-five days, the progress towards the west was  $12^{\circ} 13'$ .

According to the dead reckoning, the progress in the same interval had been only  $10^{\circ} 27'$ ; and thence it was concluded that the ship was carried  $1^{\circ} 46'$ , or 101.2 miles to the westward.

If we compare on each day the latitude deduced from observation with that indicated by the dead reckoning, it is seen that the action of the currents carried the ship almost uninterruptedly to the northward, except on the last four days of the period: the ship's imperceptible pro-

gress towards that side was frequently 10, 11, 15, and as much as 16 miles in twenty-four hours. Their sum is  $2^{\circ} 13'$ : and if we thence deduct that of some accidental differences towards the south, amounting to 19 minutes only, there remain 1 degree 54 minutes, or 114 miles, which the currents had carried the ship to the northward.

On combining the two movements, we find that, in twenty-five days, the ship made, by a compound and unperceived movement, 152.8 miles in the direction of north  $41^{\circ} 45'$  west; that is, that her mean drift in that direction was 6.1 miles in twenty-four hours.

It appears therefore, that, in this latitude, contrary to what we had observed in the SOUTH ATLANTIC OCEAN, and in the GREAT AUSTRAL OCEAN, the currents which set to the *Northward*, set at the same time to the *Westward*.

It appears too, as may be seen in the JOURNAL OF THE ROUTE; that errors somewhat considerable in the latitudes took place from the parallel of  $8^{\circ}$  south, as far as beyond the Tropic of CANCER, between  $142^{\circ} 30'$  and  $152^{\circ} 40'$  of west longitude; and that, in crossing this part of the Torrid Zone, the waters, during a month, constantly set to the northward and westward.

But the quantity of the error of the dead reckoning in both directions, such as we have before determined it, does not exactly indicate the quantity which the ship was carried to the westward,

nor that which she was carried to the northward : for it appears by Captain CHANAL's Journal, that being astonished at the constant errors in latitude which had been discovered for some time past, and almost always on the same side, Captain MARCHAND directed that the *half-minute* glass, which is employed in measuring time while the log is measuring the ship's way, should be carefully examined : on comparing it with a watch with a second hand, which was well regulated, it was ascertained that the time which the sand took to run out, was not exactly thirty seconds, as in the former part of the voyage, and that it was too short by 2 or 3 seconds. It resulted from this error of the glass respecting the measure of time, that the ship's way estimated by means of the log, was shorter than the way which she actually made, by about a *twelfth* ; and that the ship's course being between the north and the west, her progress in latitude and longitude according to the dead reckoning, ought to have been smaller by a *twelfth* than that which would have been found if the sand-glass had exactly indicated the duration of thirty seconds.

On applying to the calculations of the dead reckoning the correction required by this acknowledged error, we shall have fresh results.

According to the observations, the progress in longitude, in the interval from the 25th of June to the 20th of July, was  $12^{\circ} 13'$ . The error of

the dead reckoning *in defect* ought to have been only a twelfth of this quantity, that is,  $1^{\circ} 1'$ : we shall find it  $1^{\circ} 46'$ ; therefore there remain still 45 minutes *in defect*, which may be attributed to the action of the currents that set the ship to the westward.

If we examine the error in latitude during the same period, we shall find that the sum of the partial errors (a compensation having taken place between those which, being in a contrary direction, do away each other) is only  $1^{\circ} 54'$  towards the south: but as the ship's real progress in latitude towards the north is, according to the observations of the two extreme days of the period,  $34^{\circ} 24'$ ; the sum of the daily errors of the reckoning, *in defect* or towards the south, ought to have been, in proportion to the error of the half-minute glass, a twelfth of the real progress, that is,  $2^{\circ} 52'$ : however, it is but  $1^{\circ} 54'$ , that is, smaller by 58 minutes than it ought to have been: this diminution can proceed only from a cause, which, acting in a direction contrary to the error of the glass, carried the ship to the northward, and it must be believed that it is the effect of a current, which, in the interval from the 25th of June to the 20th of July, carried the ship 58 minutes towards that side. It will be seen that the tendency of the waters towards the north was constant, from the eighth parallel south to the land-fall on the NORTH-

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WEST coast of AMERICA, in the latitude of  $57^{\circ} 15'$  north.

If, with these new data, 45 minutes, or 43 miles, towards the west, and 58 minutes, or 58 miles, towards the north, which the currents appear to have driven the ship out of her apparent course, it were wished to calculate what were the velocity and direction of her unperceived movement, it would be found that she made 72.3 miles to the north  $36^{\circ} 30'$  west; which gives for the mean drift in that direction 2.9 miles in twenty-four hours.

#### NOTE XXXV.

The mean result of four sets of observations of distances of the sun and moon, gives for the longitude of the 23d at noon,  $154^{\circ} 25'$ ; and on comparing it to that of the 20th, it is seen that the ship's progress was  $1^{\circ} 37'$  towards the east: and, as according to the dead reckoning, this progress appears to have been  $1^{\circ} 40'$ , it follows that, in the space of three days the currents may have carried the ship 3 minutes, or 2.6 miles to the westward.

The comparison of the progress towards the north, according to the observation and according to the dead reckoning, shews that the ship was carried, during the same time, 11 minutes, or 11 miles to the northward.

Thus the unperceived movement was 11.3 miles to the north  $13^{\circ} 15'$  west; and the mean drift in that direction 3.76 miles in twenty-four hours.

The difference between the progress in longitude by observation and the progress by account, is too small for us to be able thence to conclude that the currents set to the westward; but the observations of latitude afforded the certainty that they continued to set to the northward,

#### NOTE XXXVI.

The observations for the longitude and latitude, made on the 24th, lead to a result similar to that of the preceding note.

The progress towards the east, according to the dead reckoning, differs, in the interval from the 23d to the 24th, from that deduced from the observations, only by 2 minutes in excess; that is, that the observation carries the ship 2 minutes, or 1.67 miles, to the westward.

But the observation of latitude proves that, in the same space of time, she was carried 21 minutes, or 21 miles, to the northward.

If we choose to take notice of 1.67 miles to the westward, the unperceived movement in twenty-four hours will have been 21 miles in the direction of north  $4^{\circ} 30'$  west.

NOTE

7° 27':

## NOTE XXXVII.

The longitude for the 26th at noon, deduced from two sets of distances of the sun and moon, was  $152^{\circ} 17'$ : and in comparing it to that of the 24th, we find that the progress towards the east was  $1^{\circ} 15'$ .

The dead reckoning gives for this progress  $1^{\circ} 32'$ . Thus, on comparing it to that of the observation, the ship had been carried to the westward 17 minutes, or 13.6 miles.

According to the observations of latitude she was carried 15 minutes, or 15 miles to the northward.

The unperceived movement in the interval of two days, was therefore  $20\frac{1}{4}$  miles to the north  $42^{\circ} 30'$  west; and her mean drift in twenty-four hours was 10.12 miles.

## NOTE XXXVIII.

The mean result of four sets of observations of distances of the sun and moon, reduced to noon, of the 5th of August, gave for the longitude of the ship at that period,  $143^{\circ} 46'$ ; and on comparing it to that of the 26th of July, we find that, in the interval of ten days, the progress towards the east had been  $8^{\circ} 31'$ :

According to the dead reckoning, it was only  $7^{\circ} 27'$ : the difference,  $1^{\circ} 4'$ , or 43.9 miles, expresses

NOTE

presses the quantity which the ship appears to have been carried to the eastward by the setting of the currents.

It is seen, on comparing on each day the latitude by account with that by observation, that, in the same space of time, she was carried 54 minutes or 54 miles to the northward.

It will be found, by calculation, that the unperceived movement was 69.25 miles to the north  $39^{\circ}$  east; and that the mean drift in that direction was about seven miles in twenty-four hours.

#### NOTE XXXIX.

On the 7th at noon, the latitude, according to observation, was  $57^{\circ} 20'$ ; and on deducing from the longitude observed on the 5th the estimated progress towards the east in the interval of the two days,  $3^{\circ} 50'$ , the longitude of the 7th at noon was  $139^{\circ} 56'$ . In this position, the ship was  $15\frac{1}{2}$  minutes more to the northward, and  $1^{\circ} 40' 15''$  or 94 miles more to the westward than Cape DEL ENGAÑO (COOK'S Cape EDGECUMBE) which ought to have borne east about  $15^{\circ}$  south, at the distance of 18 or 19 leagues.

In this supposition, Captain MARCHAND stood on in the direction indicated, and at half past five o'clock in the afternoon, he perceived the coast of AMERICA.

At



At six o'clock, Cape DEL ENGAÑO bore east  $19^{\circ} 30'$  south, distant 13 or 14 leagues.

From noon till six o'clock, according to the traverse table\*, the ship had advanced 4.89 miles, or  $4' 53''$  towards the south, and 15.34 miles or  $28' 30''$  towards the east.

On subtracting these quantities, the former from the latitude, the latter from the longitude of the ship at noon, we have for her position at six o'clock, Latitude  $57^{\circ} 15' 7''$ —Longitude  $139^{\circ} 27' 30''$ .

Let us see what must be her true situation according to the bearing of Cape DEL ENGAÑO, taken at the same moment.

Since the Cape bore east  $19^{\circ} 30'$  south, distant 13 leagues, the ship was  $13' 13''$  more to the northward than the Cape, and  $1^{\circ} 10' 48''$  more to the westward.

Let us apply these differences to the latitude of the Cape  $57^{\circ} 4' 30''$ , and to its longitude  $138^{\circ} 15' 45''$ , such as they were determined by the observations made in Captain Cook's third voyage †,

\* The ship had run; east  $7^{\circ} 43'$  south, 3 miles—east  $17^{\circ} 30' 10$  miles—east  $24^{\circ} 36'$  south  $3\frac{1}{2}$  miles.

† The original astronomical observations made in a voyage to the Northern Pacific Ocean, &c. page 349. Latitude according to Cook and King  $57^{\circ} 3'$ ; according to Bayly  $57^{\circ} 6'$ —Mean  $57^{\circ} 4\frac{1}{2}'$ . Longitude according to Cook and King,  $224^{\circ} .7$ ; according to Bayly,  $224^{\circ} 2'$ —Mean  $224^{\circ} 4' 30''$  east from Greenwich, or  $138^{\circ} 15' 45''$  west from Paris.

we shall find that the latitude of the ship must be  $57^{\circ} 18' 0''$ , and her longitude  $139^{\circ} 26' 33''$ .

In lieu of these quantities, we have found  $57^{\circ} 11' 7''$  for the one, and  $139^{\circ} 27' 30''$  for the other: the error on making the land was therefore :

In Latitude,  $2' 53''$ , or about 1 league too little to the northward ;

In Longitude  $0' 57''$ , or about one sixth of a league too much to the westward.

Let us examine, at present, what was the error of the reckoning in two days and a quarter, from the 5th at noon, to the 9th at six o'clock in the evening, the period at which the bearings were taken of Cape DEL ENGAÑO.

According to the observations of the 5th and the bearing of the 7th, the ship's progress in latitude towards the north was  $2^{\circ} 6'$ ; and according to the dead reckoning,  $1^{\circ} 40' 7''$  only\*: the difference,  $25' 53''$ , or 25.9 miles, is the quantity which the ship was carried to the northward, by the action of the currents, in the interval of two days and a quarter,

\* From noon on the 5th to noon on the 7th, the progress by account towards the north had been  $1^{\circ} 45'$  (smaller by 23 minutes than the progress by observation in the same interval): from noon to six o'clock in the evening of the 9th, the progress by account towards the south was  $4' 53''$ , which must be deducted from the progress by account towards the north; and the remainder,  $1^{\circ} 40' 7''$ , will be the progress by account towards the same side, from noon of the 5th to six o'clock in the evening of the 7th, the period when the bearings were taken.

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28' 30" from  
the same day

The progress in latitude towards the east, in the same space of time, was  $4^{\circ} 19' 27''$ ; and according to the dead reckoning it is  $4^{\circ} 18' 30''$ \*: the difference therefore is only  $0' 57''$  and may be considered as null.

Thus it is seen that, if, from the 5th to the 7th, the currents carried the ship to the northward 26 miles in 54 hours, or 11.5 miles a day, they produced no material change on the ship's course in the direction of the longitude.

As for the longitude by account given, on making the land, by the dead reckoning, deduced from the Bay of LA MADRE DE DIOS, it was  $138^{\circ} 30'$ , at noon on the 7th, and  $138^{\circ} 11' 30''$  at the moment of the bearing being taken at six o'clock; and as the true longitude at this latter period was  $139^{\circ} 26' 30''$ , the difference was only  $1^{\circ} 25'$  or  $15\frac{1}{2}$  leagues *abead*: I say *abead*, with respect to the land, at which it was intended to touch, and which was situated to the eastward of the ship: but this exactness is the effect of the compensations of partial errors in contrary directions, which took place in the course of the run.

The following table exhibits the partial errors of the dead reckoning in either direction, at the different periods of the observations that were employed for determining the longitude of the ship.

From noon of the 5th to noon on the 7th,  $3^{\circ} 50'$ ; and  $28' 30''$  from noon on the 7th to six o'clock in the evening of the same day.

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PERIODS OF THE OBSERVATIONS.	By Observation SOUTH.	By Observation WEST.	In the interval of the Observations, according to Observation.	In the interval of the Observations, according to the D. Reckoning.	DIFFERENCE, the Observations, compared to the Progress, according to the Observations.	of the Observations.	DAYS.
1791. June.	0 1	0 1	0 1	0 1	0 1		
In the Bay of La Madre & Diaz							
The 20th	9 55½	141 29	0 58 W.	1 1 W.	+0 3 W.		2.
From the 20th to the 22d	9 21	142 27	0 43 W.	0 36 W.	-0 7 W.		2.
From the 22d to the 24th	7 54	143 10					
From the 24th to the 25th	SOUTH.						
From the 24th to the 25th	5 42	143 49	0 39 W.	0 21 W.	-0 18 W.		1.
From the 25th							
July	.....	.....	.....	.....	.....		
to the 20th	NORTH.		12 13 W. (See Note XXXIV.)	10 27 W.	-1 46 W.		25.
From the 20th to the 23d	28 42	156 2		11 28 W.	-0 4 W.		
From the 23d to the 24th	32 10	154 25	1 37 E.	1 40 E.	+0 3 E.		3.
From the 24th to the 26th	34 5	153 32	0 53 E.	0 55 E.	+0 2 E.		1.
From the 24th to the 26th	37 49	152 17	1 15 E.	1 32 E.	+0 17 E.		1.
From the 26th	.....	.....					
August	.....	.....					
to the 5th	55 12	143 46	8 31 E.	7 27 E.	-1 4 E.		10.
From the 5th to the 7th	57 18	139 26½	4 19½ E.	4 18½ E.	-0 1 E.		2½.

At six o'clock in the evening, in sight of Cape del Engano, on the North-west coast of America.

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It is seen that, in the course of this run, the errors of the reckoning respecting the longitude were inconsiderable, either in the one direction, or in the other, and in part counterbalanced each other. The sum of the errors *astern*, relatively to the west, that is to say, the sum of the quantities *minus West* and *plus East*, is  $2^{\circ} 33'$ \*: that of the errors *abead*, or of the quantities *plus West* and *minus East*, is  $1^{\circ} 8'$ : and it is remarkable that the longitude of the point arrived at differing from that of the point of departure, only about 2 degrees (LA MADRE DE DIOS in  $141^{\circ} 29'$  west, and the point from which the bearing was taken Cape DEL ENGAÑO in  $139^{\circ} 26' 33''$  west) the sum of the errors of the reckoning is almost double the difference of the meridians. But if we deduct from the sum of the errors *astern* that of the errors *abead*, there remains, after the compensation, only  $1^{\circ} 25'$  *astern*, a quantity which becomes an error *abead* relatively to the land situated to the eastward of the ship, towards which she is directing her course.

The examination of this run leads us to make a few remarks.

1. From the 25th of June to the 5th of August, the progresses sometimes towards the west, some-

\* I take for the *Difference* from the 24th of June to the 20th of July, that of  $1^{\circ} 46'$ , because this is the error (uncorrected) with which the progress in longitude, estimated in the interval of these two days, was really affected, whatever was the cause of it.

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1791.	PERIODS OF TIME OBSERVATIONS.		by		by		in the interval		of towards the		OBSERVATIONS.
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times towards the east, such as were indicated by the observations, nearly balance each other, and the direct course of the ship deviates little from a meridian; for, according to the observations, the longitude of the 25th of June was  $143^{\circ} 49'$ , and that of the 5th of August,  $143^{\circ} 46'$ : the difference is therefore only 3 minutes, which the ship was less to the westward the last day of this period than the first.

2. From the 24th of June when the SOLIDE had reached the latitude of  $8^{\circ}$  south, till the 7th of August when she arrived at the latitude of  $57^{\circ} 18'$  north, between meridians, the most western of which is  $1^{\circ} 10'$  to the west, and the most eastern  $2^{\circ} 34'$  to the east, of the 142nd meridian west from PARIS, the currents, for forty-four days, constantly carried the ship to the northward beyond her apparent progress.

The daily quantity of this movement varied according to the following indications:

From  $8^{\circ}$  south of the equator, the unperceived movement towards the north was 12—10—15— and 13 miles in twenty-four hours:

From the equator to  $12^{\circ}$  north, 10—5—5—2— 11—6—6 miles:

From  $12^{\circ}$  to  $14^{\circ} 30'$ , little differences of 3 and 4 miles took place in a contrary direction to the former:

From  $14^{\circ} 30'$  to  $26^{\circ}$ , the movement towards the north was 6—9—6—3—16—5 miles per day:

Form

\* See at  
Currents,

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From  $26^{\circ}$  to  $28^{\circ} 40'$ , no difference :

From  $28^{\circ} 40'$ , a difference, in a contrary direction, of 11 miles :

From  $28^{\circ} 40'$  to  $32^{\circ}$ , the daily movement towards the north, 5 or 6 miles :

From  $32^{\circ}$  to  $34^{\circ}$ , 21 miles towards the north :

From  $34^{\circ}$  to  $42^{\circ} 40'$ , 7—8—13—9—15 miles towards the north :

From  $42^{\circ} 40'$  to  $43^{\circ}$ , 1 mile in a contrary direction :

From  $43^{\circ}$  to  $44^{\circ}$ , 8 miles towards the north :

From  $44^{\circ}$  to  $55^{\circ} 1-2\frac{1}{2}$  miles towards the same side :

Lastly, from  $55^{\circ}$  to  $57^{\circ} 15'$ , on approaching the coast, 13 miles a day, towards the north.

If we sum up the daily and unperceived progress towards the north, which took place, in forty-four days, between the parallel of  $8^{\circ}$  south and that of  $57^{\circ}$  north, in a run of  $65^{\circ}$  or 1300 leagues in latitude, we shall find that the sum of these unperceived progresses, occasioned by the action of the currents towards the same side\*, is 253 miles or 84 $\frac{1}{2}$  leagues; and on taking a mean term,  $5\frac{3}{4}$  miles, or near 2 leagues in twenty-four hours.

Some little differences observed in the course of this period of forty-four days, which indicate

\* See at the end of the *Notes*, the *Table of the Effect of the Currents, 4th Run*.

an accidental tendency of the waters towards the *South*, deserve no consideration; for it is not proved that the greater part of these differences do not belong to the observation of latitude, which, as is well known, may leave an uncertainty of 2 or 3 minutes in its result, when the observation is made with a sextant: and we ought not thence to conclude that the general tendency of the waters carried them towards the *North*.

3. It may be remarked too that, from the 22nd of June to the 7th of August, during forty-six days, between the parallels of  $9^{\circ} 20'$  south, and  $57^{\circ} 15'$  north, and between the longitude of  $142^{\circ} 30'$  and  $139^{\circ} 30'$  west (the extreme limits of the progress towards the east and towards the west), the currents constantly carried the ship to the westward, except on one occasion (from the 26th of July to the 5th of August, between  $37^{\circ} 45'$  and  $55^{\circ} 15'$  of north latitude, and  $152^{\circ} 15'$  and  $143^{\circ} 45'$  of longitude) when they carried her to the eastward; 44 miles in ten days. The sum of the quantities towards the west amounts to 144 miles or 48 leagues; which gives for the mean effect of the currents towards that side, a little more than 3 miles in twenty-four hours.

If we combine these 144 miles to the west with the 253 to the north, we find that the compound direction of the currents was north  $29^{\circ} 40'$  west, the way made in this direction 291.5 miles or 97.2 leagues,

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leagues, and the mean drift 6.3 miles in twenty-four hours.

Thus, a navigator who might follow the track of Captain MARCHAND, in the same season, and who should employ for directing his course only the ordinary methods of navigation, might reckon, in general, that the currents carried the ship, by an unperceived movement,  $2\frac{1}{2}$  leagues per day in the direction of north  $30^{\circ}$  west.

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## FIFTH RUN,

*From the NORTH-WEST Coast of AMERICA  
to the SANDWICH ISLANDS.*

### NOTE XL.

ON the 21st of August, the SOLIDE took her departure from TCHINKITANAY Bay, in latitude  $57^{\circ} 4'$  north, and longitude  $137^{\circ} 59'$  west.

On the 22nd, the Observations of the moon's distance from the sun gave for the longitude of the ship, reduced to noon,  $137^{\circ} 10'$ : thus the progress towards the east had been  $0^{\circ} 49'$ .

The longitude according to the dead reckoning was  $137^{\circ} 16'$ ; the difference of the progress by account towards the east, compared to that which

is deduced from observation, is only 6 minutes or 3½ miles, which the observed progress is greater.

On comparing the latitudes, we find that the progress towards the south is greater according to observation than according to the dead reckoning, by 3 minutes or 3 miles.

Thus, it should appear that the currents set about 4½ miles to the east 42° 30' south.

#### NOTE XLI.

On the 23rd, at three-quarters past five in the morning, the SOLIDE was in sight and to the westward of the northern part of the west coast of those lands which LA PÉROUSE discovered in 1786, and which, subsequently to his discovery, Captain DIXON has named QUEEN CHARLOTTE'S Islands.

On pricking off the ship's place on the chart of the English navigator, Captain MARCHAND deduced from his observations of the preceding day, that the middle of the entrance of CLOAK Bay is situated in latitude 54° 10' north, and longitude 135° 50' west from PARIS; and this longitude differs by 10 minutes in excess from that assigned to it by DIXON'S original chart, which places the entrance in 133° 20' west from GREENWICH.

But, according to the observations made in the voyage of LA PÉROUSE, we are of opinion that

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Captain MARCHAND's longitude mentioned in Captain CHANAL's Journal, ought to be increased 8 minutes; and on applying this correction to the longitude of the point whence the bearing was taken, which was, at noon,  $135^{\circ} 53'$ , we have carried this longitude; in the JOURNAL OF THE ROUTE, to  $136^{\circ} 1'$ .

NOTE XLII.

On the 1st of September, at noon, the SOLIDE took her departure from a point from whence bearings were taken of the land in latitude  $52^{\circ} 56'$  by observation; and Captain MARCHAND had fixed the longitude of this point at  $135^{\circ} 20'$ , according to the General Chart of the NORTH-WEST COAST OF AMERICA, which is prefixed to DIXON'S VOYAGE.

But the observations made in LA PÉROUSE's voyage place it in  $135^{\circ} 5'$  the portion of the coast situated in latitude  $52^{\circ} 56'$ : and, as at the moment of taking the bearings, the SOLIDE was 5 or 6 leagues, or about 30 minutes to the westward of the coast, the longitude of the point whence the land was set will be  $135^{\circ} 35'$ , that is, greater by 15 minutes than that assigned to it by Captain MARCHAND and the Journal of Captain CHANAL.

In consequence, I have (in the JOURNAL OF THE ROUTE) increased by 15 minutes the longitude of the point whence the bearings of the 1st of

September were taken; and the longitudes by account of the 2nd, 3rd, and 4th,

### NOTE XLIII.

On the 4th, the longitude deduced from the observations of the moon's distance from the sun, and reduced to noon, was  $130^{\circ} 40'$ ; and on comparing it with that of the 1st corrected, as in the preceding Note, we find that the progress towards the east was  $4^{\circ} 55'$ .

That which was deduced from the dead reckoning compared to the same longitude is only  $4^{\circ} 36'$ : the difference in three days is therefore 19 minutes, or about 12 miles, which the ship appears to have been carried to the eastward.

In the same interval, the progress towards the south was greater according to the observation than according to the dead reckoning, from the 1st to the 3rd, 11 minutes; but from the 3rd to the 4th, it was smaller by 4 minutes: thus from the 1st to the 4th, the currents, from a compensation having taken place, set 7 minutes, or 7 miles, to the southward.

It might be concluded that the ship was carried about 14 miles, in three days, at  $4\frac{1}{2}$  miles in twenty-four hours, to the east  $30^{\circ} 30'$  south,

NOTE

## NOTE XLIV.

On the 8th, before he lost sight of the coast of AMERICA, Captain MARCHAND took a bearing off BERKLEY Sound.

At half past six o'clock in the evening, the entrance of this bay bore north-east half east distant six leagues: and, on setting off the bearing on DIXON'S Chart, where BERKLEY Sound is placed in latitude  $48^{\circ} 57'$  north, and longitude  $128^{\circ} 28'$  west from PARIS, it was concluded that the point whence the bearings was taken, which was made the *Point of departure*, was situated in

Latitude  $48^{\circ} 46'$  North.

Longitude  $128^{\circ} 48'$  West.

## NOTE XLV.

The result of the lunar observations of the 19th in the morning, reduced to noon, placed the ship in longitude  $139^{\circ} 3'$ ; and, on comparing it to that of the point of departure (preceding Note), it will be seen that the progress towards the west was  $10^{\circ} 15'$ .

According to the dead reckoning, it appears to have been  $12^{\circ} 3'$ .

Thus in the space of eleven days, the ship was carried *astern* or to the eastward, by the action of the currents,  $1^{\circ} 48'$ , or 83.6 miles.

She was carried to the southward a still more considerable quantity: the daily differences between the latitude by account and the latitude by observation, were 2, 4, 8, 9, 15, 16, and 17 minutes; and the sum of these differences is  $2^{\circ} 6'$ , or 126 miles, which the ship was carried towards the south in the interval of eleven days.

On combining these quantities towards the south with the quantities towards the east, we find that the currents carried the ship by an unperceived movement, 151.5 miles in eleven days, or 13.77 miles in twenty-four hours, to the south  $33^{\circ} 15'$  east.

#### NOTE XLVI.

The progress towards the west, according to the compared results of the observations of the 19th and 21st, was  $2^{\circ} 30'$ ; and as, according to the dead reckoning, it is only  $2^{\circ} 17'$ , it may thence be concluded that, in the interval of two days, the unperceived progress towards the west was 13 minutes or 11.2 miles.

The unperceived progress towards the south was, in the same space of time, 8 minutes or 8 miles.

And, on combining the two movements, we find that the ship was carried 13.8 miles in two days, or 6.9 miles a day, to the west  $35^{\circ} 30'$  south.

NOTE

## NOTE XLVIII.

From the 21st to the 23rd, the progress towards the west was, according to the observations,  $2^{\circ} 14'$ , and  $2^{\circ} 8'$ , according to the dead reckoning; the difference is 6 minutes or 5.22 miles, which the ship appears to have been carried to the westward in two days, or 2.6 miles in twenty-four hours.

The difference between the latitudes by observation and by account have compensated for each other, and were only 2 minutes in the one direction, and as much in the other.

## NOTE XLVIII.

According to the compared results of the lunar observations of the 23rd and 30th, the progress in longitude towards the west, in the interval of seven days, was  $5^{\circ} 40'$ ; and the progress according to the dead reckoning, was  $6^{\circ} 0'$ . It follows that the ship was carried to the eastward, 20 minutes, or 18 miles.

The differences of the latitudes by account, compared to the latitudes by observation, counterbalanced each other within 3 minutes, or 3 miles, which the ship appears to have been carried to the southward.

On combining the two unperceived movements, towards the east and towards the south, it will be found

NOTE

found that the ship was carried 18.3 miles in seven days, or  $2\frac{3}{4}$  miles; in twenty-four hours, to the east  $10^{\circ}$  south.

#### NOTE XLIX.

Fresh observations for the longitude made on the first of October gave for the progress towards the west, in twenty-four hours,  $1^{\circ} 32'$ ; and the dead reckoning differed from it only 1 minute or 0.93 miles, in excess, which it might be imagined that the ship had been carried to the eastward, if the results of the lunar observations to which are compared those of the dead reckoning, could attain that precision.

The observation of latitude proved that, in the same space of time, the ship had been carried to the southward 5 minutes or 5 miles, beyond her apparent run.

She was therefore carried 5.1 miles to the south  $10\frac{1}{2}^{\circ}$  east.

#### NOTE L.

By the lunar observations which were made on the 3rd, the day before the SOLIDE got sight of the SANDWICH Islands, it was concluded that the ship had reached the longitude of  $155^{\circ} 7'$ ; and her progress towards the west, from the first of the month, had been  $4^{\circ} 8'$ , greater by 8 minutes,



or 7.53 miles than that indicated by the dead reckoning.

The progress towards the south, in the last two days, was greater according to the observations, than according to the result of the dead reckoning, by 3 minutes, or 3 miles.

Thus the compound and imperceptible movement had been 8.1 miles, in two days, or 4 miles, in twenty-four hours, to the west  $21^{\circ} 45'$  south.

#### NOTE LI.

On the 4th at four o'clock in the afternoon, the SOLIDE was exactly under the meridian of the most eastern point of the Island of O-WHYHEE, which the observations made in Captain COOK's third voyage\* have fixed at  $157^{\circ} 10' 15''$  west from PARIS; and the longitude of the ship, at that period, ought to have been the same as that of this point.

On the 3rd at noon (preceding Note), the longitude of the ship deduced from observation, was  $155^{\circ} 7'$ . From the 3rd to the 4th at noon, the dead reckoning indicated a progress towards the west of  $1^{\circ} 37'$ ; and, from noon to four o'clock in the evening of the latter day, a progress of 17

\* See *The Original Astronomical Observations made in a voyage to the Northern Pacific Ocean, &c.* by W. Bayley, page 350. The longitude of this point is there laid down  $205^{\circ} 10'$  west from Greenwich,

minutes

minutes towards the same side\*: thus the longitude deduced from observation of the 3rd and increased by the progress by account towards the west; in the interval of 28 hours, was on the 4th at four o'clock in the afternoon,  $157^{\circ} 1'$ .

It was therefore smaller than the true longitude of the point at which she was arrived; and  $9\frac{1}{2}$  minutes altern; and the error was  $8\frac{1}{2}$  miles. But it will be seen hereafter that this trifling error of  $9\frac{1}{2}$  minutes belongs to the dead reckoning, which, in the interval from noon to three or four o'clock in the afternoon of the 4th, indicates a progress towards the west too small by this quantity: and if, in these twenty-eight hours, the real progress of the ship had been the same as her apparent progress, the longitude on making the land would have been precisely the same as that of the east point of O-WHYHEE, on the meridian of which the ship was placed.

In order to ascertain the error which occurred in the reckoning, in the interval from noon to three or four o'clock in the afternoon, it will be observed that the longitude by account of the 4th at noon (JOURNAL OF THE ROUTE) was  $155^{\circ} 26'$ , to which must be added the progress by account towards the west, from noon to four o'clock

\* From noon to four o'clock, the ship steered west  $14^{\circ} 30'$  south—west  $37^{\circ}$  south—west  $31^{\circ} 30'$  south—west  $19^{\circ} 15'$  south; and she ran  $4\frac{1}{2}$  miles on each of these courses.

in the afternoon of the 4th which is 17 miles towards the west; and we shall have, for the longitude by account at this latter moment  $158^{\circ} 43'$ . On comparing this longitude to the longitude by account of the 3rd, we find that, according to the dead reckoning, the progress towards the west, in the interval from noon to three or four o'clock in the afternoon of the 4th, is  $1^{\circ} 54'$ .

But if we compare the true longitude of the 4th at four o'clock,  $157^{\circ} 10' 15''$  to the longitude deduced from the observation of the 3rd at noon,  $155^{\circ} 7'$ , it is seen that the real progress was  $2^{\circ} 3' 15''$ : thus the error of the dead reckoning was, in twenty-eight hours,  $9\frac{1}{2}$  minutes or 8.66 miles, which it appears that the currents set the ship to the westward.

At the same time, they carried her, according to the observations, 4 minutes, or 4 miles to the northward: thus the unperceived movement of the ship was 9.6 in twenty-eight hours, or 8.2 miles, in the direction of west  $24^{\circ} 45'$  north.

If, at present, we wish to find what was, on making the land, the error of the longitude by account deduced by the dead reckoning, during the passage, from the longitude of the 8th of September in sight of BERKLEY Sound, we must add  $1^{\circ} 54'$  (progress by account towards the west, from noon to three or four o'clock in the afternoon of the 4th) to  $156^{\circ} 49'$  (longitude by account of the 3rd at noon; and we shall have  $158^{\circ}$

43 for that of the 4th: it is greater than the true longitude, by  $1^{\circ} 3' 45''$ , or  $87\frac{1}{2}$  miles or 29.2 leagues *abead*.

It would have been greater by  $36\frac{1}{2}$  minutes, if no compensation had taken place: it will be seen by the following table, that from the 8th of September to the 4th of October, the sum of the errors *plus west* was  $2^{\circ} 9'$ ; but that of the errors *minus west* being  $36\frac{1}{2}$  minutes, there remained, deducting the latter, only  $1^{\circ} 32' 45''$  for the former.

It may be remarked, in the run from the NORTH-WEST coast of AMERICA to the SANDWICH Islands, that, when the SOLIDE was standing to the northward, from the 19th to the 57th parallel (between the 13th of July and 7th of August), the currents constantly set to the northward, 2½, 3½, 2½, 7½, 5½, and 11½ a day: and that, on the contrary, in running from the 57th to the 19th parallel (between the 21st of August and the 4th of October,) they set to the southward, 3, 2½, 11½, 4, 5, and 1 miles a day\*.

In the former period, the SOLIDE had sailed between the 150th and 140th meridian west from PARIS; and in the latter, she had sailed between the 140th and 157th.

It does not appear to me, therefore, that it is to the difference of meridians, which is not very considerable, that we ought to attribute the change in the direction of the currents; it would appear rather to depend on the difference of the seasons.

It will be for navigators who shall, in the sequel, sail in these latitudes, at the same periods when the SOLIDE crossed them, to ascertain whether the

\* In the last twenty-four hours only, they set 4 miles to the northward; but the ship was then at no great distance from the archipelago of the *Sandwich* Islands; and it is well known that the channels which separate islands, occasion currents that vary according to the tides, according to the wind which has blown, and whose effect is frequently felt at rather considerable distances from the lands between which they have begun to form.

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direction and the velocity of the currents will again prove the same as those which we have thought ourselves justified in deducing from the observations for the latitude and longitude made by Captains MARCHAND and CHANAL, in standing up and running down, between the two extreme parallels, which, in the latter period, limit the course of the SOLIDE.

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## SIXTH RUN,

*From the SANDWICH Islands to the MARY-ANNE Islands and to MACAO.*

### NOTE LII.

ON the 7th, at six o'clock in the evening, a last bearing was taken of the Island of O-WHYHEE, in order to fix the point of departure, at that moment, the two extremities in sight bore from north  $5^{\circ}$  east to east-south-east  $2^{\circ} 30'$  east; and the ship was at the distance of two leagues from the nearest shore. From these bearings was fixed the

Point of Departure  $\left\{ \begin{array}{l} \text{Latitude. . . } 19^{\circ} 4' \text{ North.} \\ \text{Longitude. . } 158 29 \text{ West.} \end{array} \right.$

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## NOTE LIII.

The result of two sets of distances of the sun and moon, observed on the 19th at forty-two minutes after nine in the morning, gave for the longitude of that day at noon  $178^{\circ} 48'$  west from PARIS; and on comparing it to that of the point of departure, we have for the ship's progress towards the west in the interval of  $11\frac{1}{2}$  days,  $20^{\circ} 19'$ .

The progress, according to the dead reckoning, was only  $18^{\circ} 54'$ : thus the currents had driven the ship to the westward  $1^{\circ} 25'$ , or  $81\frac{1}{2}$  miles.

In the same space of time, except the 2nd, 3rd, and 4th day of the period, the currents had constantly carried the ship to the southward, and this movement had been sometimes 10, 11, and 15 miles in twenty-four hours; but from the 8th to the 9th of the month, the unperceived movement had been 10 miles towards the north, and, from the 9th to the 10th, it was 29 miles towards the same side: in these two days the ship had sailed between the latitude of  $19^{\circ} 30'$  and  $20^{\circ}$  north, and between the longitude of  $159^{\circ} 40'$  and  $160^{\circ} 40'$  west.

On deducting the sum of the unperceived movement towards the north, from the sum of the movement towards the south, we find as the result, that the ship, in the course of the period, had been carried, 12 minutes, or 12 miles to the southward.

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And on combining the movement towards the south, with that which the observations for the longitude indicated towards the west, it will be seen that the ship was carried 82.5 miles in  $11\frac{1}{4}$  days, or about 7 miles in twenty-four hours to the west  $8^{\circ} 20'$  south.

## NOTE LIV.

The result of the lunar observations, made on the 20th, confirmed that of the observations of the 19th.

The progress towards the west in the twenty-four hours had been  $1^{\circ} 31'$  according to the observations, and  $1^{\circ} 25'$  according to the dead reckoning; the difference of 6 minutes or 5.8 miles, in defect, on the side of the reckoning, would indicate that the currents may have carried the ship to the westward that quantity; at the same time that the observation of latitude announces that they effected no change in the ship's course in the direction of the latitude.

## NOTE LV.

The progress to the westward, from the 20th to the 23rd, was, according to the observations,  $7^{\circ} 8'$ , while, according to the dead reckoning, it ought to have been only  $5^{\circ} 54'$ : the currents therefore drove the ship, in three days, 74 minutes, or

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72 miles, to the westward: this is at the rate of 1 mile an hour, or 8 leagues a day.

The effect of the currents was nearly null in the direction of the latitude: 2 minutes to the southward, the first day; 2 minutes to the northward, the second; no difference, the third: thus, the little effect of the currents, if this effect be real and belong not to some small errors in the observations, was counterbalanced and done away in the course of the period.

#### NOTE LVI.

The currents continued to set to the westward from the 23rd of October to the 2nd of November.

On comparing the result of the observations for the longitude of the latter day, with that of the observations of the former ( $172^{\circ} 33'$  with  $148^{\circ} 14'$ ) it is seen that, in the interval of ten days, the progress by observation towards the west,  $24^{\circ} 19'$ , exceeded by  $1^{\circ} 39'$ , or 97 miles, the progress by account which was only  $22^{\circ} 40'$ .

The effect of the currents, sometimes towards the north, sometimes towards the south, was inconsiderable, and, after having subtracted the one from the other, is reduced to 3 minutes, or 3 miles towards the north.

The compound effect is 97 miles in ten days, or 9.7 miles in twenty-four hours, to the west  $1^{\circ} 40'$  north.

## NOTE LVII.

Two sets of distances observed on the 2nd, at twenty-seven minutes after two in the afternoon, and reduced to noon, had given  $148^{\circ} 14'$  for the longitude (preceding Note.)

Two other sets observed on the 4th, at one minute after five in the evening, gave for the longitude at noon of that day,  $144^{\circ} 34'$ .

On comparing this latter longitude with the former, it will be found that, according to the observations, the ship's progress towards the west in two days, would have been only  $3^{\circ} 40'$ .

But, according to the dead reckoning, the progress towards that side is  $4^{\circ} 23'$ ; which would imply that, in 48 hours, the ship had been carried *to the eastward*, 43 minutes, or 41.6 miles, that is, about seven leagues a day. This extraordinary effect of the movement of the waters which, between the tropics, constantly set to the westward, unless the vicinity of some great land or of an archipelago occasion a change in their direction, suggested the idea that there might be an error in the observations of the 2nd or in those of the 4th, and our navigators determined to take a mean between the results combined with the progress which had been deduced from the calculation of the ship's run.

According to this calculation, the progress towards the west, from the 2nd to the 4th, was

23': on deducting this quantity from the longitude by observation on the 2nd and reduced to noon of that day, there remains for that of the 4th at noon,  $143^{\circ} 51'$ . Now, if we take a mean between this longitude and that which the observations gave for the same period, we shall have  $144^{\circ} 12' 30''$ , a longitude which partakes both of the observations of the 2nd and 4th, and of the progress by account in the interval of these two periods.

From noon to three quarters past five o'clock in the evening of the 4th, the progress by account towards the west was 35 minutes: and on subjecting it to the longitude observed and corrected of the same day at noon, which was  $144^{\circ} 13'$ ; we have for the longitude of the ship at three quarters past five o'clock,  $143^{\circ} 38'$ .

At the same moment, the Island of TINIAN (of the archipelago of the MARY-ANNE Isles) bore from west south-west half west to north-west by west, distant two leagues.

The island was therefore about 5 minutes to the westward of the ship; and on deducting this quantity from the longitude at three quarters past five, we shall have for that of TINIAN,  $143^{\circ} 33'$ .

Observations made, in 1767, by Captain WALLIS, on board the DOLPHIN, give for the longitude of this island  $143^{\circ} 34' 45''$ \*: the difference between

\* See *Astronomical Observations made in the Voyages for making Discoveries*

between the one determination and the other is therefore only 3 minutes.

If we wished to take the mean longitude observed of the 4th at noon,  $144^{\circ} 13'$ , for the term of comparison, and we compare to it the longitude observed of the 2nd at noon, it will be found that, in forty-eight hours, the progress towards the west was  $4^{\circ} 1'$ : but the progress by account is  $4^{\circ} 23'$ : thus the ship appears to have been carried to the eastward by an unperceived movement or has advanced less to the westward than her apparent progress indicated, 22 minutes, or  $21\frac{1}{2}$  miles.

In the same space of time, she was carried 7 minutes to the northward, from the 2nd to the 3rd, and 3 minutes to the southward, from the 3rd to the 4th: there remains a movement to the northward of 4 minutes, or 4 miles.

On combining the effect of the action of the current, we find that there was an unperceived movement of  $21\frac{1}{2}$  miles in forty-eight hours, or 10.87 miles, a day, to the east  $11^{\circ}$  north.

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*Discoveries in the southern Hemisphere*, by W. Wales, London, 1788. 4to. *Introduction*, page x. Mr. Wales gives for the longitude of *Tinian*  $214^{\circ} 4'$  west from *Greenwich*,  $143^{\circ} 35\frac{1}{2}'$  west from *Paris*.

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## NOTE LVIII.

The longitude deduced from the observations of the 16th and reduced to noon, is  $122^{\circ} 6'$ ; and on comparing it to the longitude observed and corrected of the 4th at noon, it is seen that the progress towards the west was  $22^{\circ} 7'$ .

It was only  $19^{\circ} 54'$ , according to the dead reckoning; and the difference  $2^{\circ} 13'$ , or  $126\frac{1}{2}$  miles, is the quantity which the ship was carried to the westward by an excess of the real progress beyond the apparent.

In the period of twelve days, the effect of the currents on the latitude presents variations somewhat considerable: from the 4th to the 8th, they carried the ship to the northward 17, 4, 5, and 16 minutes in twenty-four hours; from the 8th to the 10th, 9 and 5 minutes to the southward; from the 10th to the 12th, 7 and 2 minutes to the northward; from the 12th to the 14th, 8 minutes to the southward; from the 14th to the 15th, 8 minutes to the northward; lastly from the 15th to the 16th, 16 minutes to the southward. After having subtracted the sum of the errors on the one side, from that of the errors on the other, there remain 21 minutes, or 21 miles to the northward.

These 21 miles combined with the  $126\frac{1}{2}$  miles towards the west, produce a compound and un-

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perceived movement of 128 miles in twelve days, or 10 $\frac{1}{2}$  miles in twenty-four hours, to the west 9° 30' north.

#### NOTE LIX.

On the 18th at noon, the south-west point of the Island of FORMOSA bore east-north-east half north, distant four leagues and a half. The ship was therefore less to the northward than this point by 6' 1", and less to the eastward, by 12' 21".

The latitude of the ship observed at the same instant, was 21° 48'; and it may be concluded that the latitude of the point of FORMOSA is 21° 54'. It is 22° 2' on the Chart of the *China Sea*, constructed in the voyage of LA PÉROUSE, if we there take the difference of the parallel of this point in regard to the south-east point of the great BÔTEL-TABAGÓ-XIMA the position of which is fixed by the observations made in that voyage: ALEXANDER DALRYMPLE places the south point of FORMOSA, on the Chart of the *China Sea*, published in 1771, in latitude 22° 2' 30". I present these differences only for the purpose of inducing navigators to ascertain which of the latitudes ought to be adopted.

In order to establish the true longitude of the south-west point of FORMOSA, which is now to serve as a term of comparison to which we shall reduce the calculations of the SOLIDE'S run from the

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the SANDWICH Islands to abreast of this point, I observe that the south-east point of the great BOTEL-TABAGO-XIMA is situated, according to the observations made in LA PÉROUSE's voyage, of which I take the liberty of making use by anticipation, in  $119^{\circ} 32'$  east longitude; and that, on the chart of the *China Sea* constructed in this voyage and intended to form a part of the *ATLAS* which will accompany the narrative, the south-west point of FORMOSA is less easterly than the south-east point of the GREAT BOTEL, by 52 minutes: the longitude of the point of FORMOSA is therefore  $118^{\circ} 40'$ .

But on the 18th of November, at noon, the SOLIDE, according to the bearings of the land, was  $12\frac{1}{2}$  minutes less to the eastward than the point of FORMOSA: the longitude of the ship, at this period, was therefore  $118^{\circ} 27' 40''$ .

Let us first see what was the error of the dead reckoning in the interval comprised between the observations for the longitude made on the 16th and the land-fall on the 18th.

The longitude deduced from the observations of the 16th was (preceding Note)  $122^{\circ} 6'$ : that which was deduced from the bearings of the 18th is  $118^{\circ} 28'$  (in round numbers): thus, in the interval of forty-eight hours, the ship's progress towards the west was  $3^{\circ} 38'$ . But, according to the dead reckoning, this progress appeared to be only  $3^{\circ} 34'$ : and the difference of 4 minutes, or

3.72 miles, is the quantity which it may be supposed that the currents carried the ship to the westward.

During the same time, they carried her, according to the observations of latitude, 17 minutes, or 17 miles, to the northward.

The compound movement of the ship out of her apparent course, was therefore 17.4 miles in two days, or 8.7 miles in twenty-four hours, to the north  $12^{\circ} 30'$  west.

As the SOLIDE's voyage, on leaving the southwest point of FORMOSA, no longer presents any point of comparison till her arrival at MACAO, and as, in sight of this point, the calculations of the dead reckoning, made during this latter part of the run, are rectified, I can suppose it terminated on the 18th of November; and I shall examine what was, on making the land of FORMOSA, the error of the longitude deduced from the observations of the 16th, and what was the error of the longitude deduced from the dead reckoning since her departure from the SANDWICH Islands.

The longitude of the ship, on the 16th at noon, according to the observations made on that day, of  $122^{\circ} 6'$  east; and the progress by account towards the west, from the 16th at noon, to noon of the 18th, the period of the bearings being taken off the Island of FORMOSA, is  $3^{\circ} 34'$ : thus the longitude of the SOLIDE, on the 18th at noon (according to the reckoning of a course of forty-

eight



eight hours, deduced from the result of the observations of the 16th) was  $118^{\circ} 32'$ . We have seen that her true longitude deduced from the bearings was  $118^{\circ} 28'$ : the supposed longitude was therefore in error only 4 minutes, or about  $1\frac{1}{4}$  leagues *astern* of the true; I say *astern*, relatively to the course of the ship which was sailing towards the west.

Let us see, at present, what would have been the error on making the land, if, in order to regulate the course of the SOLIDE, astronomical observations had not been made use of, and if the ignorance of the captain had condemned him to employ only the ordinary methods of navigation.

The longitude deduced from the dead reckoning from the point of departure taken from the SANDWICH Islands, on the 7th of October, was at the moment of the bearings being taken off the Island of FORMOSA, on the 18th of November,  $124^{\circ} 47'$ : and as we have seen that the true longitude of the ship, at that period, was  $118^{\circ} 28'$ , it follows that after 41 $\frac{1}{2}$  days' navigation, the longitude by account was in error, *astern* (since it is east)  $6^{\circ} 19'$ , which, in the parallel of the point arrived at, answer to a little more than 117 leagues.

The following Table presents the partial errors of the dead reckoning, such as they may be reckoned in each of the periods which divide the run, considering the results of the observations for the longitude made at the extreme limits of each period, as fixed points of comparison.

PERIODS

PERIODS OR THE OBSERVATIONS.	Latitude by Observation	Longitude by Observation	Progress in Longitude in the interval of the Observa- tions accord- ing to OBSERVATION.	Progress in Longitude in the interval of the Observa- tions accord- ing to the DEAD RECKONING.	Differences in the progress to- wards the West accord- ing to the D. RECKONING compared to the progress according to OBSERVATION.	Interval of the Observations.
1791. October	0 1	0 1	0 1	0 1	0 1	DAYS.
On the 7th at 6 P. M.	In sight of the Land of <i>O. Mydyke</i> .					
From the 7th to the 19th	19 4 13 33	158 29 178 48 East.	20 19 W.	18 54 W.	1 25 W.	12.
From the 19th to the 20th	13 32	179 41	1 31 W.	1 25 W.	0 6 W.	1.
From the 20th to the 23rd	13 40	172 33	7 8 W.	5 54 W.	1 14 W.	3.
From the 23rd November						
to the 2nd	14 26	148 14	24 19 W.	22 40 W.	1 39 W.	10.
From the 2nd to the 4th	14 50	144 13	4 1 W.	4 23 W.	0 22 W.	2.
From the 4th to the 16th	21 34	122 6	22 7 W.	19 54 W.	2 15 W.	12.
From the 16th to the 18th	21 48	118 28	3 38 W.	3 34 W.	0 4 W.	2.

In sight of the South-west  
point of the Island of *Fermoyta*.

It is seen that, except in the interval from the 20th to the 4th of November, during which the ship appears to have been carried to the *eastward*\*, the currents

\* This effect of the currents is extraordinary: perhaps it ought



## SEVENTH RUN,

*From MACAO to the Isle of FRANCE.*

## NOTE LX.

It has been seen in the Narrative, that the SOLIDE having sailed from MACAO on the 6th of December, on the 11th made the islots called the TWO BROTHERS, and successively the group of PULO-SAPATA: this unexpected land-fall, at the time when Captain MARCHAND reckoned that he had still a rather long run to make before he should be near enough to perceive them, gave him reason to think that they are carried too far to the westward, in regard to MACAO, on the *Chart of the China Sea*, published in 1771 by ALEXANDER DALRYMPLE, and on the copy which D'APRÈS has given of it in the second edition of his *Neptune Oriental*. As it is by this chart that all the French navigators regulate their course in this sea, I have conceived that it would be useful to examine the question; to see whether the modern voyages did not furnish us with data sufficient for determining, with the precision required for the safety of navigation, the difference of meridian which ought to be admitted between MACAO and PULO-SAPATA, and to compare to it that at which these two points are placed on Mr. DALRYMPLE'S chart.

I. BAYLY,

\* The  
the North  
† Ibid

1. BAYLY, the astronomer, in COOK'S third voyage, observed distances of the sun and moon, in the TYPA (MACAO ROAD) on the 2nd, the 28th, and the 29th December 1779, and on the 13th of January 1780. These four sets of observations furnished him with sixteen particular results, the extremes of which differ 52 minutes. On combining these sixteen results with those of the lunar observations which he had taken at sea, before and after the ship's arrival in the TYPA, and which he reduced to this road by means of a good chronometer, he, by a mean between all these results, fixed the longitude of the TYPA at  $113^{\circ} 37' 15''$  east from GREENWICH\*: and as, according to the same astronomer, the town of MACAO is more easterly than the TYPA by 1 minute †, it results that, according to his observations, the longitude of MACAO is  $113^{\circ} 38' 15''$  ‡.

Lunar observations, made at the same period in the TYPA by different officers belonging to the RESOLUTION, furnished thirty-six other results the extremes of which differ  $1^{\circ} 45' 30''$ ; and the mean result, after having been combined with that of fourteen other observations, made before and after the ship's arrival, gave for the longitude of the TYPA  $113^{\circ} 48' 34''$  east from GREENWICH; and  $113^{\circ} 49' 34''$  for that of MACAO.

\* The original astronomical observations made in a voyage to the Northern Pacific Ocean. By W. Bayly. page 77.

† Ibid, page 76.

‡ Ibid, page 78.

The mean between the mean results of two sets of observations made in COOK'S VOYAGE, would therefore be for MACAO  $113^{\circ} 43' 54''$ : but as the observations of the first set agree better with each other than those of the second, it is expedient to place greater confidence in them; and we may admit for the mean result of the two sets,  $113^{\circ} 40'$  east from GREENWICH.

We may also determine the longitude of MACAO by its difference of meridian from CANTON.

2. GEORGE ROBERTSON, in the excellent Memoir which he has published for the elucidation of his large *Chart of the China Sea* (1771) gives an account of various observations from which he has determined the longitude of CANTON\*:

By the observations of the Hon. THOMAS HOWE, (Determined by the emersion of *Jupiter's* first satellite) . . . . .  $113^{\circ} 33' 00''$   
 Ditto of Captain JOSEPH HUDDART (emersion of *Jupiter's* first satellite)  $113 \quad 16 \quad 00$   
 By a great number of observations made by HENRY BROWN, during his long residence at CANTON, as Supercargo  $113 \quad 10 \quad 00$   
 By the observations of Captain LESTOCK WILSON, by time-keeper made by ARNOLD . . . . .  $113 \quad 21 \quad 15$

\* *Memoir of a Chart of the China Sea*. London, 1791. 240. page 2.

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The result of the Hon. THOMAS HOWE differs too much from the other three for it to be admitted\*.

The mean of these would give. . . . 113° 15' 45"

But if we are willing to adhere to a mean result between Mr. BROWN's longitude and that of Captain HUDDART, both deduced from the emerision of JUPITER's first satellite, we shall have 113° 13' 00" east from GREENWICH, or 110° 52' 45" east from PARIS †.

The difference of meridian between CANTON and MACAO was determined by three different chronometers ‡.

By Mr. HENRY BROWN, at different times 18' W.

By Captain WILSON, outward bound. . . 17'

By Ditto. . . . . homeward bound. . 16'

By Captain JOSEPH HUDSON. . . . . 16'

Difference of meridian by a mean (MACAO east) . . . . . 16' 45"

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\* Robertson observes that the Hon. Thomas Howe has determined the latitude of Canton at 22° 52' 50"; and that Captain Joseph Huddart and Captain Lestock Wilson, both excellent observers, make it, the former 23° 6' 57", and the latter, 23° 6' 53": which differs near 15 minutes from that of Mr. Howe; and he adds that "if in Mr. Howe's latitude there is so great an error there is reason to conclude that the longitude by the same observer cannot be exact."

† The *Connaissance des Temps* (Nautical Almanac) of the year VIII. of the French era, 1800, gives for the longitude of Canton, 110° 42' 30": this is the mean result of seven emerisions of the first satellite, observed towards the end of the last

If we add this difference to the longitude of CANTON  $113^{\circ} 13'$  east from GREENWICH, we shall have for the longitude of MACAO (in round numbers)  $113^{\circ} 30'$ .

We had, farther back, by the observations in COOK'S voyage. . . . .  $113^{\circ} 40'$

*Longitude of MACAO by a mean.* . . . .  $113 35$   
(or  $111^{\circ} 14' 45''$ , and  $111^{\circ} 15'$  in round numbers, east from the meridian of PARIS\*.)

3. The third voyage of Captain COOK furnishes us with observations which may serve to determine the difference of meridian between MACAO and PULO-SAPATA.

The observations of the astronomer BAYLY, and a chronometer whose rate was ascertained seven days before at MACAO, gave for the longitude of PULO-SAPATA east from GREENWICH †  $109^{\circ} 16'$ , and those of Captain KING  $109^{\circ} 10' \ddagger$ : the mean is  $109^{\circ} 13'$ :

And

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century by Father Fontenay, a Jesuit, for which there were no correspondent observations in Europe.

‡ *G. Robertson's Memoir*, page 9.

\* The longitude of Macao is likewise  $111^{\circ} 15'$  in the French nautical almanac or *Connaissance des Temps*; but the result was obtained by another means; for it has been seen (preceding Note) that it places Canton about 10 minutes less to the eastward than the determination which we have adopted.

† *The Original Astronomical Observations*, &c. page 351.

‡ *Cook's third voyage*, Vol. III. page 449. King says that his observations compared with Mr. Bayly's time-keeper,

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, &c. page 351.  
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And as it has been seen (farther back, Remark 1st) that the mean result of all the observations of COOK's voyage made in the TYPA, placed MACAO 113° 40' east from GREENWICH, it follows that the chronometer indicated for the *difference of meridian of PULO-SAPATA*, 4° 27' west from MACAO.

We may seek this difference by another method.

The observations made in the third voyage of Captain COOK during the stay of the RESOLUTION and DISCOVERY at PULO-CONDORÉ, give us for the longitude of that island \* :

By a mean between 49 results of observations of the moon's distance from the sun or stars (the extremes differing 1° 23' 15") made by Captain KING and another officer, we have for the longitude of PULO-CONDORÉ east from GREENWICH ..... 106° 18' 46"

place *Pulo-Sapata* in longitude 109° 10' east from *Greenwich*; and he adds that, during the last three days, the ships had outrun their reckoning at the rate of twenty miles a day: as he could not attribute the whole of this to the effects of a following sea, he imputed it in part to a current, which, according to his own calculation, had set forty-two miles to the south-south-west, between the noon of the 19th and the noon of the 20th of January.

\* *The Original Astronomical Observations, &c.* pages 79 and 80.

By a mean between 22 results of similar observations (the extremes differing  $0^{\circ} 40' 7''$ ) made by the Astronomer BAYLY, we have  $106^{\circ} 44' 29''$

By a mean between all . . . . .  $106^{\circ} 31' 38''$

On the other hand, we have the eastern difference of meridian of PULO-SAPATA, in regard to PULO-CONDORÉ :

By BAYLY'S Chronometer\* . . . . .  $2^{\circ} 31' 31''$

By that of Captain HODGSON† . . . . .  $2^{\circ} 39' 00''$

And by a mean . . . . .  $2^{\circ} 35' 15''$

If we add this difference of meridian to the longitude of PULO-CONDORÉ,  $106^{\circ} 31' 38''$ , we shall have for the longitude of PULO-SAPATA,  $109^{\circ} 00' 53''$ : and, on comparing it to that which we have adopted for MACAO, which is  $113^{\circ} 35'$  east from GREENWICH, we shall find for the difference of meridian of PULO-SAPATA  $4^{\circ} 34' 7''$  west from MACAO.

A third method presents itself to us for determining this difference; and G. ROBERTSON furnishes us with it in his *Memoir of a Chart of the China Sea*. On the one hand, the longitude of PULO-AOR is determined by several observations; and other observations give us its difference of

\* *The Original Astronomical Observations*, pages 79 and 351 — *Pulo-Condore*  $106^{\circ} 44' 29''$ ; *Pulo-Sapata*,  $109^{\circ} 16'$  by the observations of Mr. Bayly.

† *Robertson's Memoir*, page 7.

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meridian from PULO-SAPATA: we may thence deduce the longitude of the latter; and on comparing it with the longitude which we have given for MACAO, we shall find for their difference of meridian:

For the longitude of PULO-AOR, east from GREENWICH, according to Mr. WILLIAM BROWN, 1767, sun and moon, mean of 3 observations . . . . . 104° 35'

Captain JOSEPH HUDDART, by chronometer \* . . . . . 104 40

COCK'S third voyage, by a chronometer regulated at MACAO 19 days before.

By BAYLY'S observations † 104° 43' . . } 104 40  
By those of KING, &c. ‡ 104 40 . . }

Captain WILSON, from MACAO, by chronometer . . . . . 104 40

Ditto . . . . . from BATAVIA, ditto 104 40

GEORGE ROBERTSON, from MADRAS, by chronometer . . . . . 104 36

By a mean between 7 Results: Longitude of PULO-AOR, east from GREENWICH . . . . . 104 38½

Or rather in adhering to the four results which agree to a minute. . . . . 104 40

But, according to the account of G. ROBERT-

\* Robertson's Memoir, page 20.

† The Original Astronomical Observations, page 351.

‡ Cook's third voyage. Vol. III. page 466.

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son, page 7 of his *Memoir*, " by admitting PULO-AURO's extreme eastern longitude  $104^{\circ} 40'$  from it up to PULO-SAPATA, the meridian distance is  $4^{\circ} 14'$  measured by a well-regulated box-chronometer, made by ARNOLD, having this advantage of the islands bearing due north, when the altitudes for time were made, so that no error could arise in the estimation of distance, which is more frequently the cause of difference in observation, than any error in the observations themselves\*."

If we add the  $4^{\circ} 14'$  meridian distance to the longitude of PULO-AOR, which we have fixed at  $104^{\circ} 40'$ , we shall have for the longitude of PULO-SAPATA, east from GREENWICH,  $108^{\circ} 54'$ .

And, on comparing this longitude to that which we have adopted for MACAO,  $113^{\circ} 35'$  east from GREENWICH, we shall have for the difference of meridian from PULO-SAPATA  $4^{\circ} 41'$  west from MACAO.

We have therefore three results for this difference of meridian :

The first, by the observations of COOK's third voyage, made at MACAO and PULO-

SAPATA (page 435) . . . . .  $4^{\circ} 27'$

The second, by the longitude of PULO-SAPATA, deduced from that of PULO-CONDORÉ, and compared to our longitude of MACAO (page 436) 4 34

\* G. Robertson's *Memoir*, page 7.

Robertson's  
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and on his  
 $113^{\circ} 30'$   
meridians is

The third, by the longitude of PULO-SAPATA, deduced from that of PULO-AOR, and compared to that which we have admitted for MACAO (as above) . . . . . 4 41

The difference of meridian between PULO-SAPATA and MACAO, by a mean between all, will be . . . . . 4 34\*

4. Let us now compare this difference of meridian, the mean result of a great number of observations combined in which the errors of the one must have compensated for those of the other, with the difference which the *Chart of the China Sea* by Mr. DALRYMPLE has given between PULO-SAPATA and MACAO.

On this chart, MACAO is placed 3° 22' 30", and PULO-SAPATA 8° 57' west from the meri-

\* The absolute longitude of *Pulo-Sapata* east from *Greenwich*, deduced from the various differences of meridian west from *Macao* will be as follows, admitting *Macao* to be 113° 35' east from *Greenwich*:

	°	'	°	'
By the 1st difference. . . . .	4	27	109	8
By the 2nd. . . . .	4	41	108	54
By the 3rd. . . . .	4	34	109	1

Longitude of <i>Pulo-Sapata</i> , by a mean. . . . .	109	1
Difference of meridian, by a mean. . . . .	4	34
Longitude of <i>Macao</i> . . . . .	113	35

*Robertson*, in his *Table of Positions* (page 81 of his *Memoir*) places *Macao* in 113° 30'—*Pulo-Sapata* in 108° 55'; and on his *Chart of the China Sea*, *Macao* is laid down in 113° 30', and *Pulo-Sapata* in 108° 52'; the difference of Meridians is by the *Table*, 4° 35', and by the *Chart*, 4° 32'.

dian of the Island of BANGUEY: thus PULO-SAPATA is there laid down  $5^{\circ} 24' 30''$  west from MACAO: but as this difference of meridian ought, according to the observations, to be only  $4^{\circ} 34'$ , the error of the position of PULO-SAPATA, in regard to MACAO, on Mr. DALRYMPLE'S chart, would therefore be  $50\frac{1}{2}$  minutes, which this island is there carried too far to the westward.

In attributing this error to the chart, I suppose, as I ought, that the difference of meridian between the two points compared, such as I have deduced it from a mean between several results of observations, is sufficiently exact; but it may be remarked that the SOLIDE having sailed from MACAO, and made a direct course in order to get sight of PULO-SAPATA, fell in with it much sooner than she ought to have done, if the difference of meridian was as great as it is on Mr. DALRYMPLE'S Chart; and the calculation of the SOLIDE'S run, regard being had to the effect of the currents, gives this difference nearly the same as that which results from the observations: most assuredly, this is not a decisive proof of the exactness of this determination; but it is at least an additional presumption which must induce French navigators who shall make use of DALRYMPLE'S chart (or that of D'APRÈS, which is the Copy of it), for regulating their course in going from MACAO to PULO-SAPATA, to keep a good look-  
out

out when the chart places their ship, at no more than a degree to the eastward of that island.

I observe that, as it is probable that the islets THE TWO BROTHERS have been subjected on the chart to the position of PULO-SAPATA, they ought to be carried with the island about 50 minutes to the eastward.

French seamen will not have these corrections to make, if they use the *Chart of the China Sea* published by G. ROBERTSON, which has been constructed from the observations which the English navigators have multiplied so usefully in these latter times, and which require to be so still in order to fix with the same certainty the relative position of that considerable number of scattered islets, overfalls, and dangers of all kinds which obstruct the CHINA SEA.

If there is matter for astonishment, it is that Mr. DALRYMPLE should have been able to make so good a chart as that which he published in 1771, with courses and distances by account, always so uncertain in the midst of currents, and yet these were the only data that he then had at his disposal.

Since the discussion into which I have entered, in order to succeed in determining the difference of meridian of PULO-SAPATA in regard to MACAO has led me to inquire into the positions of some points of the CHINA SEA, it will not be useless to French navigators who neither possess G. Ro-

BERTSON'S

BERTSON's Memoir nor Chart, to compare the positions which I give to these points, both with those which he assigns to them in his TABLE, and with those which are to be found in the CONNAISSANCE DES TEMPS (Nautical Almanac) of the year VIII of the French era.

	Result of the Dificultion.		ROBERTSON.		CONNAISSANCE DES TEMPS.	
MACAO.....	Lat. N. } 0 ' "	22 11 31	Lat. N. } 0 ' "	22 12 00	Lat. N. } 0 ' "	22 12 44
	Long. E. } 111 15 00		Long. E. } 111 9 45		Long. E. } 111 15 00	
PULO-CONDORE	Lat. .... } 8 40 00		Lat. .... } 8 40 00		Lat. .... } 8 40 00	
	Long. .... } 104 11 23		Long. .... } 103 57 45		Long. .... } 104 11 37	
PULO-AOR....	Lat. .... } 2 42 00		Lat. .... } 2 29 30		Lat. .... } 2 42 00	
	Long. .... } 102 19 45		Long. .... } 102 17 45		Long. .... } 102 20 00	
PULO-SAPATA	Lat. .... } 10 4 30		Lat. .... } 10 1 30		Lat. .... } 10 4 30	
	Long. .... } 106 40 45		Long. .... } 106 34 45		Long. .... } 106 53 00	

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MACAO.....

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III 9 45

22 12 44  
III 15 00

1. MACAO.

1. MACAO. The latitude which is given to it in the *Connaissance des Temps* is  $22^{\circ} 12' 44''$ ; and according to a note which was formerly communicated to me by Citizen MÈCHAIN, Astronomer of the Navy, Member of the National Institute and of the Board of Longitude of FRANCE, it appears that this latitude is founded on the meridian altitude of the sun, taken in the College, on the 17th of June 1685, by Father THOMAS, a Jesuit, with a gnomon of 48 feet\*. Father GOUIE † made it only  $22^{\circ} 12' 14''$ ; but Father CHAUSSEAUME, who observed this latitude at the College of St. PAUL, in the summer solstice of 1753, by a gnomon of 25 feet, carefully set up, found it  $22^{\circ} 12' 40''$ : and in 1712, Fathers UREMAN and d'ALCUI had found it  $22^{\circ} 13' 00''$ .

The observations made in Cook's third voyage gave for the latitude of the TYPA  $22^{\circ} 9' 22''$ ; and W. BAYLY says that the TYPA is less northerly than MACAO by 3 minutes: the latitude of MACAO would therefore be  $22^{\circ} 12' 22''$ . I know not why, according to the same data, W. BAYLY has made it only  $22^{\circ} 12' 00''$  ‡.

G. Ro-

\* *Anc. Mém. de l'Académie des Sciences*. Vol. VII. page 705.

† First volume of his observations, 1682, 8vo page 214.

‡ *The Original Astronomical Observations, &c.* page 76.

“By a mean” says Bayly, “of a number of observations of “meridian altitudes of the sun taken with my astronomical “quadrant,

Result of the  
Discussion.

ROBERTSON.

CONNAISSANCE  
DES TEMPS.

G. ROBERTSON (page 3 of his Memoir) has made it from his own observations  $22^{\circ} 12' 00''$ , and he says that they have been corroborated by those of Captains FRASER, CUMMING, and others.

If we take a mean between the seven determinations which I have just mentioned, we shall have  $22^{\circ} 12' 31''$  for the north latitude of MACAO; and this it is which I have adopted.

I have determined its longitude at  $111^{\circ} 15' 00''$  east from PARIS. (page 434 of this Vol.) by a mean between the result of the observations made at CANTON, and that of the observations made in the TYPA, by W. BAYLY, Captain KING, and several officers belonging to the RESOLUTION. I remark that this determination agrees with that in the *Connaissance des Temps*, obtained by a very different method: for in the Note communicated to me by Citizen MÈCHAIN, it is mentioned that the longitude inserted in the *Connaissance des Temps* is determined from ancient observations of eclipses of the moon, of the 30th of November 1686, and of the 21st of November 1695, observed at MACAO by the Jesuits. But I am very far from pretending that this agreement,

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“ quadrant, and Hadley's sextant, the latitude of the *Typha* is  $22^{\circ} 9' 22''$  north, and that of *Macao* harbour by the town  $22^{\circ} 12'$  north. The *Typha* is 3 miles south from the town, and it is one mile west of it.”

which

[Dec. 1791.

Dec. 1791.]

MARCHAND'S VOYAGE.

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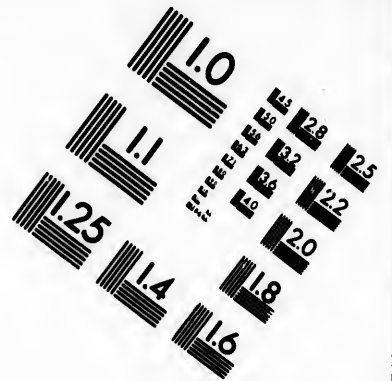
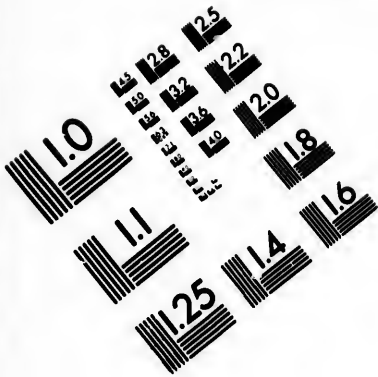
which is due only to chance, strengtMens the de-  
termination which I have adopted: every one  
knows what little reliance is to be placed on the  
results of the moon's eclipses, still less on observa-  
tions which are dated a century ago.

ROBERTSON'S longitude differs from mine by  
5 minutes in defect; but, to obtain it, he em-  
ployed only the observations made at CANTON  
with the difference of meridian of MACAO in  
regard to this former city; whereas I have thought  
that the longitude of MACAO should be made to  
participate in the numerous observations which  
were made in the *TYPA* in COOK'S third voyage.

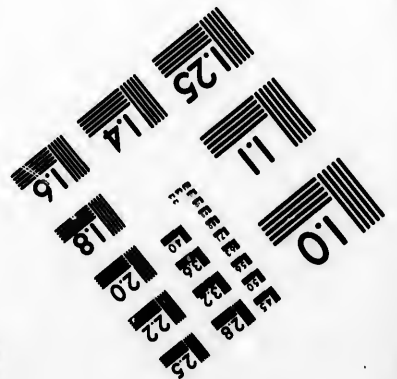
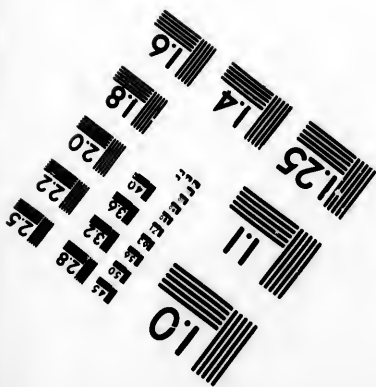
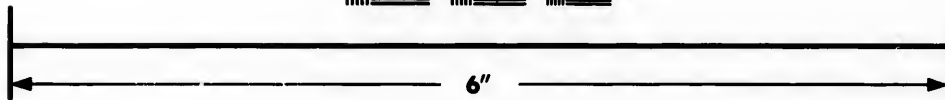
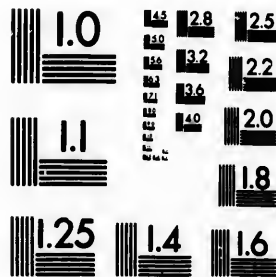
The longitude which DAGELET has deduced from  
his observations made at MACAO is 111° 19' 30"  
east from PARIS, that is, 14° 30' more to the east-  
ward than the determination on which I have  
fixed, and 9° 45' more than that adopted by RO-  
BERTSON.

2. PULO-CONDORÉ. In ROBERTSON'S Memoir,  
page 8, it is seen that the latitude of this island  
is between 8° 38' and 8° 40'; and he has fixed  
it at 8° 40', in his *Table of Positions*. That which  
I have adopted is the same, and this is the latitude  
given by the observation of the sun's meridian  
altitude, taken with sextants, at PULO-CONDORÉ,  
by W. BAYLY, and by Captain KING and other  
officers belonging to the RESOLUTION, on the  
21st, 26th, and 27th of January 1780: the mean  
result





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result would even be rather above than below  $8^{\circ} 41'$ .

As for the longitude, I do not differ a quarter of a minute of a degree from that in the *Connaissance des Temps*, but 13 minutes 38 seconds from that which ROBERTSON has given in his *Table of Positions*.

He says (page 8 of his Memoir) "that, by the "chronometers in the RESOLUTION, PULO-CONDORÉ lies in longitude  $106^{\circ} 18'$  east of GREENWICH,  $1^{\circ} 42'$  east of PULO-AOR;  $2^{\circ} 4'$  east of "PULO-TIMOAN; and  $2^{\circ} 5'$  west of PULO-SA-PATA;" and he fixes on the longitude of  $106^{\circ} 18' 00'$  east from GREENWICH.

It appears that ROBERTSON has adhered to the mean result of 49 sets of lunar observations made at PULO-CONDORÉ by Captain KING and other officers belonging to the RESOLUTION, which is  $106^{\circ} 18' 46'$ : but the mean result of the 22 observations by the astronomer BAYLY, is  $106^{\circ} 44' 29'$ ; and I have had the more reason to take the mean between the two mean results, as, if the one appeared to deserve a preference to the other, it would be that of BAYLY, since the extremes of his 22 individual results differ between them only  $0^{\circ} 40' 7''$ , while the extremes of the 49 particular results of the observations in the RESOLUTION dif-

\* See *The original astronomical observations, &c.* By W. Bayly, page 80.

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fer  $1^{\circ} 23' 15''$ \*. I have therefore placed PULO-CONDORÉ, according to the mean of the results of all the observations made in the harbour of that island in COOK'S voyage, in  $106^{\circ} 31' 38''$  east from GREENWICH, or  $104^{\circ} 11' 23''$  east from PARIS.

In the sheet No 51 of the supplement to the second edition of D'APRÈS' *Neptune Oriental*, is a plan of PULO-CONDORÉ; and under the title, stands a note which may lead into error such French navigators as are acquainted only with this *Neptune* for directing their route in the seas of ASIA: "This Island (it is there said) is situated in  $8^{\circ} 40'$  and  $45'$  north latitude, and  $103^{\circ} 40'$  west longitude from the meridian of PARIS:" the first of these latitudes is the true one; but the longitude indicated is too small by at least two-thirds of a degree.

3. PULO-AOR. The latitude which I give to it is the same as that in the *Connaissance des Temps*; and each is the mean result of the observations made in COOK'S third voyage.

That of ROBERTSON differs from it by upwards of twelve minutes in defect; and this difference is too great in a determination in latitude, for us not to have reason to be surpris'd at it, and to be

\* The original astronomical observations, &c. page 351.



apprehensive of an error on the one side or the other.

ROBERTSON says in his Memoir (page 9), that the latitude of PULO-AOR is between  $2^{\circ} 29'$  and  $2^{\circ} 30'$  north; in his *Table of Positions* (page 77) we find also  $2^{\circ} 30'$ ; and the island is laid down on his chart in  $2^{\circ} 30'$ : thus, there is no error of the press.

But W. BAYLY, in his *Table of Positions*, gives for the latitude of PULO-AOR, according to his own observations  $2^{\circ} 44' 00''$ : and according to those of KING,  $2^{\circ} 40' 00''$ ; mean  $2^{\circ} 42' 00''$ : and Captain KING, in the narrative of the voyage says that, on the 31st of January 1780, "at nine o'clock in the evening, the weather being thick and hazy, and the ships having outrun their reckoning from the effect of some current, we were close upon PULO-AOR, in latitude  $2^{\circ} 46' 00''$  north, before we were well aware of it\*:" thus, neither is there here an error of the press.

On which side lies the mistake? I dare not pronounce. I remark, however, that ROBERTSON merely says that the latitude of PULO-AOR is between  $2^{\circ} 29'$ , and  $2^{\circ} 30'$  north; but he neither quotes the observation nor the observer; and as he is tolerably exact, and with reason, in quoting both, when the determination is founded on

\* Cook's third voyage. Vol. III. pages 463 and 464.

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VOL. II.

an observation, it may be supposed that he knew of none that could fix the latitude of PULO-AOR\*. Perhaps, for want of an observation, he has taken the latitude of this island from Mr. DALRYMPLE's *Chart of the China Sea*, where it is placed, as well as on the charts Nos. 47 and 49, 2nd of the supplement of the 2nd edition of D'APRÈS' *Neptune Oriental*, in the same latitude as that assigned to it by ROBERTSON.

We must request the navigators who frequent this sea to ascertain, whenever they have an opportunity, which of the two positions is the true one.

4. PULO-SAFATA. My latitude, which will be found conformable to that given in the *Connaissance des Temps*, is the mean result of the observations made in COOK's third voyage;  $10^{\circ} 4' 00''$  by those of KING†: and by those of BAYLY‡,  $10^{\circ} 5' 0''$ . ROBERTSON (page 6 of his Memoir) says "The latitude of PULO-SAFATA I make by

\* The publication of the narrative and of the original observations of Cook's voyage is, however, prior by several years to the publication of Robertson's Memoir and Chart: Why does he not make use of these observations? Why does he not quote them? I am ignorant of the reason. Has he considered that they ought not to be admitted? In that case, he ought to have said so, and exposed his motives for rejecting them.

† Cook's *third voyage*. Vol. III. page 447.

‡ *The Orig. Astron. Observ. &c.* page 351.

VOL. II.

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“*satisfactory* observations to be  $10^{\circ} 1' 30''$  north;” but as he neither adds whether these observations were made by himself, nor by whom they were made, I have thought it my duty to adhere to those the observers of which are known; and I have placed PULO-SAPATA in  $10^{\circ} 4' 30''$  north latitude. It is in  $10^{\circ} 00'$  on DALRYMPLE'S *Chart of the China Sea*, and on the copy which D'APRÈS has given of it.

In order to fix the longitude of this island, ROBERTSON has had regard only to its mean difference of meridian,  $2^{\circ} 55' 00''$  with respect to PULO-CONDORÉ; which he places according to the observations made in COOK'S voyage, in  $106^{\circ} 18' 00''$  east from GREENWICH, or  $103^{\circ} 57' 45''$  east from PARIS, which would give  $108^{\circ} 53' 00''$  east from GREENWICH for PULO-SAPATA: however, in his *Table of Positions* he carries it to  $108^{\circ} 55' 00''$ , or  $106^{\circ} 34' 45''$  east from PARIS. He adds (page 7 of his Memoir) that “there is little doubt of its true longitude being somewhere within  $108^{\circ} 53'$  and  $109^{\circ}$  east from GREENWICH.”

In placing PULO-SAPATA  $106^{\circ} 40' 45''$  east from PARIS or  $109^{\circ} 1' 00''$  east from GREENWICH, I do not recede from the opinion of ROBERTSON; but I obtain this result by making the longitude of SAPATA depend on the longitudes observed of MACAO, PULO-CONDORÉ, and PULO-AOR,

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LO-AOR, and taking a mean between the three determinations which result from the differences of meridian observed between PULO-SAPATA and each of the three other points (page 333 of this Vol. Note †.)

## NOTE LXI.

On examining the distance and the bearing of the islots called THE TWO BROTHERS with respect to PULO-SAPATA, on the *Chart of the China Sea* by ALEXANDER DALRYMPLE, and on the *General Chart of the World*, constructed by Lieutenant ROBERTS to accompany the narrative of COOK's third voyage, we find a somewhat considerable difference respecting the relative position which the two charts have given to the islots and the island.

On DALRYMPLE's chart, THE TWO BROTHERS are situated at the distance of 33 miles, to the north  $17^{\circ}$  west of the largest of the PULO-SAPATA: and according to ROBERTS's chart, that would be to the north about  $40^{\circ}$  east, and at a greater distance than according to the former, by 10 or 15 miles, as far as the smallness of the divisions of the scale admit of its being estimated.

The bearings which were taken on board the SOLIDE in sight of the islots and in sight of the island, the course which she followed in order to repair from one point of bearing to the other,

and the number of leagues which she ran on this course, furnish us with the data necessary for determining, by approximation, the relative position of THE TWO BROTHERS and PULO-SAPATA.

On the 11th at forty minutes past four o'clock in the afternoon, THE TWO BROTHERS bore west by south, at the distance of about 5 leagues or 15 miles: thus, comparatively to the point where the bearings were taken they were 2.9 miles more to the southward, and 14.7 miles more to the westward than the ship.

At three quarters past midnight, the largest of the PULO-SAPATA bore directly west, distant 5 miles.

On reducing into a single course all those which the SOLIDE ran in the interval from one bearing to another\*, we find that she made 18.5 miles southing and 3.25 miles easting.

But I remark that, on comparing the latitude observed on the 11th at noon (JOURNAL OF THE ROUTE)  $11^{\circ} 14'$ , with that of PULO-SAPATA (on the parallel of which the ship was at the moment of the bearing being taken at three quarters

hours.	miles.	hours.	miles.
* From $4\frac{1}{2}$ to 5 SW $4^{\circ}$ S.	2.0	From 8 to 9 SSE	1.5
From 5 to 6 SW by S.	6.7	From 9 to 11 SE	6.0
From 6 to 7 SSE $\frac{1}{2}$ E.	1.25	From 11 to 12 SE by S.	3.0
From 7 to 8 SE by S.	1.5	From 12 to $12\frac{1}{2}$ SSE	1.1

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\* According to  
(page 351 of the  
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† From noon to  
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midnight), that is to say, with  $10^{\circ} 4' 30''$ , it is seen that, from noon to three quarters past midnight, the ship's real progress towards the south had been  $1^{\circ} 9' 30''$ , or 69.5 miles: and, as according to the dead reckoning, the apparent progress towards the same side, and in the same interval of time, had been only 41.5 miles †; it follows that the dead reckoning had been in error 28 miles, in the space of  $12\frac{1}{4}$  hours; and proportionably, in the space of 8 hours and 5 minutes, elapsed between the time of taking the first bearing and that of taking the second, the error must have been 17.74 miles: adding this latter quantity to 18.5 miles apparent progress towards the south, we shall have the real or corrected progress, in the interval from one bearing to the other, 36.24 miles.

The parallel of the point whence the second bearing was taken, which is the parallel of PULO-SAPATA, is therefore less northerly than the

\* According to the observations made in *Cool's* third voyage (page 351 of the collection) the latitude of *Pulo-Sapata* is, according to *King*  $10^{\circ} 4'$ ; according to *Bay*,  $10^{\circ} 5'$ ; by a mean  $10^{\circ} 4\frac{1}{2}'$ .

† From noon to 40 minutes past four o'clock on the 11th the courses had been SW 28 miles and SW.  $4^{\circ}$  S. 4 miles, which gives 23 miles southing, and as the progress towards this same side from 40 minutes past 4 to three quarters past midnight had been 18.5 miles, that the whole of the progress from noon to three quarters past midnight, was 41.5 miles.

parallel of the point whence the first was taken, by 36.24 miles; but **THE TWO BROTHERS** were less northerly than the point of the first bearing by 2.9 miles: they are therefore more northerly than **PULO-SAPATA**, by 36.24 miles *minus* 2.9 miles, or 33.34 miles.

Admitting the progress towards the east, in the interval of the two bearings, from 40 minutes past four o'clock to three quarters past twelve, such as it is given by the run by account, the point of the former is more westerly than that of the latter by 3.25 miles: and as **PULO-SAPATA** is more westerly than that of the latter, by 5 miles, it is more westerly than that of the former, by 1.75 miles. But **THE TWO BROTHERS** are more westerly than the point of the former bearing by 14.7 miles: therefore they are more westerly than **PULO-SAPATA**, by 13 miles in round numbers.

On the other hand, we have seen that the **TWO BROTHERS** are more northerly than **PULO-SAPATA**, by 33.34 miles: on combining this quantity which they are more to the westward with that which they are more to the northward than the island, it will be found that **THE TWO BROTHERS** are with respect to the great **PULO-SAPATA**, north  $21^{\circ} 20'$  west, and at the distance of  $35\frac{1}{2}$  miles.

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them by DALRYMPLE'S chart, which places the islots to the north  $17^{\circ}$  west of the island, and at the distance of 33 miles.

Although by the method, which I have employed for ascertaining this position, there can be obtained only a result of *approximation*, that result, however, is sufficiently exact for concluding with certainty, that these two points are better placed, with regard to each other, on DALRYMPLE'S chart than on that constructed by ROBERTS for COOK'S voyages, since on the latter, we see THE TWO BROTHERS situated at the distance of 40 or 50 miles, to the north  $40^{\circ}$  east of the great PULO-SAPATA.

N. B. The remarks which Captain MARCHAND and Captain CHANAL had an opportunity of making on the strength and direction of the currents in the CHINA SEA, till they quitted that Sea by the Strait BETWEEN BANCA and BILLITON and that of SUNDA, are to be found in the NARRATIVE itself, under the dates of the 15th, 18th, 19th, and 25th of December.



## NOTE LXII.

*ANALYSIS of the general Chart of the two Straits situated between the Island of BANCA and that of BILLITON, known by the name of GASPAR'S STRAIT and CLEMENTS' STRAIT, with sailing directions relative to the two passages.*

(See the general chart *Plate VII*, and the particular Chart *Plate VIII*).

The east coast of the Island of BANCA and the west coast of the Island of BILLITON leave between them a large passage which was at first known only by the name of GASPAR'S STRAIT, because D'APRÈS DE MANNEVILLETTES published, in 1775, the first Plan of this Strait (No. 48 of the second edition of his *Neptune Oriental*), under the title of "*Petit Plan DU DÉTROIT A L'EST DE BANCA, par lequel a passé un navire Espagnol commandé par le Sieur GASPAR,*" no date". But, in 1781, Captain JOHN CLEMENTS, commanding a fleet of English East-Indiamen, crossed between BANCA and BILLITON by another passage than that through which GASPAR had passed; and, since, several English and French navigators have passed through both, and given us particular charts of them. This strait has long been frequented by the Portuguese; but it is well known that the navigators of that nation publish nothing.

\* *Alexander Dalrymple* has given a copy of it in his collection of Plans of the Seas of Asia.

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The great Strait BETWEEN BANCA AND BILLITON, whose width is about fourteen leagues from the one island to the other, is divided into two arms by a small island which the English have named MIDDLE Island, and which is also called PASSAGE Island.

This Strait therefore affords two Passages: the former, or the WEST PASSAGE, between BANCA and MIDDLE Island; the latter, or the EAST PASSAGE, between MIDDLE Island and BILLITON.

We have five charts of the WEST PASSAGE: the first is that of Captain GASPAR, which also comprehends the EAST PASSAGE: but the latter is there represented in a manner which must induce the belief that it is impracticable.

The second is a manuscript chart of DORDELIN, an officer belonging to the French navy, commanding the ships TRITON, PROVENCE, and SACITTAIRE, who passed through the WEST PASSAGE, in going to CHINA, in 1784, and on his return in 1785: he has annexed to it views of the land and a few remarks.

The third is that of Captain LESTOCK WILSON, an Englishman commanding the ship CARNATIC, coming from CHINA in 1787: Mr. DALRYMPLE has published it in his collection of Plans, and has printed the journal and observations of Captain WILSON, in his collection of *Memoirs*, &c. This chart deserves particular attention, because the intelligent and enlightened navigator by whom it

was

was constructed, has there drawn all the angles of bearing inserted in his journal, to which the chart is faithfully subjected; and the different points are connected with each other by trigonometrical operations: we remark above all that frequently, from the same station, two points are set by each other or by opposite rhumbs: as, for instance, one point by another, north by east; or else, a point north by east, at the same time that he set another south by west: and it is well known that bearings of this sort are the only ones which, for fixing relative positions, present an incontestable exactness.

The fourth chart is that of Captain JOHN PASCAL LARKINS, commanding the ship WARREN HASTINGS, coming from CHINA in 1788; it was published in the collection of Mr. DALRYMPLE'S plans, and the Journal, in his collection of *Memoirs*. I wish it were in my power to bestow the same praise on this chart as on that of Captain WILSON; but it is seldom found to agree with the Journal, according to which it ought to have been constructed; and the lands on it seem scattered and represented at random: fortunately, his journal furnishes data which may be employed very usefully in the plan of GASPAR'S Strait.

The fifth, in short, is the chart which was constructed in 1791, by Captain CHANAL, and the Engineer LE BRUN, on board the ship SOLIDE, commanded by Captain MARCHAND, coming

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We have but three plans of the EAST PASSAGE; and they can be reckoned only as two.

The first is that of Captain JOHN CLEMENTS, commanding a fleet of Indiamen: he is, as I have already said, the first known navigator who attempted in 1781 to pass through the EAST PASSAGE, and struck out this new track to the ships of his nation. The name of CLEMENTS' Strait distinguishes it from the WEST PASSAGE OF GASPAR'S STRAIT. The plan of this Strait was constructed by GEORGE ROBERTSON, an officer employed on board the Commodore's ship, the *VAN-SITTART*\*; Mr. Dalrymple was the first who published it, in his *Collection* in 1786: and, in 1788, ROBERTSON brought out a *Plan of Gaspar's and Clements' Straits* together, without any scale of latitude, like that of 1786, but with a scale of marine miles of 2½ lines to a mile. In the same year, he published a chart of the *Straits of Banca, Gaspar, and Clements*, united in the same sheet on a scale of six inches to a degree. On both are drawn the tracks of the different English navigators who have passed through these Straits.

From this exposition of ROBERTSON'S labour,

\* This is a mistake: though ROBERTSON was on board the *Van-sittart*, the Commodore's ship was the *Glatten*. *Translator.*  
which

which appears to have been performed with equal care and intelligence, it seems that it might have been sufficient to copy his chart or his plan, and to add to it the track of the French navigators; but I hope that the seamen who shall read the analysis of the new chart which I present to them, will be of opinion that ROBERTSON'S chart and plan stand in need of some corrections; and, no doubt, a longer acquaintance with these straits will soon prove that this new chart itself is susceptible of improvement. I will not dissemble, that it still leaves much to be wished for: what! does not every one know that a sea chart is never finished?

The second plan of the EAST PASSAGE is a chart of Captain ALLEN COOPER, commanding the ship ATLAS, in 1785, and coming from the southward. This chart is comprised in the *Collection* of Mr. DALRYMPLE who has also published, in his collection of *Memoirs*, Captain COOPER'S Journal; all the points there correspond very exactly with the bearings inserted in the journal.

Of these six charts or plans (for that of GASPARD is too defective in every part for it to be made any use of), I have formed a general chart which comprehends the two PASSAGES, and presents the whole of the great STRAIT BETWEEN BANCA AND BILLIMON: the plans of the WEST PASSAGE are connected to those of the EAST PASSAGE by GASPARD'S and MIDDLE Islands which are

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are common to the two passages; and from which bearings have been taken on the two routes. But in order to enable enlightened navigators to judge of this new chart, I must discuss the materials of which I have made use, and examine, point by point, and contradictorily, the journals and charts, which, till this day, have come to my knowledge.

I begin by the analysis of the **WEST PASSAGE**; and, in going from the northward to the southward, it will lead us to the points which are common to the two passages.

I. The northern coast of **BANCA**, from Point **PISANT** to its **EAST** Point, was drawn from the journal and chart of Captain **CHANAL**, who took bearings of the different points.

The four **BREAKERS** situated to the north-east of Point **BRISÉE** of **BANCA** and marked on my chart a, b, c, d, as well as the isles and islots to the eastward of that point, were in like manner subjected to bearings taken on board the **SOLIDE** \* which,

\* On the 21st of December 1791, at three quarters past 4, P. M. Point *Brisée*, bore S. 30° W. the first island on the coast, to the eastward of this point, S. from 17 to 20' W: the second island S. from 10 to 12° W.

Captain **MARCHAND** hauled close on a wind on the larboard tack, with a fresh breeze at N. N. W. in order to avoid a breaker which was perceived to the southward.

At 4 minutes after 5, this breaker bore S. 18° W.  $\frac{1}{2}$  or 3 miles.

At 12 minutes after 5, a second breaker shewed itself to the north 15° east distant  $\frac{1}{4}$  or  $\frac{1}{2}$  miles.

At

which, as is seen by her track drawn on the chart and mentioned in the narrative, passed between

At the same instant, a third was seen to the south  $3^{\circ} 30'$  west, at the distance of 3 or 4 miles.

The SOLIDE bore up to the south-east in order to clear a fourth breaker which was seen ahead.

At 50 minutes after 5, the first island that had been set, bore from south  $43^{\circ}$  to south  $49^{\circ}$  west; the second, from south  $38$  to  $40^{\circ}$  west.

At 2 minutes after six, the fourth breaker which had been seen, bore south  $67^{\circ}$  east, distant 4 or 5 miles.

From three quarters past four, the soundings had been 12, 13, and 14 fathoms, over a bottom of sand, gravel, and broken shells: the same bottom continued till  $\frac{1}{2}$  past 6, when Captain Marchand came to an anchor, in 14 fathoms, with the same kind of bottom.

During the night, there was a moderate breeze from the north-west with clear weather: the currents set faintly to the south-south-east and east-south-east.

On the 22nd at break of day, the following bearings were taken: Point *Brise* S.  $\frac{1}{2}$  W. the third island, from south  $35^{\circ} 30'$  to south  $38^{\circ}$  west—the fourth island, from south 2 to south  $4^{\circ} 30'$  west.

Captain Marchand got under way at 50 minutes past 7, and steered S. S. E.  $\frac{1}{2}$  E: still carrying 14 fathoms, over a bottom of sand, gravel, and broken shells.

At 50 minutes after 8, Point *Brise* west  $1^{\circ} 30'$  south—the third island, from south  $56^{\circ}$  to south  $67^{\circ} 30'$  west—The fourth island, from south  $34^{\circ} 30'$  to south  $35^{\circ} 30'$  west—at 40 minutes past 9, the third island from south  $83^{\circ}$  to south  $84^{\circ}$  west; and the fourth or last island, from south  $67^{\circ}$  to south  $70^{\circ}$  west. This last appears to be surrounded by breakers.

From that moment, Captain Marchand stood south east by south—soundings from 14 to 13 fathoms, constantly the same kind of bottom, till 4 minutes after 11, when having perceived from

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tween the four BREAKERS to the north of BANCA, in the midst of which she anchored. The MAS-CARIN, commanded by our Captain CROZET, in 1773, had passed and anchored there like the SOLIDE\*; and it appears that, as far back as 1702, the English galley the MACCLESFIELD had taken her route through these BREAKERS†. These two are the same that Captain WILLIAMS in the SULLIVAN saw and took bearings of in December 1784; but it appears, from what is said in his journal, that he saw three only; and, on setting off these bearings on my chart, we conceive that the BREAKERS which he saw are the three westerly ones, and that he did not perceive the fourth, situated to the eastward of these. The Journal of

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from the masthead *Gasper* Island to the east 6° south, he steered S. E. by E.

At a quarter past 11, the high mountain of *Banca* bore from S. 13° to S. 42° W.: still 14 fathoms, *with the same kind of bottom.*

\* See her track drawn on the chart No. 49 2nd of the second edition of *D'Après Neptune Oriental*: a copy of it is to be found in *Alexander Dalrymple's* collection of Plans.

Mr. *Dalrymple* has published, under the date of the 17th of December 1781, a *View of Banca*, of the islots and the breakers, taken from the point where *Crozet* had anchored. This plan, which is inserted in his *Collection*, is to be found there under the title of *Plan of the Place where Monsieur Crozet anchored* (latitude 1° 56' south) on the east side of *Banca*, on the 13rd of March 1773.

† Farther on will be found an extract from his journal, taken from the collection of *Memoirs*, published by *Alexander Dalrymple*.

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the **SULIVAN** makes no mention of the small islands: it is only said there that, at noon of the day on which, in the afternoon, the **BREAKERS** were discovered, there was seen, from the mast-head, an island to the south-south-west; but the weather was so over-cast, that **BANCA** could not be seen\*.

In following on **D'APRÈS'** Chart (No. 49 2nd) the Track of the **MASCARIN** which came from the eastward, it is seen that **CROZET** had first perceived the **BREAKERS** which are situated to the north by west of **GASPAR** Island (the principal leading mark in the Strait); and that before he had reached the four **BREAKERS** to the northward

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\* Extract from the journal of the Sullivan, Captain *Stephen Williams*, coming from *China*, taken from the *Collection of memoirs published by Alexander Dalrymple, Appendix to memoirs of Charts of Sunda and Banca*, pages 15 and 16.

" On the 25th of December 1784, At 6 A. M. the weather clearing a little, saw the island of *Banca* S. W. by W.

" At 8 A. M. saw a high body of land from S. by W. to W. by N. which is the land we first saw; distant from the nearest shore about 5 leagues."

" At noon saw an island from the mast-head S. S. W. being very cloudy could not see *Banca*."

" At half past 2 P. M. saw three shoals of Breakers, one bearing about S. S. W. 3 miles distant—another S. E. by S. 5 miles, and another E. N. E. about 4 miles."

" I immediately hauled my wind to the northward. (Wind N. W. course N. N. E.)"

" At half past 4 P. M. the northernmost breakers bore S. E. by E.  $\frac{1}{2}$  E. distant full two miles; on the breakers there appeared two or three rocks above water."

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of BANCA, he had seen in the interval a *solitary BREAKER* which is laid down on D'APRÈS' chart, and which I have thought necessary to preserve on mine, because, if its position be doubtful, its existence is certain. The SOLIDE's track passes three leagues to the eastward of this *solitary BREAKER*: it was not seen by Captain MARCHAND; but a *BREAKER* which, perhaps, does not always break, may probably not be perceived at three leagues' distance.

II. Let us endeavour to fix the latitude of GASPAS Island, the principal leading mark for ships that are bound through the straits from the northward.

On the old Plan published by D'APRÈS, No. 48 of the second edition of his *Neptune Oriental*, GASPAS Island, under the name of *Ile du PASSAGE* (PASSAGE Island), is placed in  $2^{\circ} 6'$  south latitude. This latitude is certainly smaller than the true, by upwards of a quarter of a degree: but how had it been observed? by whom? and with what instrument?

On D'APRÈS' CHART No 49 2nd, a copy of which is to be found in Mr. DALRYMPLE'S Collection, and on which is marked a track of CROZET, in 1773, which passes to the northward of the straits and pretty near GASPAS Island, the latitude of the middle of this island is  $2^{\circ} 17'$ ;

but we are ignorant by what proceeding it was determined.

ROBERTSON'S Plan, inserted in Mr. DALRYMPLE'S collection, under the date of 1786, has no scale of latitude: in that which ROBERTSON himself published in 1788, and which differs from the former only by its being on a larger scale, and also comprehending GASPAR'S STRAIT, we read in the parallel which passes through the peak of GASPAR'S Island, *Latitude South*  $2^{\circ} 20'$ ; but it is not mentioned that this latitude was observed; we are even justified in thinking that it was not; for we remark that the smallest distance at which CLEMENTS was from the island, is 26 miles to the south-east: and if, in this position, he had deduced the latitude of GASPAR Island from so disadvantageous a bearing, especially when it is combined with so great a distance, this determination could not but be very doubtful. Indeed, it does not appear that ROBERTSON has adopted it exclusively: for in his Table of Latitudes and Longitudes which is to be found at the end of the Memoir that he published with his handsome Chart of the CHINA SEA\*; the Peak of GASPAR Island is placed in latitude  $2^{\circ} 27'$ , though, on his Plan of the Strait, it is laid down in  $2^{\circ} 30'$ , and though, in his chart of the

\* *Memoir of a Chart of the China Sea, &c. by George Robertson, London, 1791, 4to, page 123.*

Dec. 1791.]

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Journal, page 24

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*Straits of Banca, Gaspar and Clements*, it is also  $2^{\circ} 30'$ : and, in the same Table, he gives a second latitude of the same point of GASPAR Island, of  $2^{\circ} 25' 35''$ : this last is accompanied by the mark †, which indicates the positions deduced from the observations of Captains HUDDART, HODGSON, and WILSON, "which," he says, "are "seemingly well determined."

DORDELIN, in a manuscript Memoir, relates that, on the 3rd of August 1784, GASPAR Island bore from him at noon, from north-east by north  $3^{\circ} 45'$  north to north-north-east, distant 5 leagues: which places the south coast of the island in  $2^{\circ} 22'$ , and its peak in  $2^{\circ} 21' 15''$ .

On the 23rd of February 1785, on his return from CHINA, the observed latitude of the ship was  $2^{\circ} 24'$ , and GASPAR Island bore at the same moment, from east  $15^{\circ}$  south to east  $26^{\circ}$  south, at the distance of 3 or 4 miles at most: which gives  $2^{\circ} 24' 30''$  for the north coast of the island, and  $2^{\circ} 25' 15''$  for the Peak.

On the same day the captain of the ship the PROVENCE (a man of great reputation, says DORDELIN), which was sailing in company with the TRITON, had an observed latitude of  $2^{\circ} 22'$ , which would give for the Peak of the island  $2^{\circ} 23' 15''$ .

Captain COOPER, in 1785, says, in his printed Journal, page 24, that, on the 8th of August, he took his departure from GASPAR Island, as it bore

bore at noon of that day, north  $19^{\circ}$  east distant 4 or 5 miles. The latitude of the ship, observed at noon, was  $2^{\circ} 33'$ , whence we conclude that the latitude of the island, according to the bearing, is  $2^{\circ} 28' 45''$ : but the observation is marked *indifferent*, that is neither good nor bad, doubtful; and we must imagine that COOPER did not consider himself bound to adhere to it; for, after having said in his Journal, that he places GASPAR Island in latitude  $2^{\circ} 30'$  south, we find it placed on his chart, in  $2^{\circ} 21' 20''$ , at its middle.

Captain WILSON, in 1787, deduced from his observations and from his bearings in the Strait the latitude of GASPAR Island  $2^{\circ} 22' 00''$  (page 28 of his printed Journal) but it is not mentioned to what point of the island he applies it: on his chart, the north coast of the island is in  $2^{\circ} 19'$ , the Peak, in  $2^{\circ} 20'$ , and the south coast, in  $2^{\circ} 21'$ .

Captain LARKINS, in 1788, having got aground on the Shoal which he discovered to the north-west of GASPAR Island, there observed the latitude (page 16 and 17 of his Journal): on the 2nd of May  $2^{\circ} 22'$ ; on the 3rd,  $2^{\circ} 23'$ ; on the 4th,  $2^{\circ} 22'$ ; by a mean,  $2^{\circ} 22' 20''$ , and the point where he struck is laid down on his chart of the Strait in  $2^{\circ} 23'$ .

But he says (page 16,) that from this very point the centre of GASPAR Island bore south  $70^{\circ}$  east distant 6 miles: this island would therefore be according

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\* See the Journal  
Dec. 1791.

according to the bearing  $5\frac{1}{2}'$  more to the southward than the point where he struck, and consequently in  $2^{\circ} 28' 40''$ ; but, on his chart, it is placed in  $2^{\circ} 25' 45''$ . I am ignorant of the cause of this difference; but it will be seen hereafter that there must be an error in the distances estimated by the eye; for it is impossible to make these distances agree with the angles of bearing taken, from the place where the ship got aground, to the middle of GASPARD Island and to the middle of ROCHER NAVIRE, the TREE ISLAND of the English.

On the 22nd of December 1791, Captains MARCHAND and CHANAL deduced from their observations at noon the latitude of the SOLIDE,  $2^{\circ} 21'$ , and as the Peak of GASPARD Island bore, at the same instant, directly east of the ship, its latitude is the same as that of the SOLIDE\*.

On recapitulating all the latitudes of GASPARD Island which I have mentioned:

GASPARD'S Plan.....	2	5	00
CROZET'S Track .....	2	17	00
ROBERTSON'S { Memoir .....	2	27	00
{ Plan and Chart ..	2	25	35
	2	30	00

\* See the *Journal of the Route* at the date of the 22nd of Dec. 1791.

DORDELIN, 1784.....	2	21	15
DORDELIN, 1785.....	2	25	15
The ship the PROVENCE .....	2	23	15
COOPER } Journal.....	2	30	00
} On his chart .....	2	21	20
WILSON } Journal .....	2	22	00
} On his chart.....	2	20	00
LARKINS } Journal .....	2	28	40
} On his chart .....	2	25	45
MARCHAND and CHANAL } Journal and chart } .....	2	21	00

it is seen that, with a great number of determinations, the latitude of GASPAR Island cannot be determined in an incontestible manner. Navigators, no doubt, will not be willing to admit the first two, the foundations of which are unknown, and which besides differ too much from those that have been subsequently observed; those of DORDELIN and of the ship the PROVENCE depend on estimated distances: those of the English present, in general, one quantity in their Journals, and another quantity on their charts; the latitude determined by Captains MARCHAND and CHANAL is the only one against which no objection can be made; the ship was exactly on the parallel of the Peak of GASPAR Island, at the moment when a good observation gave  $2^{\circ} 21'$  for

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for the latitude ; I remark, besides, that this determination is the same as that of DORDELIN in 1784 ; the same as that which COOPER has employed on his chart ; the same, within a minute, as that given by Captain WILSON whose observations are reputed correct. I add another remark to the first. Navigators know that it is very difficult to determine with exactness the latitudes of points situated near the equator, especially in the months when the sun has little declination, because the meridian altitude of the sun cannot be observed with precision, when the luminary culminates near the zenith of the observer\* : now the observation of Captains MARCHAND and CHANAL was made on the 22nd of December, a day of the summer solstice in the austral hemisphere, that is, at one of the periods of the year the most favourable for having, at noon, the sun less near the zenith, when the observer is in the parallels in the vicinity of the equator ; whereas COOPER having observed on the 8th of August ; DORDELIN, on the 3rd of August and 23rd of February ; LARKINS, on the 2nd of May and following days ; those navigators must have had the

\* It is to this difficulty of observing exactly the meridian altitudes of the sun near the zenith, that must be attributed the great differences that are remarked between the latitudes which different seamen, good observers, have given to the same points of the west coast of *Africa* situated in the vicinity of the equinoctial line.



sun much nearer the zenith than the observers of the SOLIDE had, I am therefore of opinion that, without fearing to be suspected of too favourable a prepossession for the observation of these last, I can grant it the preference to the others, and place the Peak of GASPARD Island in latitude  $2^{\circ} 21'$  south.

As for its longitude, it may be determined by approximation.

In G. ROBERTSON'S Table, we find two positions which differ little from each other: the first, marked \*,  $107^{\circ} 4'$  east from Greenwich, or  $104^{\circ} 43' 45''$  east from PARIS, is that which Robertson has discussed and which he has employed in his chart of the CHINA SEA \*: the second, marked †;  $107^{\circ} 7' 15'$  east from GREENWICH, or  $104^{\circ} 7'$  east from PARIS, is that which WILSON'S observations have given; but it will be  $104^{\circ} 48' 45''$  if we place PULO-AOR, from which he deduced its longitude by a chronometer, in  $102^{\circ} 19' 45''$  west from PARIS †.

\* Mr. Robertson has varied respecting the longitude of Gaspard island: for it has just been seen that, in his *Table of Positions*, published in 1790, he gives this longitude  $107^{\circ} 4'$  east from Greenwich, and this is within 2 minutes, that of his *Chart of the China Sea*, published the same year on which Gaspard is placed in  $107^{\circ} 2'$ ; but on his chart of *the Straits of Banca, Gaspar, and Clements*, 1788, and on his large *Plan of Gaspar's and Clements' Straits*, the same year, it was  $106^{\circ} 53'$ , and  $106^{\circ} 54'$ .

Captain

Captain COOPER (page 24 of his Journal) says that he has placed GASPAR Island, by his chronometer *corrected*, in longitude  $106^{\circ} 55'$  east from GREENWICH, or  $104^{\circ} 34' 45''$  east from PARIS. But Mr. DALRYMPLE, who in his collection of *Memoirs*, has printed COOPER's original Journal, observes, in an introduction which he has prefixed to this Journal (page iv) that at the time when this navigator passed the Strait, his chronometer did not give the longitude with *competent precision*.

Captain CHANAL, in comparing his dead reckoning, corrected by allowing for the effect of the currents, to the longitude of the NORTH point of BANCA, such as it is given on D'APRÈS' chart, reckoned that the longitude of the ship, on the 22nd at noon, was  $104^{\circ} 12'$  east from PARIS: and, as at this period, the distance from the Peak of GASPAR Island, estimated by the eye, was 28 or 29 miles east, he makes the longitude of the Peak  $104^{\circ} 40'$  or  $41'$ .

In taking a mean between the determinations which I have just mentioned; but excluding the third, which differs too much from the other three, and granting something more to that of WILSON than to the first two, we might place the Peak of

† See Note LX. pages 437 and 442 are the longitude which Robertson has given to *Pulo-Aor* and that which I have deduced: *Wilson's* chronometer gave him for *Gaspar*  $2^{\circ} 29'$  east from *Aor*. (See his Journal page 28.)

GASPAR

Captain

GASPAR Island in longitude  $104^{\circ} 45' 00''$  west from PARIS, or  $107^{\circ} 5' 15''$  west from GREENWICH.

III. After GASPAR island, which as I have said, is properly the leading mark for the entrance of the strait, in coming from the northward, the point that it is of most importance to fix, is the dangerous shoal which Captain LARKINS discovered in 1788, on which his ship remained aground for three days, and which may be called the WARREN HASTINGS' Shoal, from the name of his ship: unfortunately, the contradiction that is to be found between his journal and his chart leaves a great uncertainty respecting the real position of this shoal in regard to GASPAR Island and TREE Island; but at least navigators will be apprised that they have to avoid a shoal situated to the west-north-west of the island. I shall compare the bearings and distances, such as they appear in the Journal taken from the point where the ship struck on the east edge of the shoal, with the bearings and distances of the same points such as they stand on the chart.

*In the Journal* (page 16.)      *On the Chart.*

The high land of BAN- } Is not on the chart.  
CA, S.  $58^{\circ}$  W. }

The extremes of BANCA, } The east point of BAN-  
from S.  $22^{\circ}$  W. to S. } CA S.  $35^{\circ}$  W. The  
 $62^{\circ}$  W. } lands more to the  
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The

*In the Journal*  
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*In the Journal* (page 16)      *On the Chart.*

The centre of GASPAR }  
 island S.  $70^{\circ}$  E. distant 6 } S.  $60^{\circ}$  E. 6 miles.  
 miles.

TREE Island; or Ro- } Directly south of the  
 CHER-NAVIRE S.  $17^{\circ}$  } shoal,  $5\frac{1}{2}$  miles.  
 E. distant 9 miles.

The comparison of the positions given in LARKINS'S Journal and of those which he has employed in his Chart, is sufficient, without any observation, to shew the want of agreement.

Let us first endeavour to place TREE Island (ROCHER NAVIRE) in the position which it ought to have with respect to GASPAR Island; we shall afterwards see how it will be possible to subject the WARREN HASTINGS' Shoal to these two points, by the bearings which LARKINS took of them, while he lay aground.

WILSON, page 4 of his Journal, says that, passing to the westward of TREE Island, GASPAR Island bore in one with it, north  $62^{\circ}$  east, or east  $28^{\circ}$  north; but this linear direction, on his chart, is that of the centres of the two objects; and the most southern part of the island there lies, with respect to the most southern part of TREE Island, east  $22\frac{1}{2}$  or  $23^{\circ}$  north. The bearing of these last two points is exactly the same on DORDELIN'S manuscript chart, on ROBERTSON'S large plan, and on LARKINS'S chart: and the SOLIDE, in  
 passing

passing to the westward of TREE Island, at the distance of about five miles, had the south point of GASPAR in one with the south islot of TREE Island, bearing east  $23^{\circ}$  north\*. On ROBERTSON'S large Plan, the centres of the two objects, as well as their most southern points lie in like manner, with respect to each other east-north-east and west-south-west. This bearing of the centre of TREE Island, to the south  $62^{\circ}$  west, or west,  $28^{\circ}$  south, from the centre of GASPAR Island, therefore, appears ascertained in such a manner that it may be employed with safety; and it is, no doubt vaguely, that Captain COOPER says, in his Journal, that TREE Island is to the south-west of GASPAR Island; for, on his chart, he has placed the south islot to the west  $22$  or  $23^{\circ}$  south of GASPAR.

As to the distance of TREE Island from GASPAR Island, the Plan of DORDELIN † who passed between them both, in going to and coming from CHINA, and anchored there, gives us the width of the channel, from coast to coast,  $5\frac{1}{2}$  miles, and it is the same on ROBERTSON'S large plan, and there are seen four tracks of ships, marked between GASPAR Island and TREE Island.

Captain WILSON, (page 28 of his *Journal*) has

\* See the Narrative, vol. II. at the date of the 22nd of December, 1791.

† The scale of this Plan is 7 inches 7 lines to a degree.

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concluded from his different bearings, taken from a base which he measured by the ship's way, that this width was 6.64 miles; but he does not say whether it be from *coast to coast*, or from *centre to centre*; on the chart, this distance of 6.64 miles, is that from *coast to coast*; and that from *centre to centre* is there about  $7\frac{1}{2}$  miles. The method which he employed for measuring the width of the channel is not susceptible of very great precision: but, in combining some other bearings which he took in the strait, and particularly those from his station A, we find that the distance from TREE Island to GASPAN Island, taken from *centre to centre*, may be reduced to 7.2 miles in lieu of 7.5. I observe, besides, that there is never any inconvenience in presenting on a chart a channel a little narrower than it really is, and that there is a great deal in presenting it too wide.

In saying that there is no danger in diminishing a little the width of the channel between GASPAN Island and TREE Island, I shall not propose however, to reduce it to  $3\frac{1}{2}$  miles, as it is seen on Captain LARKINS'S chart: this navigator did not pass through the channel; from afar he estimated the distance from the one island to the other, while he lay aground on the WARREN HASTINGS'S Shoal. It appears that he has judged no better of the distance from his shoal to TREE Island, on the one hand, and to GASPAN Island, on

on the other: and we must choose between his angles of bearing and his estimated distances, which it is impossible to make agree. But we cannot hesitate respecting the choice; the angles were measured *by the compass*, and this measure must be as exact as the nature of the instrument allows of, whereas the distances were estimated *by the eye*, and all seamen know that, especially when small islands are in question, errors somewhat considerable may be committed in estimations of this nature.

We are convinced that the distance which LARKINS has estimated between TREE Island and GASPARD Island, is too small, and those which he has supposed between each of those two points and the WARREN HASTINGS'S Shoal, are so too. In order to learn by approximation these two last-mentioned distances, I have made use of the distance between the two islands, which I have before established of 7.2 miles from *centre to centre*, and of their bearing south  $62^{\circ}$  west and north  $62^{\circ}$  east, which has been well ascertained.

With these data and the angles of bearing taken by Captain LARKINS, from the place where he lay aground on the WARREN HASTINGS'S Shoal to TREE Island, on the one hand, and on the other to the centre of GASPARD Island, we may fix the distance of the shoal to each of these points.

In order to abridge the discussion, I employ a figure

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VII.

In the figure  
TINGS'S Shoal

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by LARKIN  
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In calculating  
formulas of trigonometry

$\angle W G$ , distance  
GASPARD Island

figure which will be found on my chart *PLATE VII.*

In the figure, let *W* be the WARREN HASTINGS'S Shoal, *R*, TREE Island, *G*, GASPAS Island.

The data are: 1. The angles of bearing measured from the ship when aground on the shoal, by LARKINS, namely, the angle  $s W R$ , from the WARREN HASTINGS'S Shoal to TREE Island, from south to east  $17^\circ$ .

The angle  $s W G$ , from the SHOAL to the ISLAND, from south to east  $70^\circ$ .

2. The distance of the objects, *R*, *G*, from centre to centre, 7.2 miles.

3. Lastly the angle  $e R G$  of bearing, from TREE Island with respect to GASPAS Island, from east to north  $28^\circ$  the complement of 62 degrees, the angle of bearing from north to east.

We shall then know the three angles in the triangle  $R W G$ .

For, we have the angle  $R W G = 70^\circ - 17^\circ = 53^\circ$ :  
the angle  $W G R$  (the complement of  $s W G 70^\circ$ ) =  
 $70^\circ$ ; the angle  $a G R$  (alternate of  $G R e$ ,  $28^\circ$ ) =  $28^\circ$ :  
and consequently the whole angle  $R G W = 48^\circ$ :

And the third angle  $G R W$  (supplement of the sum of the two former) equal to  $79^\circ$ .

In calculating the triangle according to the formulas of trigonometry, we shall find:

$W G$ , distance from the SHOAL to the centre of GASPAS Island = 8.85 miles.

*W R*



THE distance from the Shoal to TREE Island = 6.7 miles.

The former of these distances is, in LARKINS's Journal, 6 miles, and also 6 miles on his chart: the latter is 9 miles in the journal, and  $5\frac{1}{2}$  on the chart.

As these distances were estimated by the eye, it is not surprising that there should be an error in both; but we may be astonished that the chart does not agree with the journal, neither as to the distances, nor as to the angles of bearing. I have, as I have said, thought it proper to preserve these angles such as they were inserted in the Journal; they were observed, and these are the only data of LARKINS on which it is possible to rely: but why did he not make use of them in constructing his chart? He gives no reason, and it is not possible for me to atone for his silence: it were to be wished that Mr. DALRYMPLE, who has published the Journal and the chart, had explained himself respecting this want of agreement which certainly has not escaped him; and no one better than he could assign the cause of it, and rectify the chart and the journal. It is easy to conceive how greatly such contradictions must embarrass a navigator who has before him both the Plan, and the written data, according to which the Plan ought to have been constructed; they leave him in doubt to determine on which side the truth lies; he

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he may even suspect whether it be on either : and his embarrassment here must be the greater, as, till now, the WARREN HASTINGS'S Shoal is laid down only on LARKINS'S chart, unless it be on some chart with which I am not acquainted, more recent than those published by G. ROBERTSON in 1788 and 1790.

IV. On the chart No. 49, 2nd, making part of the *Supplement* of the second edition of D'APRÈS' *Neptune Oriental*, and of an earlier date than all the charts which I have quoted, is seen another shoal situated to the northward of the north point of GASPAS Island, at ten miles distance, measured between this point and the south part of the shoal. CROZET'S Track in the MASCARIN, in 1773, which is marked on this chart, passes only at the distance of 4 miles from the north part of the shoal which occupies 1 mile ; and it may be presumed that it is from the account of this navigator, that D'APRÈS has placed it : CROZET having passed only at the distance of 16 or 17 miles from the north point of GASPAS ought to have seen at the same time that island and the breakers of the shoal.

I find on DORDELIN'S chart, (track going to CHINA) a shoal nearly in the same position : he places it to the north by west of the most northern part of GASPAS Island, and at the distance of about 10 miles, measured from the south extremity

of the shoal; he gives it 4 miles in extent from north by west to south by east. At its north extremity is delineated an islet; and DORDELIN says, in a note written on the chart, that *these are Rocks and Breakers, even with the water's edge, and that the Rock is always above water.* DORDELIN'S track, marked in the chart, extends along the shoal at the distance of about a mile from the breakers; and as he saw at the same time GASPAR Island, we may admit the position which he assigns to the shoal on his chart, relatively to the island, as well as the extent which he has given to it.

ROBERTSON'S large Plan presents to us two shoals in the same quarter, under the name of *Breakers*: the first to the north by west 1 or 2° west of the Peak of GASPAR Island, 7 miles from its north point: the second to the north by west 4° west of the same Peak, and at 10½ miles from the same point. The extent of these shoals is left undetermined on the Plan; they are merely indicated by a † surrounded by a dotted circle.

It is very probable that the most distant shoal is the same as that which DORDELIN examined and ranged along throughout its whole length: as for the second, its existence might appear doubtful. The French navigator had passed through the channel which separates GASPAR Island from ROCHER NAVIRE or TREE Island; it was in standing to the north 5° west, that he perceived the breakers  
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\* Mr. Dalrymple

one of the Memoirs

pendix to Memoir of

and the rock above water which he has laid down on his chart; and it would be astonishing if he had not also perceived the breakers nearest to the island, which are laid down in ROBERTSON'S Plan, in the same direction as the most distant ones, relatively to the island. I presume that ROBERTSON has placed this shoal according to the Journal of the SULLIVAN, Captain STEPHEN WILLIAMS, who, in 1784, on his return from CHINA, passed through GASPAR'S Strait\*. It is there mentioned that the following bearings were taken.

" At  $\frac{1}{2}$  past 9, A. M. saw *Breakers*, bearing  
 " N.  $\frac{1}{2}$  E. distant about 3 miles, and appearing to  
 " be about 3 miles north from GASPAR Island,  
 " and some *others* bearing W. S. W. about 6  
 " miles. Likewise saw an Island making like a  
 " sail (this is ROCHER NAVIRE or TREE Island,)  
 " S.  $\frac{1}{2}$  E. distant about 2 leagues, GASPAR Island  
 " then bearing S. E. distant 3 leagues. A rock,  
 " off it, with *Breakers* all round it, bearing from  
 " the ship S. E. by S."

These bearings, taken at the same moment, give room to make a few observations.

1. From the point whence GASPAR Island bore south-east distant 3 leagues, the SULLIVAN ought to have seen TREE Island to the south half

\* Mr. Dalrymple has given an extract from this Journal in one of the *Memoirs* of his Collection, the title of which is, *Appendix to Memoir of Chart of Sunda and Banca*, page 16.

east; but the distance of this rock, which carries it only to 2 leagues, has been badly estimated; it was at 3, as well as the distance from GASPARD Island: in order to be convinced of this, it is sufficient to prick off the bearings of GASPARD Island on our chart where the relative position of this island and of TREE Island is fixed according to the Bearings of WILSON, CHANAL, &c. It will be seen that the point of bearing of the SULIVAN is at *three leagues'* distance from TREE Island.

2. The point of this bearing may be equally well determined by the two bearings and the distance alone from GASPARD Island, although there is an error respecting the estimated distance from TREE Island; for it is well known that it is very usual to estimate the distance too small, when bearings are taken from a little island which is lofty; and the bearing with respect to TREE Island is exact, as well as the bearing with respect to GASPARD Island. In therefore admitting this bearing, let us look for the position of the *first Breakers*. It is said that they were about 3 miles to the north half east of the ship; and that GASPARD Island bore south-east, distant 3 leagues or 9 miles, the ship was therefore about  $6\frac{1}{2}$  miles more to the northward than GASPARD Island: and as the breakers were still about 3 miles more to the northward than the ship, they must therefore be  $9\frac{1}{2}$  miles more to the northward than GASPARD Island. It is

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is therefore evident that there is an error in the Journal, when it is said there that the *Breakers* are about 3 miles to the northward of GASPAR Island; it was, no doubt, meant to say 3 leagues or 9 miles.

3. At present, I remark that the south part of the breakers seen by DORDELIN, the same, according to every appearance, as those seen before by CROZET, is distant about 10 miles from the north point of GASPAR; and that the extent of sea which they occupy in breadth, is situated, with respect to the island, between the north by west and the north: thus, from the position where the SULLIVAN was in regard to GASPAR Island, these breakers, if they be at the point where they are laid down on DORDELIN's chart, must have borne from the SULLIVAN, from north-north-east to north-east, their south part about 6 miles distant: and yet those which he saw bore, it is said in his Journal, north half east distant only 3 miles.

We cannot therefore affirm positively that these breakers were the same as those which DORDELIN saw; but still less can we say that they are not the same; the SULLIVAN's bearings appear not taken, or at least set off with exactness, and can inspire no great confidence: her commander may have been mistaken here as elsewhere. It has been seen that her journal places these *breakers* 3 miles to the northward of GASPAR Island; and

from those very bearings is taken the proof that they must be distant from it 3 *leagues* or 9 *miles*; we cannot therefore place the **SULIVAN's** breakers 3 miles to the northward of **GASPAR** Island; and if, as we must conclude from her bearings, we carry them 9 or 10 *miles*, we fall on **DORDELIN's** Breakers, at least as to the distance from **GASPAR** Island. I observe that if, independently of the latter, there exist others to the north half east of the point from which the **SULIVAN's** bearings were taken of **GASPAR** Island and **TREE** Island, **DORDELIN** who, on sailing from the middle of the channel which separates them, constantly held a northerly course, must have passed very close to the eastward of the **SULIVAN's** Breakers: and as he has laid down none on the chart, we are assured that he saw none.

However, as it is always a matter of consideration to suppress a shoal, even when there are the most justifiable doubts respecting its existence, I have thought it proper to preserve, on my chart, that of the **SULIVAN**, because I cannot suppose that Captain **WILLIAMS** has committed errors respecting all his bearings and all the distances which he has estimated: but, in order to place this Shoal, I have paid no regard to the distance of 3 miles, evidently erroneous, at which he supposes **GASPAR** Island; but only to the position of the ship deduced from the angles of bearings taken, at  
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the same time, from GASPARD Island, TREE Island, and the Shoal. What determines me to preserve it, is, on the one hand, the bearing of the Shoal with respect to the ship, a bearing which does not agree with DORDELIN's Breakers: it is, on the other, because DORDELIN tells us that the *rock to the northward is always above water*, and that, doubtless, Captain WILLIAMS of the SULLIVAN would not have failed to make the remark; yet I admit that this last motive is weakened, if we notice that DORDELIN speaks but of *one single rock above water*; that he does not say that it is lofty; that he might probably have perceived it, because he ranged along the Breakers from south to north throughout their whole length; but that this rock may probably too not have been perceived by a ship that was at a somewhat great distance to the southward of the Breakers. Be this as it may, I have laid down on my chart these Breakers of the SULLIVAN, under her name; I am, however, far from believing their existence, and much further still, from vouching that I have not laid them down twice.

Let us now endeavour to fix our opinion respecting some other Breakers which bore from the SULLIVAN *west-south-west, at about 6 miles' distance*, at the same time that the former bore from her north half east, distant 3 miles,

Admitting the position of the ship to be 3 leagues



leagues or 9 miles to the north-west of GASPAR Island, such as it is given by the SULIVAN's Journal, she ought to have been to the west-south-west the northern part of the WARREN HASTINGS's Shoal; but the distance would be only 3 miles, and not 6, as it was estimated by the eye: for, if we chose to admit this distance of 6 miles, the track of the ship WARREN HASTINGS which rounded the Shoal to the northward, after she had been got off, would pass over the shoal seen by the SULIVAN, if placed according to that ship's Journal\*.

It appears to me nearly proved that these second Breakers, seen from the SULIVAN to the west-south-west of her position, are no other than a portion of the WARREN HASTINGS's Shoal, which may either be connected with the Shoal, or be separated from it only by a channel. This opinion is also that of Mr. DALRYMPLE, who says, in a note, that he has added to the Journal of the CARNATIC, Captain WILSON, of which he is the Editor †, that "Captain LARKINS gives the "Bearings of GASPAR south 70° east and TREE

\* In speaking of the track of the *Warren Hastings*, I do not mean that which is marked on Captain *Larkins's* Chart, but that which he ought to have followed, in fact, according to the data consigned in his journal: these tracks differ rather considerably from each other.

† See page 35 of Captain WILSON's Journal.

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" Island south  $70^{\circ}$  east when *aground* (in the WARREN HASTINGS in 1788) on an *extensive Reef*, " probably the *Breakers* seen by the SULLIVAN, " bearing west-south-west 6 miles distant, when " GASPAR bore south-east and TREE Island south " half east." Captain WILSON, who passed through GASPAR'S Strait in 1787, and was not acquainted with the shoal on which the WARREN HASTINGS struck in 1788, was not willing to admit the existence of the Breakers which had been seen from on board the SULLIVAN in 1784. In page 37 of his Journal he tells us, " In respect to the *Breakers* which they set west-south-west 6 miles from them, when TREE Island bore south half east and GASPAR Island south-east, I cannot but think they were mistaken, as, where there any existing, I must have passed very near them and have seen them." I observe that, in fact, on examining Captain WILSON'S Track in the CARNATIC, it appears that he passed *very close* to the westward of the WARREN HASTINGS'S Shoal: but though he had passed closer to it still, provided he did so without striking, it would have been very possible that he might not perceive it, since LARKINS had no knowledge of it till he struck on it.

We may conclude, however, that, if the Breakers seen by the SULLIVAN to the west-south-west of her position, 3 leagues to the north-west of  
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GASPAR, are, indeed, the same as the WARREN HASTINGS's Shoal, these *Breakers*, as the Capatin of the SULLIVAN terms them, must needs *not break at all times*, since Captain LARKINS, who got aground on them *in the open day* and at low water, had 'not been apprized of their presence by any ripling, nor even any change in the colour of the water: and his journal does not mention that, during the three days which he remained aground, he ever saw the sea break on it. Neither does it appear that WILSON, who passed through GASPAR'S STRAIT with the intention and the charge of examining every thing, and who must have passed very near the shoal, perceived, in this quarter any appearance, any indication of danger.

If these shoals or these breakers met with by the WARREN HASTINGS, and seen by the SULLIVAN, never break, or do not always break, they are the more dangerous on that account: and, no doubt, it will not be matter of surprisè that I have taken so much pains in endeavouring to ascertain their existence and fix their position. From every presumption, which appears to unite in order to indicate the identity of the SULLIVAN'S *Breakers* and the WARREN HASTINGS'S *Shoal*, I have thought it proper to confine myself to laying down the latter on my Chart; but as nothing proves that the extent which LARKINS has given it on his, is exactly that which the Shoal has received from

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Nature, I have likewise thought that I might take the liberty of altering it a little, in order that WILSON'S Track, drawn according to his Journal, might not pass over the west part of this shoal.

A note of Mr. DALRYMPLE, inserted in Captain WILSON'S Journal, page 35, would seem to indicate other dangers to the west-north-west of GASPAR Island.

"The BELVIDERE," says he, "being at anchor in 10 fathoms in latitude  $2^{\circ} 24'$  south by observation, GASPAR east-south-east  $3\frac{1}{2}$  leagues, TREE Island south by east, had the *Shoal* about a cable's length distant; north-north-east and south-south-west from the ship." They found the *shoal* about 2 miles in length, in some places from 6 to 10 feet water, and within "twenty yards' distance 15 fathom hard coral."

If we wish to look in the chart for the position of the BELVIDERE, such as it is given in this note, with respect to GASPAR and TREE Island (without concerning ourselves about her latitude \*), we shall find

\* I observe that, if the latitude of *Gaspar* Island, as I think I have proved (farther back, page 466 to 472) must be very near  $2^{\circ} 21'$  south; that of the *Belvidere*, of  $2^{\circ} 24'$ , although being announced as deduced from an observation, was not correct: for since *Gaspar* bore from her east-south-east, distant  $3\frac{1}{2}$  leagues, she was less to the southward than the island by 4 minutes, and her latitude must be only  $2^{\circ} 17'$ .

It might be objected that her observed latitude does not deviate

find that the ship was at anchor to the north-east of the point where the WARREN HASTINGS got aground, and at the distance of half a mile from that position: and it does not appear to me doubtful that the shoal seen and sounded by the BELVIDERE, was the same as that on which Captain LARKINS got aground.

Mr. DALRYMPLE continues: "Being at anchor in 16 fathoms, GASPAR east-south-east, 12 miles distant; TREE Island south 20' east, about 10 miles distant, a *Shoal of Rocks* west-north-west, with not more than 3 fathoms in some places: it appears to be the length of half a mile."

If we set off these bearings and these distances on the chart, we find that this shoal is situated to the north-west of the place where the WAR-

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ate much from that of *Larkins*, who, by a mean between 3 observations taken on three successive days, found  $2^{\circ} 22\frac{1}{2}'$  for the point of the shoal on which he was aground, nearly about the middle of its length; which would give the same latitude for the place of the *Belvidere*: but as it has been proved by the comparison of other observations, made in more favourable circumstances, the latitude of the place where the ship got aground, compared to that of *Gaspar*, by Captain *Larkins*'s bearings, must be about  $2^{\circ} 18'$ , and if there be any doubt respecting this position, it would be better for the safety of ships coming from the northward, that the shoal should be laid down too far to the northward, than that it should be placed too far to the southward.

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This shoal appears to be also the north part of the WARREN HASTINGS'S Shoal, the same point that had been set by the SULLIVAN to the west south-west of her position, when GASPAR bore south-east 3 leagues, and TREE ISLAND south half east. I would not, however, vouch for the identity; and I am entirely of the opinion of Mr. DALRYMPLE, who concludes his Note by saying that "These seem to be straggling *Shoals* with channels between, and therefore, in the day-time, dangerous only by neglecting to keep a good look-out from the mast-head."

The instance of the WARREN HASTINGS might, however, prove that this precaution is not sufficient, for she got aground in *the day-time*. I think, with Mr. DALRYMPLE, that the great shoal situated about 3 leagues to the west-north-west of GASPAR Island, is not a *continued* shoal, but, if I may use the expression, an *archipelago* of shoals the extent of which is not perhaps yet well known, and which leave, by intervals, deep channels through which ships might pass, if some rocks above water served as *Beacons* and pointed out to them the passages: but as the grounding of the WARREN HASTINGS proves that, at least in some circumstances, no rock breaks, we cannot but recommend to ships which shall have got sight of

GASPAR

**GASPAR** Island; and been able to fix their position in the chart, to pass at such a distance from the place that the shoal there occupies, as not to have to dread it. The marked tracks of the navigators who have not met with shoals, and have not had sight of them, may determine on that which a ship will have to keep in order to be certain of avoiding them.

I have thought it proper to lay a stress on the position of the shoals that may be situated from the north to the west-north-west, relatively to **GASPAR** Island, because the uncertainty of their position and the fear of falling in with them during the night, in looking for the Strait BETWEEN **BANCA** AND **BILLITON**, must have hindered several navigators from preferring it, notwithstanding its advantages to that of **BANCA**, which, besides its inconveniences, has its dangers too: but as these dangers are better known, they were less feared.

I proceed to the discussion of the other points of the West Passage or **GASPAR'S STRAIT**, of which it is necessary to fix the bearings and distances, in regard to each other.

V. THE EAST POINT of the Island of **BANCA**, which some navigators call its NORTH-EAST Point, forms with **GASPAR** Island the entrance of the WEST Passage; and, in the interval, lies **TREE** Island, nearer to **GASPAR** than to **BANCA**. The

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bearing of the EAST Point of the latter, with respect to the Peak of GASPAR, has been exactly determined by bearings taken when the two points were *in one*.

WILSON (page 2 of his Journal) says that "in passing betwixt the East point of BANCA and GASPAR Island, he set at the same moment, the Peak of the latter north  $50^{\circ} 30'$  east, and the point of the former south  $50^{\circ} 30'$  west."

LARKINS, in the same position, page 20 of his Journal, set the Point of BANCA south-west half west, and GASPAR north-east half east, or, in other words, south  $50^{\circ} 45'$  west and north  $50^{\circ} 45'$  east: and the bearing is the same on his chart.

Captain CHANAL, in a similar position with respect to the two points, found that their bearing was north  $53^{\circ}$  east and south  $53^{\circ}$  west: this bearing was taken from the Peak of GASPAR, on the one hand, and on the other, from the hummock that rises on the middle of the point of BANCA, which comes to nearly  $57^{\circ}$ , if we reduce this bearing to the eastern extremity of the coast.

We shall place the hummock of the EAST Point of BANCA with respect to the Peak of GASPAR, south  $53^{\circ}$  west and north  $53^{\circ}$  east.

This bearing is the same on ROBERTSON'S Chart and great Plan, and on LARKINS'S Chart; but on that of DORDELIN, it is south  $59^{\circ}$  west.

VI. Captain WILSON, in employing various bearings



bearings taken from his Station *b* \*, where he had observed the latitude  $2^{\circ} 49'$ , and in taking for a base a portion of the distance run by the ship in a determined direction, has made the latitude of the EAST Point of BANCA,  $2^{\circ} 33'$ ; and it has been seen that he places GASPAR Island in his journal in  $2^{\circ} 22'$ , and on his chart in  $2^{\circ} 20'$ . The operations of Captain CHANAL gave him the same latitude of  $2^{\circ} 33'$  for the EAST Point of BANCA; and this is that which he has employed on his chart where GASPAR is in  $2^{\circ} 21'$ , as he deduced it from his observations. The latitude of the same point is  $2^{\circ} 3' 30''$  on the chart of DORDELIN, who places the middle of GASPAR in  $2^{\circ} 25' 15''$  ( $2^{\circ} 21' 15''$  according to his observations of 1784):  $2^{\circ} 38' 30''$  on that of LARKINS who places GASPAR in  $2^{\circ} 25' 45''$ : and in  $2^{\circ} 42'$  on that of ROBERTSON, who has given  $2^{\circ} 30'$  for the latitude of GASPAR †. The results of these seven determinations give for the difference of latitude between the middle of GASPAR Island and the EAST Point of BANCA:  $11' - 13' - 12' - 9\frac{1}{2}' - 12' - 12\frac{1}{2}'$ : the mean is  $11' 55''$  or 12 minutes in round numbers; this is the difference of latitude that results from CHANAL's operations: this is that which ROBERTSON's Chart gives; and it is a mean between the two differences of WILSON. We may

\* See farther on these Bearings.

† See farther back, page 469.

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therefore consider this difference of latitude as exactly determined.

If, with this difference of latitude of 12 minutes, or 12 miles, and the angle of bearing of  $53^{\circ}$  from north to east; equally well determined (page 495) we wish to find by the calculation of the oblique triangles, the length of the hypothenuse, we shall find 19.8 miles for the distance from the Peak of GASPARD to the hummock which rises on the EAST Point of BANCA.

The distance is the same on WILSON'S Chart, on that of CHANAL, on ROBERTSON'S Chart and Plan; but it is from 21 to 22 miles on LARKINS'S Chart and on that of DORDELIN.

This base whose length and direction are equally well determined, is that to which we shall reduce, by trigonometrical operations, all the Points of the WEST PASSAGE whose position it is of importance to fix.

VII. A mountain situated inland on BANCA, serving as a land-mark to ships coming from the northward.

The position of this mountain is not susceptible of great precision. WILSON, being in a line with the East Point of BANCA and the mountain, set them, in one with each other, south  $81^{\circ}$  west: CHANAL, in a similar position, had set them south  $78^{\circ} 45'$  west. The difference of  $2^{\circ} 15'$  in the bearings of these two observers makes us pre-

sume (and other bearings of the mountain, taken from other points of the Strait, also indicate it) that it presents two summits which lie nearly east and west in regard to each other\*, and it is not proved that the two observers have pointed to the same: besides, they may not have set the same point on the EAST Point of BANCA, which is a large round point, unequally elevated in its middle. Be this as it may, I have placed the hummock, or the Peak, the most eastern of the mountain, with respect to the point of the island, west 9° south, or south 81° west. This bearing is confirmed by another bearing of WILSON, who, from a station G. which is seen marked on his chart (in 18 fathoms), having GASPAR Island east-south-east half east, distant  $9\frac{1}{2}$  miles, and TREE Island south-south-east  $6\frac{1}{2}$  miles, set, at the same time, the mountain of BANCA west 33° south.

As to the distance from the mountain to the EAST Point of BANCA, WILSON, page 28 of his Journal, has made it, from his trigonometrical operations, 21.26 miles: this distance, on his chart, is that of the point of the island at the summit of the mountain; but that from the same point to the point of junction of his lines of bearing on the mountain, is 20.5 miles. I have placed

\* This remark is confirmed by a *View* of this mountain, taken by Captain *Chanal*, and which is to be found on my Chart, *Plate VII.*

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the summit of the eastern hummock at 19.5 miles, because that is the distance given me by cross bearings, taken from different stations in the Strait.

This mountain is not comprehended in ROBERTSON'S Plan. It is placed on DORDELIN'S chart to the south  $55^{\circ}$  west, and at 33 miles' distance, from the EAST Point of BANCA: this distance and this bearing differ too much from the result of the operations of Captains WILSON and CHANAL, for us to pay any regard to a position which, no doubt, was determined from a mere view.

VIII. MIDDLE Island, (and according to WILSON, PASSAGE Island.)

This navigator from his station *a*\* at anchor (in 8 fathoms water, to which the ship had shoaled,

\* The bearings which Captain *Wilson* took from his station *a*, are too important for any of them to be omitted.

" Gaspar Island . . . . . N.  $37^{\circ} 30'$  E.

" The South-west point of *Passage Island*, and the East Point of *Banca* in opposite bearings, estimated distance from the east point 5 miles . . N.  $28^{\circ}$  W. & S.  $28^{\circ}$  E.

" The northern extreme of *Passage Island* . . . . . S.  $50^{\circ} 30'$  E.

" *Mount Parmasan* . . . . . N.  $87^{\circ}$  W.

" The south-east point of *Banca* . . . S.  $5^{\circ} 15'$  E.

" One Island in the Bay . . . . . S.  $10^{\circ}$  W.

" The other . . . . . S.  $22^{\circ}$  W.

" Tree Island just visible from the poop N.  $25^{\circ} 30'$  E.

(*Wilson's Journal*, page 1.)

in three casts of the lead to 20 fathoms) set the SOUTH-WEST Point of MIDDLE or PASSAGE Island south  $28^{\circ}$  east, at the same time that he set the EAST Point of BANCA north  $28^{\circ}$  west, which comes to  $30^{\circ} 30'$  reducing the bearing to the hummock of the point; and he has (page 28 of his journal) made their distance 21.11 miles. The SOLIDE's journal gives us no bearing in the same position; but, on the chart that Captain CHANAL has constructed from those which he took in other points of the Strait, the fourth-west point of MIDDLE or PASSAGE Island lies, with respect to the hummock of the EAST Point of BANCA, south  $31$  or  $32^{\circ}$  east, which gives  $28$  or  $29^{\circ}$ ; reducing the bearing to the eastern extremity of the point; and the distance is 24 miles. The angle of bearing is  $28^{\circ}$  on ROBERTSON's Plan, and the distance is  $16\frac{1}{2}$  miles only: on DORDELIN's chart, the angle is  $34^{\circ} 30'$ , and the distance  $22\frac{1}{2}$  miles: on that of LARKINS, the angle is  $38^{\circ}$ , and the distance about 18 miles; but respecting this last, the SOUTH-WEST point of MIDDLE or PASSAGE Island is represented by a large mass of shapeless land which is lost in the frame of the chart.

I have preserved the angle of  $28^{\circ}$  of WILSON's bearing, which was taken in a line with the two points, and which is  $30^{\circ} 30'$ , when reduced to the hummock; but having regard also to the angle from GASPAR and to other angles taken, other stations,

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stations, in different points of the strait, I have thought it proper to diminish to 20.2 miles the distance carried to the hummock, which in WILSON'S Table of results, is 21.11 miles, reduced to the eastern extremity of the Point.

From the same station, this navigator set the NORTHERN extreme of PASSAGE Island, south  $50^{\circ} 30'$  east; which would place it south  $44^{\circ}$  east of the EAST Point of BANCA, and at the distance of 18.1 miles.

But the sequel of WILSON'S operations combined with those of CHANAL, allows not this result to be adopted: it appears that, in reading the card of the compass, the observer has taken the complement of the angle for the angle itself, which he meant to insert in his journal, and which must have been *East  $50^{\circ} 30'$  south, or south  $39^{\circ} 30'$  east*. What proves it, is that, in employing conjointly the bearings of WILSON from his station at 11 o'clock\*, those from his station *b* at noon†; a bearing

\* *Wilson's Journal*, page 26. The bearings from this station will be mentioned hereafter.

† *Wilson's* 2nd station marked *b*, is that of the 25th of February at noon; the latitude observed there was  $2^{\circ} 49'$  south. "The base *a b*," says *Wilson*, "is assumed upon a south  $13^{\circ}$  east course, distant 13 miles." We have before given the bearings taken from the point *a*; here are those which were had from the point *b*.

"The two Islands in the Bay, in one . . . . West

"The north-east end of *Passage* Island . . . . N.  $64^{\circ} 41'$  E.

" And

a bearing which he took, subsequently, from the south-west Point of PASSAGE Island and the north-east point of the same, north  $26^{\circ}$  east\*, and a bearing taken by CHANAL at 5 o'clock in the evening †, I have deduced the position of the most northern point of PASSAGE Island, as follows: with respect to GASPARD Island, south  $8^{\circ} 45'$  west, in regard to the hummock on the EAST Point of BANCA, south  $46^{\circ} 30'$  east, at the distance of 18.2 from this last point; and 17.2 miles from the eastern extremity of the Point.

On ROBERTSON'S Plan, the distance to the hummock on BANCA is 17.75 miles, and the angle of the bearing  $58^{\circ}$ ; and in measuring from the extremity of the Point  $13\frac{1}{2}$  miles and  $48^{\circ} 30'$ : on

“ And the south-west end of *It* . . . . . S.  $66^{\circ}$  E.

“ Gaspar Island (just visible from the balcony) . . N.  $17^{\circ}$  E.

“ And the south-east point of Banca in opposite bearings estimated distance 5 miles . . . . . S.  $17^{\circ}$  E.

“ *Mount Parmasan* . . . . .

“ The hummock over the east point of Banca . .

“ The extreme Point not visible from the deck

“ The East Point is laid down by its bearings from Gaspar Island which I observed in passing betwixt them, S.  $50^{\circ} 30'$  W. and N.  $50^{\circ} 30'$  E.”

(*Wilson's Journal* page 2.)

\* *Wilson's Journal*, page 28, left line of the Table.

† At 5 o'clock in the evening of the 22nd December, the *Solide* had the East Point of Banca bearing N.  $35^{\circ}$  W.—*Gaspar* Island N.  $22^{\circ}$  E. The north-east point of the peninsula S.  $6^{\circ} 30'$  W. An Island to the northward of this point from S.  $45^{\circ}$  to S.  $48^{\circ}$  W. — *Middle* or *Passage* Island from S.  $25^{\circ}$  to S.  $52^{\circ}$  E.

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Island N.  $13^{\circ}$  30

from N.  $68^{\circ}$  W.

DORDELIN's chart, the distance to the extreme Point, 18 miles; the angle  $47^{\circ}$ ; on that of LAR-KINS, distance, 15 miles; the angle  $48^{\circ} 30'$ .

IX. ISLANDS in the BAY OF GULF, situated to the northward of the Peninsula of SEL.

WILSON, from his Station *b* (page 501; note †) had the most eastern of the two islands which are situated to the northward of the peninsula bearing directly west; and, from this position, it concealed from his view the western or small island. From his Stations (see farther on), the south-east point of BANCA, in one with the NORTH-EAST of the peninsula, or, as WILSON expresses himself, the *Outer Island* in the Bay, north  $34^{\circ}$  west. Other bearings, taken previously from his station *a* (farther back page 499, note \*) of each of the two islands, of the south-east Point of BANCA or north-east Point of the peninsula, and at the same time, of the south-west Point and northern Extreme of Passage Island, combined with the former and with the bearings taken by Captain CHANAL \*,

\* On the 22d, at 5 P. M. the SOLIDE had the following bearings: the *East Point of Banca* N.  $35^{\circ}$  W.; *Gaspar Island* N.  $22^{\circ}$  E.; the *North-east Point of the Peninsula* S.  $9^{\circ} 30'$  W.; an *Island to the Northward of the Peninsula*, from S.  $40^{\circ}$  to S.  $48^{\circ}$  W.; *Passage Island*, from S.  $25^{\circ}$  to S.  $52^{\circ}$  E. She anchored at 40 min. past 6; and from the anchoring place, the hummock on the *east Point of Banca*, N.  $21^{\circ}$  W. *Gaspar Island* N.  $13^{\circ} 30'$  E.; the *Great Island in the Bay or Gulf*, from N.  $63^{\circ}$  W. to N.  $77^{\circ}$  W.



have furnished the data necessary for placing exactly the two Islands in the Bay, as well with respect to the south-east point of BANCA, as with respect to PASSAGE Island, and the other Points determined in the Strait, by bearings already mentioned, or by those which will be so hereafter. It results from these operations, that the east coast of the large island is situated south  $6^{\circ} 15'$  east of the hummock of the EAST Point of BANCA; north  $34^{\circ}$  west of the north-east point of the peninsula; south  $26^{\circ} 30'$  west of the Peak of GASPAS; west  $9^{\circ} 30'$  north of the SOUTH-WEST Point of PASSAGE Island: that the centre of the Island is distant 16 miles from the EAST Point of BANCA;  $31\frac{1}{2}$  from GASPAS; and that it is, from coast to coast, distant  $8\frac{1}{2}$  miles from PASSAGE Island.

The small or western island, has been laid down, in regard to the large one, from a bearing taken by WILSON from his Station *a*, and a subsequent bearing when the middle of the small island bore west of the northern part of the large one.

DORDELIN has laid down *three* islands, on an east by north and west by south line, in lieu of the *two* which are seen on WILSON'S Chart and on that of CHANAL: the bearing of the most eastern of these islands, in regard to the *north-east* point of the peninsula, differs little on his Chart from that given by the bearings of the two others; but those of the station *a* of WILSON who set, at

the same time, the most eastern of his *two* islands, south  $10^{\circ}$  west, and the western, south  $22^{\circ}$  west, (farther back page 499 note \*) do not allow me to admit *three* islands in the direction which DORDELIN has given to them, since WILSON could not but have seen the third, when, from the northward whence he beheld them, he set the *two* islands which he has laid down on his chart. However, it is possible that there may be a third island; but, in this case, it must be much nearer the main land of the large island than the two others, and at the same time be sufficiently near, for it to be confounded, to the eye, with the land, when WILSON at the same time set the two islands.

I pay no attention to the chart of LARKINS, who has laid down at random three large islands, occupying a space of about 9 miles, between the north by west and north-west by west from the north-east point of the peninsula of SEL, from which they are 8 miles distant.

On WILSON'S Chart and on ROBERTSON'S Plan, between the north-north-west and north-west by north of a point which might be taken for the NORTH-EAST Point of the Peninsula, and at about the distance of 6 miles from this point, are seen two islands which almost touch each other; but we are certain by the bearings taken by WILSON from his station *a*, that these two islands must be separated

separated by a channel of  $1\frac{1}{2}$  miles or 2 miles in width.

**X. NORTH-EAST POINT of the Peninsula of SEL.**

This Point forms with the SOUTH-WEST Point of PASSAGE Island, the narrowest part of the WEST PASSAGE OF GASPAR'S STRAIT: Captain WILSON from his station *b* (see page 501 note †) set GASPAR Island north  $17^{\circ}$  east; at the same time that he set the south-east point of BANCA, in opposite bearings, south  $17^{\circ}$  west: and, from this same position, the south-west end of PASSAGE Island bore from him south  $66^{\circ}$  east.

There is here a small error in the bearing of the north-east point of the peninsula: the sequel of the operations of WILSON proves that the point which he set is the SOUTH-EAST, and not the NORTH-EAST Point. In the position he was in, they must have borne from him almost in one with each other, since the angles scarcely differ a degree; and, no doubt, WILSON set the latter point.

It therefore is the SOUTH-EAST point of the peninsula which I have placed south  $17^{\circ}$  east from the Peak of GASPAR, and the NORTH-EAST point is nearly  $18^{\circ}$ .

The NORTH-EAST Point, on CHANAL'S Chart, is situated in  $18^{\circ} 30'$ ; it is  $20$  or  $21^{\circ}$  on that of DORDELIN, and in  $27^{\circ}$  on that of LARKINS. The

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configuration of the lands, in this part, is such, on ROBERTSON'S Chart and Plan, that it is not possible to distinguish a NORTH-EAST point; we see only that, in taking in a lump this projecting part of BANCA, its bearing with respect to GASPAR Island agrees *nearly* with that which results from the Bearings of WILSON and CHANAL.

According to the position before given to the SOUTH-WEST Point of Middle or PASSAGE Island, this Point and the north-east point of the Peninsula of SEL, ought, according to WILSON, to bear, with respect to each other (page 28 of his Journal) south  $74^{\circ}$  west and north  $74^{\circ}$  east; but, to adopt this bearing of the one point in regard to the other, we should necessarily alter the positions already fixed by other bearings, as well with respect to GASPAR Island, as with respect to the EAST Point of BANCA, and particularly that of the SOUTH-WEST Point of PASSAGE Island which is one of the most certain; and we have no reasons that can dictate, or even authorize these changes. In maintaining the first positions, I found that the two points which we wish to place, lie with respect to each other south  $56^{\circ} 15'$  west and north  $56^{\circ} 15'$  east: the difference, on a comparison with the bearing given by WILSON, is considerable, it is  $17^{\circ} 45'$ ; but the width of the passage, from coast to coast, which is the essential point, differs on my chart, from that given by WILSON'S result, only  
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by being 6 miles instead of 6.2 miles, so that they may be said to be the same.

On examining whence this difference of  $17^{\circ} 45'$  may arise, between the bearing indicated by WILSON, in his *Table of Bearings and Distances* (page 28 of his Journal) and that which I have employed on my chart, I have thought I discovered that it proceeded from a bearing taken from his station *b* (see page 501 note †) from which he set the SOUTH-WEST Point of Passage Island South  $66^{\circ}$  east. In the position he was in with respect to this island, the *south-west* point and *southernmost* point must have borne from him, nearly, in one with each other; and surely he set the last point that he had in sight, since he mentions but one: now the last point must be the *southernmost*, and not the SOUTH-WEST point: and they are distant from each other, 3 miles, in the direction of  $66^{\circ}$  south-east, and  $66^{\circ}$  north-west. The sequel of WILSON's operations, combined with those of CHANAL, will prove that the presumed error must have taken place.

The width of the strait is greater on all the other charts than on WILSON's and mine; on that of CHANAL who places the north-east point of the peninsula with respect to the south-west Point of PASSAGE Island, nearly in the same bearing as that which I give to them, the distance is 9 miles; it is upwards of 10 miles on that of DORDELIN;  $12\frac{1}{2}$  miles on that of LARKINS's, and  $9\frac{1}{4}$  miles on

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ROBERTSON'S Chart and Plan. But we may be certain that all these distances are too great; for the bearings of the two points which form the narrowest part of the passage, taken in opposite situations, namely; on the one part, the north-east point of the Peninsula of SEL and the Peak of GASPAR south 18° east (farther back page 506) and on the other the SOUTH-WEST Point of PASSAGE Island and the east Point of BANCA south 28° east and north 28° west (farther back page 500), admit not of giving more than 6 miles opening to the passage between the NORTH-EAST Point of the Peninsula of SEL and the SOUTH-WEST Point of PASSAGE Island.

XI. EAST COAST of the Peninsula of SEL.

Bearings taken by WILSON from his station *c* \*  
 give

\* *c* WILSON'S third Station of which is assumed from the Bearings

" Of the South-east point of *Banca* . . . N. 56° W.  
 And the Southernmost Point of *Passage*  
 Island . . . . . N. 5° W.

" by which," says he, " we must have had a strong current to the S. E. Hence

" The Eastern Extreme of *Passage* Island  
 bore . . . . . N. 33° E.

" And the South Point of *Banca* bore . . West  
 which had before been observed in one  
 with the South-east Point . . . . . S. 11° W.

" The South-west Point of *Banca* . . . . S. 73° W.  
 which had been observed in one with the  
 South Point . . . . . S. 67° 20' W.

" A small

give us for the extent of the east coast of the Peninsula  $4\frac{1}{2}$  miles; and a preceding bearing of its north-east and south-east points, in one, determine their relative position, south  $11^\circ$  west, and north  $11^\circ$  east.

This bearing is the same, within one degree, by the bearings and on the chart of CHANAL; but the distance of the two Points, or the length of the coast is there carried to  $8\frac{1}{2}$  miles: on DORDELIN's chart, the bearing is that of WILSON, and the distance 7 miles: on ROBERTSON's chart and plan, the bearing, if the configuration of the lands admitted of assigning one, would seem to be south  $11^\circ$  east and north  $11^\circ$  west, rather than south  $11^\circ$  west and north  $11^\circ$  east; but the distance cannot be measured there, for we are at a loss where to find the north-east point. The bearing is still more erroneous on LARKINS's chart than on the preceding; the two points are placed, in regard to each other, south  $22^\circ$  east, and north  $22^\circ$  west: but it appears, in general, that this navigator had no other intention than to mark his track

- 
- “ A small Island..... N.E. by E.  
 “ Another ..... N.E. by E.  $\frac{1}{2}$  E.  
 “ Another ..... E.N.E.  
 “ Another ..... E. by N.  
 “ And another ..... from E.  $\frac{1}{2}$  N. to E. by S.”  
 (Wilson's Journal, page 2.)

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on his chart, and to lay down on it the soundings which he took in the WEST PASSAGE, without concerning himself, in any way, with the relative bearings of the points, and the configuration of the lands which seem to be traced nearly at random.

Captain CHANAL observes that, in the Chart of *Gaspar's Strait* inserted in D'APRES' *Neptune Oriental* (N<sup>o</sup>. 48 of the 2d Edition) by which the SOLIDE regulated her course, and of which all the French navigators make use, is laid down a great number of islands on the east coast of the peninsula; but that he perceived none, although the ship had sailed at no great distance from the coast: he only saw a few breakers or rocks quite close in shore: DORDELIN'S chart, WILSON'S, LARKINS'S, and those of ROBERTSON indicate no island on the eastern coast of the Peninsula; and we are at a loss to conceive how Captain GASPAS could have seen any: the different time of tide may occasion a navigator, in passing, to see or not to see Breakers very near the shore, which are either under or above the surface of the sea, according as it is high or low water; but an archipelago, such as that which GASPAS has represented on his chart, is visible at all times, if, in fact, it exist.

We shall consider the distance of 6 miles, from the north-east Point of the Peninsula of SEL to the south-west point of MIDDLE OR PASSAGE Island as

N.E. by E.  
N.E. by E.  $\frac{1}{2}$  E.  
E.N.E.  
E. by N.  
N. E.  $\frac{1}{2}$  N. to E. by S.  
Wilson's Journal, page 21.



a new *Base* the direction of which is north  $56^{\circ} 15'$  east and south  $56^{\circ} 15'$  west.

WILSON'S station  $\epsilon$  has been subjected on my chart to the position which his bearings give relatively to these two points: to south  $56^{\circ}$  east from the north-east point of the peninsula; to south  $5^{\circ}$  east from the most southern point of PASSAGE Island. I shall reduce to these same points the different points whose positions we shall now endeavour to fix.

XII. SHOAL and BREAKERS to the north-east of the north-east point of the Peninsula of SEL.

We are indebted to Captain LARKINS for a certain knowledge of these shoals on which his ship touched, but without sticking fast. Having immediately come to the wind, and dropped an anchor, he took from the anchoring-place the following Bearings (page 21 of his Journal.)

- The SOUTH-EAST of the  
 Peninsula . . . . . S.S.W.  
 Its NORTH-EAST Point . . . S.W. by S.  
 A cluster of *Rocks* . . . . . S. by W.  $\frac{1}{2}$  W.  
 A single *Rock* . . . . . S. by E.  
 Northermost extremes of the  
 Island (the eastern island  
 in the gulf) off the N.E.  
 end of *Sel* . . . . . N.W. by W.  $\frac{1}{2}$  W.  
 Distant from the Peninsula 4 miles (esti-  
 mated by the eye.)

He

He got under way again, and, standing on, he had the cluster of Rocks, in one with the NORTH-EAST Point of the Peninsula, bearing south-west.

It is from these bearings that I have laid down on my chart Captain LARKINS's Reef, or the WARREN HASTINGS's Shoal, by reducing it to the points already determined of the Peninsula; and it results from the position which this operation has given them, that the middle of the cluster of rocks is situated to the north-east of the NORTH-EAST Point at the distance of  $2\frac{1}{2}$  miles. As for the detached and solitary rock, its bearing with respect to the NORTH-EAST Point is not certain; but its distance from this Point ought not to be less than  $2\frac{1}{2}$  miles.

Captain LARKINS, from an ocular estimation, has placed on his chart the cluster of Rocks, taken at its exterior north-east part, at the distance of  $3\frac{1}{4}$  miles from the NORTH-EAST Point of the Peninsula; but his bearings, reduced as well to this Point as to the SOUTH-EAST Point and the large island in the gulf, admit not of carrying this distance to more than  $2\frac{1}{2}$  miles.

On DORDELIN's chart is seen a somewhat considerable extent of Breakers laid down at about the distance of  $3\frac{1}{2}$  miles to the north and north by east of the NORTH-EAST Point of the Peninsula: there can be no doubt of these being the same as those on which the WARREN HASTINGS rubbed her keel,

north  $56^{\circ} 15'$ 

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S. by W.  $\frac{1}{2}$  W.  
S. by E.

. N.W. by W.  $\frac{1}{2}$  W.  
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keel, which, fortunately for her, touched only on the edge of the Shoal.

It appears that the sea does not always break on the north-east extremity of the shoal, since LARKINS touched on it, without any thing having announced to him the vicinity of danger.

XIII. We are come to the group of small islands, situated to the south-east of MIDDLE or PASSAGE Island, which, with the small island, forms the EAST PASSAGE; OF CLEMENTS' STRAIT. This group is composed of seven islands which may be separated into two groups: the first or *West* group, comprises four islands; the ship ATLAS, Captain COOPER, and the ROYAL ADMIRAL, passed between this group and MIDDLE Island: the second, or EAST group, is composed only of three islands; the ship VANSITTART, Captain CLEMENTS, and the fleet under his command, passed between this second group and the *west* group.

But, before we endeavour to fix the position of both groups with respect to MIDDLE or PASSAGE Island, and their position relatively to each other, it is proper to settle the name that is to be applied to each of the islands; for the want of agreement between the English navigators, who have imposed names on them, might lead to an error.

In the west group, composed of four islands, the most western of the two northern islands is named by ROBERTSON, SANDY Island, and by

COOPER

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COOPER, SANDY BEACH Island: the most eastern is called BUTTON Island by COOPER and BARN Island by ROBERTSON. The difference between the names given to these two northern islands is of no consequence; it may easily be remembered that the island called by the one BUTTON Island, is called by the other BARN Island, &c. But this is not the case with the two southern islands of this same group, because the two navigators have imposed the same names on the two islands, but not the same name on the same island; which would lead into an error the geographer or the seaman who, wishing to reduce to these islands, on ROBERTSON'S Chart and Plan, the bearings which are to be found in COOPER'S printed journal, should apply them to the one island, while they ought to be applied to the other. COOPER gives to the most southern island of the *west* group, which is also the most southern of the seven islands, the name of SADDLE Island, "so called," says he (page 21 of his journal) "from having that appearance:" and "to the north-east of SADDLE Island," adds he, "there is a low island," which, on his chart, he names FLAT Island. These two names are interchanged on ROBERTSON'S Chart and Plan: he gives the name of SADDLE Island to the small low island to the north-east COOPER'S FLAT Island, and that of Low Island to the south island, the largest of the two southern islands, which is

remarkable from a particular configuration, inso-  
 much that it has induced COOPER to impose on it  
 the significative name of SADDLE Island. I am of  
 opinion that the denominations employed by  
 COOPER ought to be preferred to those of ROBERT-  
 SON; and I ground the preference on the follow-  
 ing circumstances. First, I see that COOPER has  
 drawn on his chart, at the northern extremity of  
 his SADDLE Island, *two hummocks*, at no great dis-  
 tance from each other, which may, in fact, pre-  
 sent themselves under the form of *a saddle*; while  
 the island to which ROBERTSON has given on his  
 charts the name of SADDLE Island, is there pre-  
 ceded, in its east part by a sand-bank adjoining to  
 the island, and shewing some rocks off which the  
 VANSITTART anchored does not this latter island  
 appear likely to be a *low* or *flat* island, rather than  
 that which is remarkable from *two hummocks*? In  
 the second place, I see on the chart of DORDELIN  
 who, like COOPER, had entered from the south-  
 ward, that on the most southern island of the  
 west group which the latter has named SAD-  
 DLE Island, the French navigator also represents  
 two *hummocks*, and that he calls it L'ILE AUX  
 MAMMELLES, and I observe that this is the only  
 one of the small islands situated to the south-east of  
 MIDDLE Island, on which DORDELIN has imposed  
 a name, because, no doubt, it is the only one that  
 is remarkable: I observe too that it is the most  
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southern island of the two groups taken together, like COOPER'S SADDLE Island, like ROBERTSON'S Low Island, I am therefore of opinion that there may have been a mistake in writing the names on the charts of this latter navigator; and I shall name on my chart, and in the sequel of this analysis, SADDLE Island or ILE AUX MAMMELLES, the most southern of the islands of the west group; and FLAT Island, that which lies to the north-west of the former. Of the two northern Islands of the same group, the western one will be named SANDY BEACH Island, and the eastern BUTTON Island, a denomination which appears to me to be more suitable than that of BARN Island, because COOPER says that this island has a *round form*. It may be remarked that this navigator (page 21 of his Journal) observes that "SADDLE Island loses that form as it draws to the eastward, and then looks moderately high and well wooded." It is probable that ROBERTSON who may have seen it when it bore west of him, and who thence stood to the southward, may not have remarked the two hummocks which presented themselves to DORDELIN and COOPER, when, in coming from the south-west, both of them had the island bearing north-east: we may, however, be surprised at the hummocks not having been perceived and noticed by ROBERTSON, who anchored at about the distance of 4 miles to the south-east by east of his

Low Island, DORDELIN'S ILE AUX MAMMELLES, COOPER'S SADDLE Island \*.

The denominations of the three islands which form the east group also give occasion for a few remarks. They are disposed in the form of a triangle: of the two western islands, the most northern is named on the charts NORTH Island and sometimes THWART-THE-WAY Island; the southern is called every where SOUTH Island; the third island, situated to the eastward of the middle of the first two, bears on ROBERTSON'S charts, the name of TABLE Island. This last, which its name indicates as likely to be a flat and level island, is not laid down on COOPER'S chart, nor is it mentioned in his journal: it was concealed from his view by the first two, and may not have been perceived at the distance at which, by his track, he must have passed from it.

COOPER'S Track passes, as I have said, between the west group of the small islands and MIDDLE Island: it leaves to the eastward SANDY BEACH, and to the northward of this island, the breakers which I have laid down on my chart, and which are not inserted in COOPER'S. These breakers are

\* The difference of the names given by *Robertson*, and of those which are met with on the Chart and in the Journal of *Cooper*, is to be found the same on the copy of *Robertson's Plans* which Mr. *Dalrymple* had published in 1786, in his *Collection of Plans*.

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taken from the chart and plan of ROBERTSON, who has there marked the track of the ATLAS, Captain COOPER; they are placed to the east-south-east of the south-east point of MIDDLE Island, and to the north-north-west of BUTTON Island (ROBERTSON'S BARN Island.) There appears only, in COOPER'S chart, nearly in the same position with respect to MIDDLE Island, a place indicated by a dotted circle; and it is said in the Notes which are engraved on the chart, that in this place, COOPER saw the water of a green colour: but St. BARBE, commanding a Portuguese ship in company with which he passed through the strait, told him that the sea was often seen to break there. ROBERTSON lays down, two miles to the northward of these breakers, on the very track of the ATLAS, an anchor which indicates that this ship anchored in the place which it occupies; and there are other breakers marked within less than the distance of a mile to the westward of the position indicated by the anchor. As Captain COOPER has neither marked, on his chart, this anchoring-place, nor the second breaker to the eastward of it, I have thought it proper not to lay it down on mine; and I have preserved there only the first breakers of which the Portuguese captain has furnished the indication. I observe that, between SANDY-BEACH Island and the south part of these Breakers, there is drawn on ROBERTSON'S chart and plan the track



of the ROYAL ADMIRAL, which passes between the breakers and the island, crossing from north-east to south-west\*.

The relative position, with respect to each other, of the two groups which I have just described, and their respective position in regard to MIDDLE Island, is what it is of most importance to fix, in order to succeed in drawing a Plan of the EAST PASSAGE OF CLEMENTS' STRAIT.

Unfortunately the charts which have been given us, by ROBERTSON, WILSON, and COOPER differ considerably from each other respecting the relative position of the small groups and of MIDDLE Island. The Journal of the ship VANSITTART, Captain CLEMENTS, on board of which G. ROBERTSON drew his plan of CLEMENTS' STRAIT, has not been published, at least this journal is not comprised in the number of those for the publication of which we are indebted to the zeal of Mr. DAL-

\* Captain Cooper certainly mentions, in his log-book (*page 20 of his Journal*) having come to an anchor in 22 fathoms, on the 7th of August, at 8 P.M. but, on calculating the courses given in this same log, from his first station, at noon of this day, in 3° 20' latitude observed, till 8 P. M. and in setting off the result on his chart, we find that he must have anchored 10½ miles to the north 8° east of the northern Point of his *Sandy Beach* Island; whereas, on *Robertson's* chart and plan, the indication of the anchorage is 6½ miles distant from this same point, and directly north. *Cooper* does not say that, from the place where he brought up, there were breakers to the eastward at less than the distance of a mile, as they are seen on *Robertson's* chart.

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RYMPLE; and we are reduced to take from the very charts of ROBERTSON, the bearings and distances; but it cannot be doubted that this navigator subjected them to the angles which he had measured.

It has been seen (farther back, page 509, note \*) that WILSON, from his station *c*, whence he set the south-west point of MIDDLE Island north  $5^{\circ}$  west, and the south-east point of the peninsula of SEL directly west, had at the same time the eastern extreme of MIDDLE Island bearing north  $33^{\circ}$  east, and an island, which is SANDY BEACH Island, north-east by east, or north  $56^{\circ} 15'$  east.

From his station *d*\*, whence he set the SOUTH-

\* From the station *d*, *Wilson* had the following bearings (*page 3 of his Journal*)

The	in one with the north-east end	
of the <i>Outer Island</i> in the <i>Bay</i> . . . . .		N. $34^{\circ}$ W.
The south-west of <i>Passage Island</i> . . . . .		North.
The south-west point of		S. $87^{\circ}$ W.
A remarkable hummock upon <i>Banca</i> (which		
had been observed in one with the <i>Outer</i>		
<i>Island</i> in the bay S. $50^{\circ}$ W.) . . . . .		N. $81^{\circ}$ W.
A very small island . . . . .		N. E. by N.
Another larger . . . . .		N. E. $\frac{1}{4}$ N.
Another . . . . .		N. E. $\frac{1}{2}$ N.
Another still larger, with one beyond it, in		
one with it . . . . .		N. E. by E.
Another (from the mast head) about . . . . .		E. by S.
Another (from the deck looking like a sail)		
very distant . . . . .		S. E. $\frac{1}{2}$ E.

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WEST point of PASSAGE Island directly north, and the SOUTH-EAST point of the peninsula (in one with the north-east end of the *Outer Island* in the Bay) north  $34^{\circ}$  west, he had, at the same time, a very small island (SANDY BEACH) bearing north-east by north, or north  $33^{\circ} 45'$  east.

It is from these bearings that Captain WILSON must have constructed the part of his chart that presents the channel or open passage between MIDDLE or PASSAGE Island and SANDY-BEACH Island, which is the nearest. The south part of PASSAGE Island presents on this chart a straight coast which extends about 5 miles on an east and west line, declining only 2 or 3 degrees from the east towards the north: this configuration differs from that which all the other charts have given of this part of the island, and from that which it must have from good bearings that determine the position of the southernmost point of the island in regard to its south-west point. Be this as it may, if we take, on WILSON'S chart, the shortest distance from PASSAGE Island to SANDY BEACH Island, and the relative bearing of the two points of the shortest distance, we find that the width of the channel there is  $3\frac{2}{3}$  miles, and that the bearings, on this line, is south  $5^{\circ} 30'$  east, and north  $5^{\circ} 30'$  west.

On COOPER'S chart, which is exactly subjected

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*Sandy Beach I*  
*Saddle Island*.  
*Button Island*.  
*Middle Island*

*Sandy Beach I*  
*Button Island*. .  
*Flat Island* . .

to the bearings which he took\*, the width of the channel is 5 miles, and the bearing of the two points at the shortest distance, south-east and north-west, or 45 degrees.

On ROBERTSON'S chart and plan, the shortest distance is, on the Plan,  $6\frac{1}{2}$  miles, and 7 miles on the chart; and the bearing, south  $28^{\circ} 30'$  east, and north  $28^{\circ} 30'$  west on the Plan; and  $37^{\circ} 30'$  on the chart.

BUT on ROBERTSON'S Plan, published by Mr. DALRYMPLE in 1786, the distance is  $5\frac{1}{2}$  miles, and the angle of bearing  $19^{\circ}$ .

## \* STATION II.

*Saddle Island* distant 6 leagues.... N.  $45^{\circ}$  E.

## STATION III.

*Saddle Island* ..... E.  $26^{\circ}$  N.

*Sandy Beach Island* ..... N.  $28^{\circ}$  E.

*Middle Island* ..... from N.  $9^{\circ}$  E. to N.  $11^{\circ}$  W.

## STATION IV.

*Saddle Island* ..... from S.  $75^{\circ}$  E. to E.  $5^{\circ}$  N.

*Flat Island*... .. E.  $10^{\circ}$  N.

*Middle Island*..... from N.  $5^{\circ}$  E. to N.  $25^{\circ}$  W.

## STATION V.

*Sandy Beach Island* ..... S.  $32^{\circ}$  E.

*Saddle Island* ..... E.  $39^{\circ}$  S.

*Button Island* ..... E.  $25^{\circ}$  S.

*Middle Island* ..... from N.  $2^{\circ}$  W. to N.  $43^{\circ}$  W.

## STATION VI.

*Sandy Beach Island* ..... S.  $8\frac{1}{2}^{\circ}$  W.

*Button Island* ..... S.  $6^{\circ}$  E.

*Flat Island* ..... S.  $32^{\circ}$  E.

(Cooper's *Journal* page 20 to 23)

Thus the four Plans or Charts which I have quoted give us the following results :

	Width of the Channel.	Bearing of the Points at the shortest Distance.
	Miles.	Degrees.
<i>Wilson's Chart</i> .....	3.66.....	5½
<i>Cooper's Chart</i> .....	5.00.....	45
<i>Robertson's</i> {	1786 ....	5.50..... 19
	1788 { Plan	6.33..... 28½
	Chart	7.00..... 37½

These determinations differ too much between them for us to endeavour to reconcile them, or for us to be able to content ourselves with taking a mean between the results. It has therefore been necessary to recur to other means for fixing the position of SANDY BEACH and SADDLE Islands with respect to MIDDLE Island: these Islands which are the westernmost of the group of the seven islands which form the EAST Passages, will be found connected in a manner sufficiently exact, as well to MIDDLE Island as to the Peninsula of SEL, which are themselves connected by good operations to the EAST Point of BANCA and GASPAR Island; and the Position of the group very well determined will identify, if I may use the expression, the Plan of CLEMENTS' STRAIT with that of GASPAR'S STRAIT.

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Let us begin by fixing the position, with respect to the Peninsula of SEL, of the southernmost Point of MIDDLE Island, which is not its south-west Point, and which may be said to belong equally to both STRAITS.

On the 23rd of December 1791, at 22 minutes past 7 A. M. Captain CHANAL, from on board the SOLIDE, set at the same time the SOUTH-EAST Point of the Peninsula of SEL south  $54^{\circ}$  west, and the southernmost Point of MIDDLE Island north  $55^{\circ}$  east; and as, at that moment, the ship was at nearly an equal distance from the two points set, we may admit that these two points lie, with regard to each other, north  $54^{\circ} 30'$  east, and south  $54^{\circ} 30'$  west.

An hour after this first bearing (at 20 minutes past 8) the south coast of MIDDLE Island, comprised between its SOUTH-WEST Point and its most eastern Point on the south shore, bore from north  $11^{\circ} 30'$  east to north  $32^{\circ}$  east.

The bearings taken at these two periods being combined, they fix both the extent of the south coast of MIDDLE Island, which presents itself to a ship coming from the southward, and the position of the SOUTHERNMOST Point of that island in regard to the Points of the Peninsula of SEL, already determined, and more immediately, in regard to its SOUTH-EAST Point: we find that the latter

latter point lies, with respect to the south point of MIDDLE Island, south  $43^{\circ}$  west and north  $43^{\circ}$  east: that their distance is  $10\frac{1}{2}$  miles, and that the extent of the south coast of MIDDLE Island is 3.6 miles.

On the other hand, WILSON, from his station *b* (farther back, page 501 and 502, note †, and 507) set the southernmost end of MIDDLE OF PASSAGE Island in sight south  $66^{\circ}$  east; and as this station is fixed by good bearings, as well in regard to MIDDLE Island and the Peninsula of SEL, as with respect to the hummock on the EAST Point of BANCA, and with respect to GASPAR Island; it follows that, if, from this station, we draw a line whose direction is south  $66^{\circ}$  east, we cannot carry any portion of the south coast of MIDDLE Island more to the southward than this line of bearing, which agrees perfectly with the result of CHANAL's bearings.

This argument confirms the necessity of the correction which I have before made (page 507) to one of WILSON's Bearings, by substituting the *southernmost* Point of PASSAGE Island (that which he must have seen from his position) to the SOUTH-WEST Point mentioned in his Journal; and, in fact, if the bearing of north  $74^{\circ}$  east, and south  $74^{\circ}$  west, assigned by WILSON, between the north-east point of the Peninsula of SEL and the SOUTH-

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WEST Point of PASSAGE Island, be applied on my chart to the NORTH-EAST Point of the peninsula and the southernmost Point of the island, it will be found that this bearing agrees with all the results of my labour.

WILSON, from his station *c* (farther back, page 509, note \*) set the easternmost entrance in sight of the south coast of PASSAGE Island north  $33^{\circ}$  east; but the agreement of the bearings which I have mentioned above, proves that there is an error in the measure of the angle, or rather a fault in the copy, and that this angle should be 23 degrees in lieu of 33.

After having thus fixed the extent of the south coast of PASSAGE or MIDDLE Island, and the position of the southernmost Point in regard to the SOUTH-EAST Point of the Peninsula of SEL, it remains for us to determine the bearings in regard to MIDDLE Island of the westernmost islands of the group which forms the EAST Passages: in order to accomplish this, I shall make use of various bearings taken from the Journals of Captains WILSON, COOPER, and CHANAL.

WILSON, from a Station of the 26th of February, at 11 A. M. which is well fixed by bearings taken at the same time of four Points already determined (the east Point of BANCA, GASPAR Island, the eastern island in the gulf, and the north-



north-east point of the Peninsula of SEL \*) also fet the west coast of MIDDLE or PASSAGE Island, namely, the northern extreme in sight, south  $79^{\circ}$  east, and in one with the southern extreme (which from his position must be the SOUTH-WEST Point of the island) a small round island south  $42^{\circ}$  east: this was the only land that he then saw more to the eastward than PASSAGE Island. This small island which was seen in the direction of south  $42^{\circ}$  east with respect to the SOUTH-WEST Point of MIDDLE Island, could be no other than SANDY BEACH, or SADDLE Island, or perhaps both in one; for they lie from each other on the same point of the compass.

\* a *Gaspar* Island seen from the Stern Gallery . . . . . N.  $19^{\circ}$  E.

The East Point of *Banca* breaking away into trees N.  $22\frac{1}{2}^{\circ}$  W.

The north-east point of the Peninsula of SEL . . . . . S.  $9^{\circ}$  W.

The extremes of an Island in the Bay (which extreme is in one, with a remarkable hummock upon *Banca*) from . . . . . S.  $50^{\circ}$  W. to S.  $62^{\circ}$  W.

The extremes of *Passage* Island . . . . . from W.  $42^{\circ}$  E. to S.  $79^{\circ}$  E.

“ which last extreme (that of the 8 W) is in one with a small

“ round island a long way off, and is the only land we see to

“ the eastward of *Passage* Island.

“ At this time, viz. 11 o'clock, the ship is nearly mid-chan-

“ nel betwixt the island in the Bay, and *Passage* Island, rather

“ nearer to the former, in 15 fathoms water.” (See *Wilson's* Journal, page 26.)

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The linear direction which this last of WILSON'S bearings gives us, fixes the limit of the small westernmost islands of the south-east group; they cannot be carried within the line of south  $42^{\circ}$  east, down from the SOUTH-WEST Point of MIDDLE Island nearly through the middle of these two islands.

Captain CHANAL, from the anchoring-place of the 22nd of December in the evening, the point of which is fixed by his bearings of Points already determined, had in sight four of the islands of the south-east group, and the southernmost bore from him south  $56^{\circ}$  east\*. This linear direction from the point where the SOLIDE lay at anchor, passes through the middle of SADDLE Island, which is, in fact, the southernmost of the islands.

It is from these linear directions combined with the bearings of WILSON'S Stations *c* and *d* (farther back, pages 509 and 521) and with those of COOPER'S Stations IV, V, and VI (page 523) that I have placed on my chart the four western islands of the south-east group, SANDY-BEACH, SADDLE FLAT, and BUTTON Islands: and the positions which I assign to them are confirmed by bearings taken from on board the SULLIVAN which, being in a position whence the west coast of MIDDLE Island bore from her from south  $65^{\circ}$  east to

\* See pages 141 and 142 of this volume.

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north  $45^{\circ}$  east, had an island (this is SANDY-BEACH) bearing south  $45^{\circ}$  east; another (this is SADDLE ISLAND in its highest part, as the hummocks on the north side) south  $51^{\circ}$  east; and a third (this is BUTTON Island) south  $55^{\circ}$  east\*: in her position FLAT Island was concealed from her by BUTTON; and, indeed, he makes mention only of *three* islands which he perceived and set. If the SULLIVAN'S position at the time of these bearings be pricked off on my chart, it will be

\* See the *Sullivan's Journal*, in the Appendix to *Memoir of Chart of Sunda and Banca*, published by Mr. Dalrymple, page 18.

According to the Journal, the distance of the ship from Middle Island was about *four miles*; but it is evident that this distance was estimated too great, and cannot be, as it is seen on my Chart, but about *a mile and a half*; and, if it had been 4 miles, the *Sullivan* which, from the point of her bearings, steered, according to her logbook, (page 17 of her journal) S.  $\frac{1}{2}$  E.—S by E.—S by W. and ran from  $\frac{1}{2}$  past 5 to 9 P. M. upwards of 6 miles on these courses, would have passed over the breakers and the shoal of the north-east point of the Peninsula. It appears that *G. Robertson* thought, like me, that there was an error respecting the distance estimated by the *Sullivan*; for, on his Chart and on his large Plan, he makes his ship's track pass at about *two miles*, and not at *four miles'* distance from the south-west Point of Middle Island which bore from the *Sullivan* south  $65^{\circ}$  east, at the same time that the north-east bore north  $45^{\circ}$  east. But the relative position of these two Points, such as it has resulted from the sequel of my labour, allows me not to give more than the distance of *a mile and a half*, from the point where the *Sullivan's* bearings were taken to the south-west Point of Middle Island.

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found that the three islands which I have designated, the only islands that could be perceived from her, fall very exactly in the linear directions in which she saw them.

In regulating on my chart the position of the west islands of the south-east group according to what has been established above, the width of the passage between these islands and MIDDLE Island, measured at the narrowest place is 4.1 miles; and the bearing of the two Points at the shortest distance from MIDDLE Island on the one hand, and, on the other, from SANDY-BEACH is south  $28^{\circ}$  east, and north  $28^{\circ}$  west. If these results be compared with those of page 521, it will be seen that the distance comes near to that of WILSON,  $3\frac{1}{2}$  miles, and that the angle of bearing is nearly that of ROBERTSON'S Plan, (1788) 28 degrees and a half.

I have quoted my authorities, the journals whence I have taken the data on which my chart is grounded; I have detailed the operations by which I have succeeded in fixing the width of the passage at  $4\frac{1}{10}$  miles, and the bearings of the nearest points, at an angle of  $28^{\circ}$  from south to east and  $28^{\circ}$  from north to west: I leave to the intelligent reader to ascertain whether the use which I have made of the data, has led me to an exact result, and whether the new chart deserves in this respect a preference to the older charts.

In order to place NORTH or THWART THE WAY, SOUTH, and TABLE Islands, composing the little eastern group which, with that of the four western islands, form the passage through which passed the VANSITTART and the fleet under the command of Captain CLEMENTS, I have made use of COOPER's bearings at his Stations IV and VI (farther back, page 523). The relative position which the two groups take between them, according to these bearings, is confirmed by that which Captain CHANAL took on the 23rd of December at seven minutes past nine o'clock \*; from the point where the SOLIDE was at this period, the small islands, seven in number, partly shut in by each other, formed a group, the general direction of which was north  $43^{\circ}$  east.

If, on my chart a line be drawn from the south point of SADDLE ISLAND, the southernmost of the seven islands, to the middle of NORTH ISLAND, the northernmost, this line will have the direction of north  $43^{\circ}$  east. Thus it may be concluded that SADDLE and FLAT Islands on the one hand, and on the other, NORTH and SOUTH Islands, which form the VANSITTART's Passage, are well situated on my chart, with respect to their relative bearing. As to their distance, which is the width of the passage, it is there such as it is given by the cross bearings of Captain COOPER's Stations IV

\* See page 143 of this volume.

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This distance, at the narrowest part of the passage, between the north-east Point of FLAT Island and the south-west Point of SOUTH Island, is, on my Chart,  $2\frac{2}{3}$  miles; and the bearing of the two Points, in regard to each other, is east  $15^\circ$  north and west  $15^\circ$  south.

On ROBERTSON'S chart, the distance is  $4\frac{1}{2}$  miles and the angle  $17^\circ$ ; and, on his great Plan, the distance is  $4\frac{1}{2}$  miles and the angle  $16^\circ$ .

The comparison with the other charts would be useless; the navigators who constructed them took not their route through this Passage.

After having placed the seven islands of the south-east Groups, as well in their positions relative to each other, as in their situation in regard to MIDDLE Island, it remains for me to fix the position of a Shoal which may be called the VAN-STUART'S Shoal, and which merits all the attention of navigators who may be desirous of passing through CLEMENTS' STRAIT between the seven islands, leaving, like him, three of them to the eastward, and four to the westward. This Shoal is situated to the northward of our FLAT Island, ROBERTSON'S SADDLE Island. Captain CLEMENTS, who had anchored with his fleet at a little distance to the south by west of the Shoal, sent his boat to take the bearings of the islands

from the Shoal itself, on which there was not found more than a foot and a half of water. These bearings make part of the sailing directions which Mr. DALRYMPLE has engraved on the Plan itself of CLEMENTS' Strait drawn by ROBERTSON, which he inserted, in 1786, in his great Collection of Plans of the Seas of ASIA, before ROBERTSON had published his general Chart and his particular Plan of GASPAR'S and CLEMENTS' Straits.

From the shoal, the VANSITTART'S boat set NORTH Island OF THWART THE WAY, east by north, at  $3\frac{1}{2}$  or 4 miles' distance estimated by the eye — ROBERTSON'S SADDLE Island, which is COOPER'S FLAT Island, and the same on my Chart, south by west half west  $3\frac{1}{2}$  or 4 miles distant — BARN Island, which is COOPER'S BUTTON Island, and the same on my Chart, west by south — The south Point of MIDDLE Island west-north-west.

ROBERTSON has subjected with tolerable exactness the VANSITTART'S Shoal to the distances estimated by the eye; namely, to  $3\frac{1}{2}$  miles from NORTH Island; and to  $3\frac{1}{2}$  miles from FLAT Island — he has also placed it in its bearing with respect to the south Point of MIDDLE Island, that is to say, to the east  $22^{\circ} 30'$  south from this Point; but he has given up the bearings which were taken of three of the small islands; he has placed the shoal west of NORTH Island, instead of west

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11° 15' south—north 20° east of FLAT Island, instead of 14° 15' east—east of BUTTON Island, instead of east 11° 15' south. I am ignorant what motive can have determined ROBERTSON to give to distances of small islands, *estimated by the eye*, and consequently, so erroneous, especially when the observer is placed in a boat near the level of the sea, the preference to angles of bearing measured with care, which always afford more certainty as to correctness, especially when the magnetic needle has no variation. I could not adopt his proceeding, and I have subjected the VANSITTART'S Shoal to all the bearings taken, from the shoal itself, with respect to the south Point of MIDDLE Island, NORTH Island, FLAT Island, and BUTTON Island: the point where these four lines of bearing met, has fallen  $2\frac{7}{8}$  miles from NORTH Island, instead of  $3\frac{1}{2}$  or 4 miles, mentioned in the note engraved on the Plan published by Mr. DALRYMPLE; and  $1\frac{1}{8}$  miles, instead of  $3\frac{1}{2}$  or 4 miles, from FLAT Island. My distance to the first island differs from the distance indicated in the Note, only in the proportion of 11 to 14; but the distance to the second differs in the proportion of 18 to 35. I observe that, to reduce these distances to those which were *estimated* from the boat that took the bearings, it would be necessary, either to alter considerably the *observed* bearings which do not, like distances estimated



by the eye, depend on a computation always arbitrary and very uncertain, or give to the small islands positions relative to each other and with respect to MIDDLE Island, very different from those which it is impossible not to assign to them according to the Bearings of WILSON, COOPER, and CHANAL, which, in general, reciprocally serve each other as a verification and a proof.

I know of no other than ROBERTSON'S Chart and Plan that present the east part of CLEMENTS' STRAIT, that is to say, the west coast of BILLITON, and the small neighbouring islands, and which can be employed for delineating this part. But, in making use of the work of that navigator, I was obliged to subject this portion of it as well to the position which I have given to MIDDLE Island, as to that assumed by the seven islands which compose the south-east Groups.

I observe first that ROBERTSON anchored to the south-west, at the distance of about 8 miles from the north-west Point of BILLITON Island; and that, from this Point, to abreast of MIDDLE Island and within sight of NORTH Island or THWART THE WAY, he made a direct course of about 8 leagues: and it is, no doubt, partly from the result of this course, and the bearings which must have been taken of its two extreme points, that he has laid down NORTH Island 26½ minutes more

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to the southward than the north-west Point of BILLITON.

NORTH Island, at its middle, according to the result of the triangles of which I have made use for constructing my Chart, is situated in latitude  $2^{\circ} 53' 20''$  (the Peak of GASPAR being in  $2^{\circ} 21'$ ): and since the north-west point of BILLITON is less southerly by  $26\frac{1}{2}$  minutes than NORTH Island, and since its latitude is south, this point must be in  $2^{\circ} 27' 10''$ : and it is thus that I have laid it down on my Chart. On that of ROBERTSON it is in  $2^{\circ} 37'$ , and its position in latitude differs on our charts 9 minutes and 50 seconds.

This difference, which is the same, within less than 1 minute, as that which we have had in our latitudes of GASPAR Island (between  $2^{\circ} 21'$  and  $2^{\circ} 30'$  farther back, page 466), may make us presume that, from his anchoring-birth under the north-west point of BILLITON, ROBERTSON had sight of GASPAR\*; and that, not having observed the latitude of the anchorage, he subjected it to that which he applied to GASPAR. What confirms me in this opinion is, that having, by a series of triangles, subjected in my work the la-

\* *Robertson* anchored to the south-west of the north-west Point of *Billiton*, at the distance of about 8 miles: from this anchorage, he could perceive *Gaspar* Island 8 or 9 leagues distant, as *Wilson* perceived it at this distance, from his station at 11 A. M. in *Gaspar's Strait* (farther back, page 528 note \*).

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titude of NORTH Island to that of GASPAR, I found that their difference of latitude was  $32' 30''$ ; and, on ROBERTSON'S Chart, this difference is  $33' 30''$ , that is to say, the same within a minute.

In giving to NORTH and SOUTH Islands the position, with respect to MIDDLE Island, which resulted from the series of our triangles, and which differs from that given them by ROBERTSON, I was forced to bring nearer to the south-east group the points of the anchorage where the VANSITTART'S anchor is marked off MIDDLE Island; and this was the sole method of preserving to these points their position in regard to this island, the extremes of which must have been set from each anchoring-place.

LONG ISLAND, that large island situated to the north-east of the Groups, as well as the Points of the coast of BILLITON which correspond thereto, must, for the same reason, have experienced a general movement towards the south, in order to preserve to them, with respect to MIDDLE Island, the position which ROBERTSON has given them.

XIV. ILE DE LA RECONNOISSANCE, SHOAL-WATER ISLAND, and the shoals situated to the southward of the STRAITS.

I have fixed with all the exactness that the materials at my disposal would admit of, the northern part of the Straits, and principally GASPAR

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Island and the EAST Point of BANCA, which serve as a land-mark for ships that are coming to the STRAITS from the northward; it remains to fix the land-marks for those coming to them from the southward.

The Island or rather the Islands of LA RECONNOISSANCE \*, which Captain CLÉMENTS calls SHOAL-WATER Island, is the first point which it is proper to determine, because it is that which must be made by ships coming from the southward, whether it be intended to enter by the EAST or the WEST PASSAGE.

DORDELIN, in going to CHINA, in 1784, got sight of these islands in the morning, and, in reducing, by the computation of his run, their position to the latitude which he observed at noon, he made the latitude of the southern island  $3^{\circ} 18'$  south.

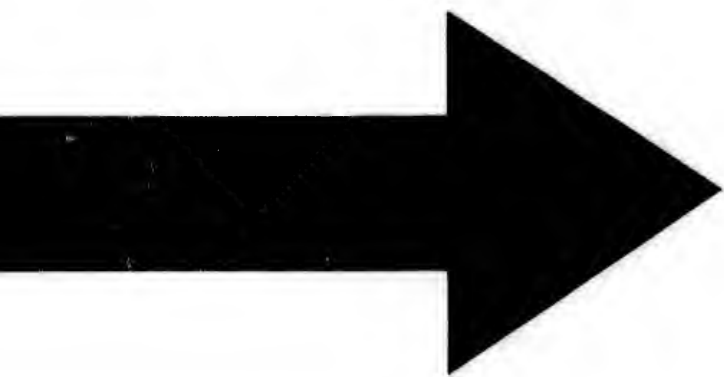
WILSON's chart places the south point of this island in  $3^{\circ} 16'$  †, but he determined its position only by a bearing taken from his station *d*, as far off as he could discern it: and we can only make

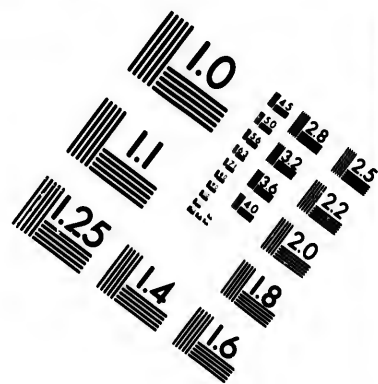
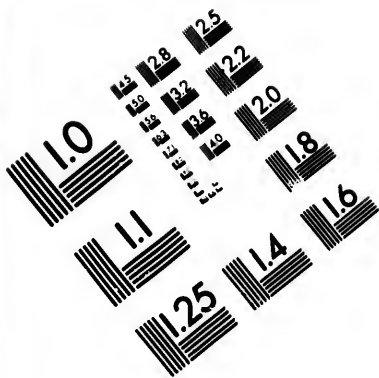
\* All the Charts and Plans agree in making of them two small islands, on a N.E. and S. W. line, about 1 or 2 miles distant from each other, and connected by a circular shoal.

† I observe that, on this chart, the latitude of *Gaspar* is only  $2^{\circ} 20'$ ; and that as *Shoal-water* must have been subjected to *Gaspar* by *Wilson's* series of bearings and trigonometrical operations, it must have been placed 1 minute less southerly, than if, as I have placed it, *Gaspar* is laid down in latitude  $2^{\circ} 21'$ .

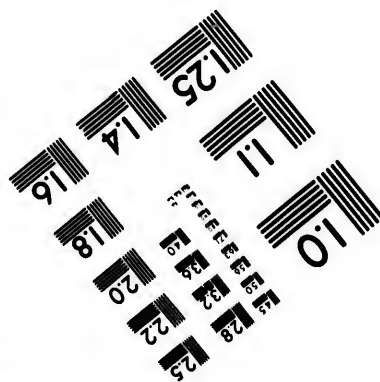
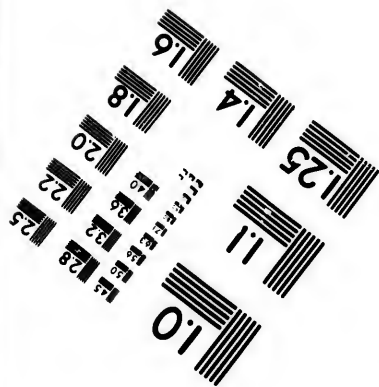
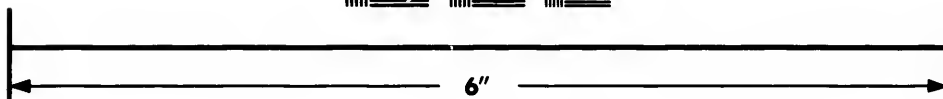
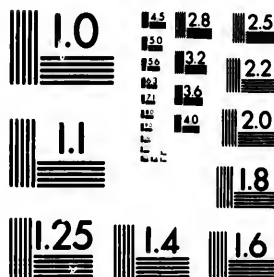
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use of this linear direction for subjecting this island to the south Point of MIDDLE Island, by preserving to it its latitude of  $3^{\circ} 18'$ , confirmed, as will be seen, by the Plan which was constructed by ROBERTSON, at the time of the discovery of the EAST PASSAGE by CLEMENTS.

This Plan, such as he himself published it in 1788, has no scale of latitude, but the difference of latitude between the middle of GASPAR Island and the south part of SHOAL-WATER Island or Islands, is there 57 miles, or 57 minutes; and if GASPAR is in latitude  $2^{\circ} 21'$ , SHOAL-WATER must be, according to this Plan, in  $3^{\circ} 18'$ .

It is true that ROBERTSON, on his *Chart of the Straits of BANCA, GASPAR and CLEMENTS*, 1788, and on his large *Chart of the China Sea* 1791, places SHOAL-WATER Island in  $3^{\circ} 27'$ , that is to say, 9 minutes more to the southward than DORDELIN; but, on these very charts, he places GASPAR in  $2^{\circ} 30'$ , in lieu of  $2^{\circ} 21'$ , that is, 9 minutes more to the southward than the latitude which, it appeared to me, ought to be adopted for GASPAR Island (farther back, page 469): the difference of latitude is therefore the same on the two charts. As all the Charts and Plans agree in general, respecting this difference of 57 minutes\*,

\* Robertson's Plan, published by Dalrymple, as far back as the year 1786, in his Collection, gives this difference of latitude smaller

it appears that adding it to for SHOAL-WATER from his observation

Captain Cook the support of August, at no his latitude of instant, the coast of BANCA Island north from direction in no other than bore east half ward than the  $3^{\circ} 21'$ , and co- tude assigned to RECONNOISSANCE by ROBERTSON

I take the difference of latitude of GASPAR is, in have made it,

smaller by 2 minutes of that of Robertson published by Mr. Dalrymple be due to the origin

it appears that it ought to be admitted; and on adding it to the  $2^{\circ} 21'$  of GASPAR, we shall have for SHOAL-WATER,  $3^{\circ} 18'$ , as DORDELIN made it from his observation and his route:

Captain COOPER'S Journal (page 19) comes to the support of this determination. On the 6th of August, at noon, at the point of his first station, his latitude observed was  $3^{\circ} 21'$ , and, at the same instant, the remarkable hummock on the south coast of BANCA bore north  $26^{\circ}$  west—MIDDLE Island north  $25^{\circ}$  east—and a *low island*, east half north: from the position of his ship, and the direction in which this island bore, it could be no other than SHOAL-WATER Island: but since it bore east half north, it is therefore *less to the southward* than the ship; its latitude is therefore under  $3^{\circ} 21'$ , and consequently nearer to  $3^{\circ} 18'$ , the latitude assigned by DORDELIN to the Island of LA RECONNOISSANCE, than  $3^{\circ} 27'$ , the latitude given by ROBERTSON.

I take the opportunity of observing that, if the difference of latitude between SHOAL-WATER and GASPAR is, in fact, 57 minutes, as all the charts have made it, and if the latitude of  $3^{\circ} 19'$  or  $20'$ ,

smaller by 2 minutes: but as this Plan is, no doubt, only a copy of that of *Robertson* who drew it, to whatever confidence a Plan published by *Mr. Dalrymple* may be entitled, still more must be due to the original.

such

such as it is deduced from COOPER'S observation and bearing in regard to SHOAL-WATER Island, is exact, GASPAR Island must be in  $2^{\circ} 22'$  or  $23'$ ; which is far enough from  $2^{\circ} 30'$ , adopted by ROBERTSON, and near enough to  $2^{\circ} 21'$ , given by the SOLIDE'S observation, taken on the very parallel of GASPAR.

ROBERTSON'S two Charts and Plan, which I have quoted, agree in placing, very nearly to the southward of SHOAL-WATER Island, two shoals, under the name of *Breakers*; and the southernmost extremity is there at the distance of 11 miles from the south extreme of these islands. It is written on the Plans that a small portion of the latter is dry, that it appears white, and is very low. I have thought it proper to preserve these shoals in the position that is given to them on the Charts and Plans which the English have published within these four years, and which merit the confidence of navigators.

DORDELIN'S chart indicates a third shoal to the west  $33^{\circ}$  south, and at 18 miles' distance from the Islands of LA RECONNOISSANCE (SHOAL-WATER Island). He anchored 11 or 12 miles to the south-west by west of this shoal, in  $10\frac{1}{2}$  fathoms; and it appears that he examined it well; for on his chart is written the following phrase:

“ Sand-bank and rocks even with the water's edge, seen by the ship TRITON bound to CHINA  
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in 1784, near which were found 7 fathoms water. It must be covered at high water. This bank is laid down on the charts of D'APRÈS' old *Nep-tune Oriental*. But it is not laid down on those of the new edition."

As this shoal, on DORDELIN'S chart, is  $7\frac{1}{2}$  miles more to the southward, and upwards of 16 miles to the westward than the south part of the Islands of LA RECONNOISSANCE (SHOAL-WATER Island), or about 17 miles to the *west-south-west half west* of these islands, while the southernmost part of the BREAKERS which are seen on ROBERTSON'S Charts, is carried 11 miles directly to the *southward* of these same islands, of which DORDELIN had got sight, and determined the latitude; it does not appear that we ought to confound these shoals, and suppose that DORDELIN'S Shoal and the BREAKERS marked on ROBERTSON'S charts, are but one and the same shoal: I have therefore preserved and laid down both on my chart; it will there be seen that in placing them in the respective position which has been given to them, the one on the French Chart, the others on the English Charts, the track of Captain CLEMENTS, borrowed from ROBERTSON'S Chart, passes in mid-channel, between the two positions, at  $6\frac{1}{2}$  miles distance from both: and, at this distance, DORDELIN'S Shoal, *that sand-bank and rocks even with the water's edge, which must be covered at high water*, could not

be

be perceived by CLEMENTS, as ROBERTSON'S *Breakers* of which a *small portion* only becomes dry and is *very low*, could not be perceived by DORDELIN, since having passed to the westward of his shoal, and thence steered to the north-east, he came no nearer than 9 miles to SHOAL-WATER Island, and he must have passed at a greater distance from the *Breakers* which extend 11 miles to the southward of these islands. COOPER'S track, drawn according to his bearings and his chart, passes not at more than the distance of a mile to the westward of DORDELIN'S SHOAL : but if, as we must believe from the report of this captain, his Shoal is not dry at low water, COOPER may have passed very close to it without getting sight of it.

I here terminate the Analysis, too long perhaps, of the Charts which I have constructed of the two Straits comprised in the great Strait BETWEEN BANCA AND BILLITON ; in taking the liberty to make corrections in those which have, within these few years, been published by the navigators who have frequented this STRAIT, it was incumbent on me to enter minutely into the motives of the alterations ; and I must expect from time and experience to learn whether my labour has led me to results, the correctness of which is sufficient for the safety of navigation.

I have thought that it might be useful to French navigators, who do not possess the Plans of the English,

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\* I have thought the track of Gaspar who frequented the Straits of Oriental, which is marked on the chart which Mr. Dalrymple's track presents nothing it is marked is so denote his track on a

English, and that it would be agreeable to them to see marked on the Charts of the STRAIT all the tracks of the ships which, till 1791, have frequented the two Passages: the traveller loves to see a beaten path: he is then certain of not losing his way.

In GASPAR'S STRAIT OF THE WEST PASSAGE will be found \*:

1st. DORDELIN'S track (the TRITON, the PROVENCE, and the SAOITTAIRE) going to CHINA in August 1784.

N. B. I might also have delineated there his track on his return, but it would be confounded with others, without being of any use.

2nd. The track of the SULLIVAN (Captain STEPHEN WILLIAMS) coming from CHINA in December 1784, taken from his Journal.

3rd. The track of the CARNATIC (Captain LESTOCK WILSON) on her return from CHINA in February 1787, subjected to the Bearings mentioned in his Journal.

4th. The track of the WARREN HASTINGS (Captain JOHN PASCAR LARKINS) coming

\* I have thought it proper to dispense with marking the track of *Gaspár* whose chart is to be found in D'ARIS' *Neptune Oriental*, which is in the hands of all our navigators, and of which Mr. *Dalrymple* has given a copy in his *Collection*. This track presents nothing particular, and *Gaspár's* Chart on which it is marked is so defective, that it would not be possible to delineate his track on a more correct chart.

from the northward in May 1788, subjected to his Bearings and his log-book.

5th. Lastly, the track of the SOLIDE (Captain ETIENNE MARCHAND) on her return from CHINA, in December 1791, drawn from the Bearings mentioned in the ACCOUNT of her voyage, and the Chart which was constructed by Captain CHANAL, conjointly with the Engineer LE BRUN.

*N. B.* I have not inserted in my Chart the track of the MACCLESFIELD Galley, coming from CHINA, in March 1702, which ROBERTSON has drawn on his large Plan: it presents nothing particular, and would only crowd the Passage. From the parallel of the EAST Point of BANCA, and  $2\frac{1}{4}$  miles from this Point, this Track runs south and south by east, and stops at the parallel of the SOUTH-EAST Point of the Peninsula of SEL at the distance of  $2\frac{1}{2}$  miles from that Point. The depth of water is the same as that which is seen on the other tracks that pass in mid-channel in the WEST PASSAGE. It might be presumed that it has been marked on ROBERTSON's large Plan, only to shew a track made in this Passage, by an Englishman, previously to the publication of GASPAR's Chart by D'APRÈS \*.

\* Mr. Dalrymple has given us in his Collection of *Memoirs* (*Appendix to Memoir of Chart of Sunda and Banca*, page 1 to

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In the EAST PASSAGE OF CLEMENTS' STRAIT  
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10), an Extract from the Journal of the *Macclesfield Galley*, which in coming from the northward, in March 1702, passed unintentionally through *Gaspar's Strait*: no help can be derived from it for drawing the Plan of the Strait: but it appears that the is the first vessel known that chance has led to pass it.

After having been long doubtful respecting the land in sight of which he found himself, the Captain discovered that it must be the Island of *Banca*.

"Yesterday (the 13th of March)" it is said in the Journal, "steering along the coast of *Banca*, we found it altogether as good as the *Plaiet* sheweth; the soundings as per Collum; there is many small Islands near the shoar, from which we saw many Breakers, and from the shoar itself, but they are all so near and visible that none have any occasion to come so near. Last night in the evening at 6 we got under the north Point of the East end of *Banca* anchored in 18 fathom, in the night it was calm; we found a small current along the shoar to leeward, the Island N. E. from this point or thereabouts dist. 7 leagues is very remarkable." (Mr. *Dalrymple* judges that this must be *Gaspar* Island, because in the original manuscript, is drawn a *Peaked Hummock*) "In the morning at day-light weighed and sent our pinnace on head of the ship to sound, and the yawle I sent towards *Banca* into the Bay, being inclined to have borrowed on that side, but going right in the soon shoaled the water to 10 fathom. I ordered them on or towards the great Island," (This must be *Middle or Passage Island*) "and resolved to keep the middle: steered through S. by E.  $\frac{1}{2}$  E. had not less than 13 fathom nor more than 18 till the east part of the Great Island bore E. by S. and the South Point of *Banka* S. by W. then 24, 26 fathom; soon after shoaled down to 12, 11 $\frac{1}{2}$ , &c."

"I conclude that the South Part of *Banka* is on the latitude of 3° 2' south." (This latitude can agree only to the south-



- 1st. The track of the VANSITTART and the Fleet commanded by Captain JOHN CLEMENTS, coming from CHINA, in the beginning of JULY 1781, delineated from the Plan drawn and published by GEORGE ROBERTSON:
- 2nd. The track of the ATLAS (Captain ALLEN COOPER) going to CHINA, having entered the Strait from the southward, in August 1785; it is drawn from his Journal:
- 3rd. The track of the ROYAL ADMIRAL, taken from ROBERTSON'S large Plan, where it appears without a date, and without any other indication.

Independently of these eight tracks which are marked at full length on my chart, I have also inserted there, from the Journals, those of the HAWK (Captain ROBERT RIVINGTON) and of the PONS-

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cast Point of the Peninsula, and not to the southernmost Point of Banca).

“ On the 15th, at 6 in the evening, the southernmost part of the *Great Islands* bore S. E. and the *southmost* part of Banca in sight, N. W. by W. dist. 5 or 6 leagues; the ship drove to the eastward with the current a small matter.” We are at a loss to conceive how a ship that has the *southernmost* part of Banca north-west by west 5 or 6 leagues distant, can have the *Great Island south-east*.

The Captain of the *Macclesfield* terminates this article of his Journal by saying: “ I like the coming through this way much better than through the Straits of Banca, it's more secure and much nearer.”

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BORNE (Captain WILLIAM HAMMETT) sailing in company, and coming from the northward in January 1785. I have discontinued these last-mentioned tracks above the parallel of GASPAR Island: to trace them beyond that, would create confusion in the Passage between GASPAR and TREE Island, by which these two ships entered the Strait. These two tracks have appeared to me useful to be preserved, because they may indicate the places that are *clean* amidst the shoals situated from the north to west-north-west, in regard to GASPAR Island.

This same reason has determined me to mark the track of the MASCARIN (Captain CROZET) in 1773, such as it is seen on the Chart N° 49, 2d. of D'APRÈ's *Neptune Oriental*, 2nd edition, a copy of which Mr. DALRYMPLE has given in his *Collection of Plans*. This track of CROZET crosses the part of the sea situated to the northward of the two Straits, and passes very close to the Northern Shoals which this navigator has made known, it likewise passes between the four Breakers north of BANCA, which were seen by the MACCLESFIELD, in 1702, and the SULLIVAN, in 1784, and between which the SOLIDE passed in 1791.

Although VIEWS of LAND are, in general, of no great use to navigators, because they necessarily vary, and often in such a manner as to be incognizable according to the different points from

which the lands may be seen; yet that I may neglect nothing that can add any advantage to the general Chart which I publish of the STRAIT BETWEEN BANCA AND BILLITON, I have caused to be engraved a VIEW, drawn by the Engineer LE BRUN, of the northern Part of BANCA, which comprehends the Mountain serving as a land-mark, such as, in the position indicated, this part presents itself to ships coming from the northward; various views of GASPAR Island taken from different Points; lastly, a GENERAL VIEW of the southern lands of the STRAIT, such as they appeared to DORDELIN, in standing for the Passages when coming from the southward.

*N. B.* The figures of the *soundings* indicate, on the tracks of the English, *fathoms* of 6 ENGLISH feet: to convert the *fathoms* into *Brasses* (fathoms) of 5 FRENCH feet, it is sufficient, in practice, to add an *Eighth* to the quantity of the English soundings. If I had wished to make this reduction on the Chart itself, I should have been obliged to employ fractional quantities at the end of the whole ones; and this multitude of figures, crowded and heaped together, would not have failed to cause a great confusion in the soundings, and to crowd the Plan which was already but too much so.

After having thus analyzed the materials of which I have made use for constructing a general Chart

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of the Strait BETWEEN BANCA AND BILLITON, by appropriating to its execution the Bearings and the Observations of the navigators who, till 1791, have published the Journals and Plans which brought us acquainted with the two Passages, it remains for me to unite in a general point of view the particular remarks which each of them has made on the depth of water and the quality of the bottom in the channel, on the islands, the points of land, the shoals, &c. which are met with in the Strait, or which lie to the northward or southward of it, and to mention the *Sailing Directions* relative to both PASSAGES, for which we are indebted to their experience, and which their zeal for Navigation has induced them to publish. I have thought it the more necessary to present them at some length, as this Strait being little known when D'APRÈS published his directions respecting the navigation of the SEAS OF ASIA, and French navigators being scarcely acquainted with any other work than his, it was requisite to supply what is deficient in this particular in the directions to which, in other respects, they have every reason to conform themselves in order to regulate the routes that they have to follow according to the season, if they wish to repair with safety and dispatch, from one place to another.

1. *GENERAL Remarks on making the land, in coming*

to the Straits from the northward; and on the navigation in GASPAR'S Strait, or the WEST PASSAGE\*.

"I would advise every ship intending to come out of the CHINA Sea by GASPAR'S Strait" says Captain LARKINS, page 2 of his Journal, "to make PULO-TOTI (a small island situated 0° 53' south latitude, and at 45 miles distance to the north 17° east of Point PESANT, the most northern of the Island of BANCA†): and from thence to steer a course midway between GASPAR Island, and the EAST Point of BANCA."

BUT Mr. DALRYMPLE thinks otherwise; and it is well known of what weight is his opinion.

"Ships intending to pass to the EASTWARD of GASPAR," says he in a note, "cannot, at

\* I refer the reader to the *Narrative of Marchand's voyage* for the track which the SOLIDE followed in her passage through the Strait: he will there find the best directions that can be given to ships which intend to pass Gaspar's Strait in coming from the northward, pages 133 to 144 of this volume.

† On the Chart of the Straits of Banca, Gaspar, and Clementi, published in 1788, by G. Robertson, it is said that the hill which rises above Point Pesant, is seen from Pulo-Toti, and from Pulo-Decan, situated about 10 miles to the south-west by west and west-south-west of Toti. This, doubtless, implies very clear weather: the distance from coast to coast is 15 leagues, on Robertson's chart, and 16 or 17 leagues, if the distance be measured to the summit of the hill, and it seems to me that in general, it is reckoned that Point Pesant can be seen only 8 or 10 leagues.

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“ any time, but especially *late* in the *Season*, when  
“ the south-east winds may be expected to prevail,  
“ have occasion to go round to *leeward* by PULO-  
“ TOTI. It is proper, indeed, to have daylight  
“ for making GASPAR, and ships should not ap-  
“ proach it till they are in the fair-way between  
“ *It* and BANCA; I mean in the present ignorance  
“ of the exact position and extent of the *Shoals* on  
“ the *west* and *north-west* of GASPAR.”

According to Captain WILSON, “ GASPAR  
“ Island bears from PULO-TOTI south-east exactly,  
“ distance 42 leagues,” (On ROBERTSON'S chart,  
the distance is only 40 leagues, and the bearing  
south-east 3° south), “ for which,” continues  
WILSON, “ you may steer almost direct upon  
“ leaving PULO-TOTI; the soundings are more  
“ regular, and it seems advisable not to approach  
“ BANCA nearer than 17 or 16 fathoms.” (WIL-  
SON'S *Journal*, page 35.)

With this precaution, you will avoid getting  
entangled among the breakers situated to the north-  
ward of BANCA, which, however, are by no means  
dangerous, since they all shew themselves (more  
or less, no doubt, according to the time of tide),  
and since the MASCARIN and the SOLIDE passed  
between the four breakers: for greater safety, it is  
expedient to go to the eastward of all these shoals.

But as soon as you get sight of GASPAR, you  
ought, as Mr. DALRYMPLE advises, to steer so as  
to

to get into mid-channel between that island and the EAST point of BANCA.

“Steering for mid-channel,” says WILSON, p. 35, “betwixt GASPAR Island and the EAST Point of BANCA, you may pass (as he did) TREE Island, within a mile or nearer, to the westward of *It*, and then the winds or currents, prevailing at this season (WILSON was in the strait on the 26th of February), will incline you to borrow upon BANCA; but you must avoid entering the Bay, which is formed by the east and south-east Points, (or the Gulf formed between the EAST Point of BANCA and the north-east Point of the peninsula of SEL): and having passed the east point, you must not bring it to the northward of north north-west half west\*; the foundings

\* Captain *Wilson* being nearly abreast of the East point of *Banca*, says that “seeing nothing like danger, and having such regular soundings, hauled in SSW, SW, and SW by W, wishing to borrow upon *Banca*, the weather shore to anchor. At  $\frac{1}{2}$  past 6, while preparing to anchor, shoaled in a cast of the deep sea line, from 20 to 18 $\frac{1}{2}$  fathoms, next cast to 15 $\frac{1}{2}$ , anchored immediately, and when the ship was brought up, found only 8 $\frac{1}{2}$  fathoms muddy bottom.”

“Sent an officer to sound round the ship, whose report is as follows.”

S b E. from the ship 6 $\frac{1}{2}$  to 7 fathoms—SSE  $\frac{1}{2}$  E from 8 $\frac{1}{2}$  to 9 $\frac{1}{2}$ —S b E  $\frac{1}{2}$  E. from 13 to 15—S b E from 7 $\frac{1}{2}$  to 6—S from 5 $\frac{1}{2}$  to 5—S  $\frac{1}{2}$  W from 4 to 3 $\frac{1}{2}$ —S b W 3 $\frac{1}{2}$ —S b W  $\frac{1}{2}$  W from 3 $\frac{1}{2}$  to 3 $\frac{1}{2}$  S b W  $\frac{1}{2}$  W. from 4 to 3 $\frac{1}{2}$ —SSW  $\frac{1}{2}$  W from 4 $\frac{1}{2}$  to 4 $\frac{1}{2}$ —S W  $\frac{1}{2}$  S from 4 $\frac{1}{2}$  to 4 $\frac{1}{2}$ —S W b W 5—WS W. rowing towards the

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“ ings betwixt these two points are the best guide ;  
 “ you may range betwixt them in 14 and 15  
 “ fathoms water very regular depths, till the  
 “ island, in the Bay, bears west of you, and then  
 “ you will see the reef, which runs off the south  
 “ east point a mile and a half at least. You must  
 “ edge over to the eastward, so as to pass without  
 “ the reef, and having brought the SOUTH-WEST  
 “ Point of PASSAGE Island to bear north of you,  
 “ you may steer to the southward, not bringing  
 “ it to bear further to the eastward than north by  
 “ east, while it continues in sight”.

Captain WILSON, other navigators, and latterly  
 Captain MARCHAND, have experienced that, when  
 a ship is out of the strait, but has not yet passed  
 the parallel of the SOUTH-EAST Point of the pe-  
 ninsula (of SEI.) the currents set to the south-east,  
 at the rate of about a mile an hour ; but this rate,  
 and even the direction of the current, must expe-  
 rience some variations according to the time of  
 tide.

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the ship, from 5 and  $5\frac{1}{2}$  to 4 ; then, from 4 to  $7\frac{1}{2}$  all hard sand  
 —A. M. Sent the boat again to the distance of  $\frac{1}{2}$  of a mile from  
 the ship. W. N. W. from her, from  $7\frac{1}{2}$  to 9 ; —W  $\frac{1}{2}$  N. from  
 $8\frac{1}{2}$  to  $7\frac{1}{2}$  soft bottom—West, from  $7\frac{1}{2}$  to 7 hard sand—Rowing  
 to the southward he found the soundings as over night, and  
 Sb E  $\frac{1}{2}$  E. from the ship he found 13, 14, 15, and 16 fathoms  
 deepening fast to the eastward. See *Wilson's Journal*, pages 24  
 and 20.

## 2. Breakers



2. *Breakers to the northward of the Northern Coast of BANCA.*

I have before mentioned (pages 461 to 465) every thing that can indicate the position of these breakers and their distances and respective bearings, as well from each other as with respect to the small islands which are closer in shore, and to Point BRISÉE of BANCA. According to the report of Captain CHANAL, these Breakers are above water; but it may happen that at certain times of tide, and especially at the times of the equinoctial spring tides, they do not shew themselves at high water. Captain STEPHEN WILLIAMS of the ship SULLIVAN, who saw and set three of these Breakers (farther back, page 463, note †), says, in his Journal, that "on the breakers there appeared *two or three rocks* above water." I would not, continues he, "advise any" one that "sails along the *north coast* of BANCA to come "under 15 or 16 fathoms water, then they will "have *muddy ground*, but, within that," says he, "I found it *hard and rocky*."

Captain CROZET, commanding the MASCARIN, who, in 1773, crossed in the middle of the four (patches of) Breakers, from east to west had soundings at 17—16—15—14—12—10—11—12, and 14 fathoms (See D'APRES' Chart, N°. 49, 2d. Edition of the *Neptune Oriental*.) Captain MARCHAND, in the SOLIDE, who, in 1791, crossed the

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Captain STEPH  
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(pages 488 to 49  
The Shoal to v

four Breakers from west to east, had 12—13—12—14—13 and 14 fathoms, a bottom of sand, gravel, and broken shells: he anchored in the latter soundings of 14 fathoms, with a bottom of the same quality. See farther back, pag. 461, 2, note \*.

3. *Breakers to the north by west of GASPAS Island, and of the WARREN HASTINGS'S Shoal.*

I refer the reader to what I have said (farther back, paragraph IV. pages 481 to 487) respecting the breakers situated to the north-west by west of GASPAS Island: there may remain some doubt as to their true position, and their number, but not as to their existence.

The position of the WARREN HASTINGS'S Shoal (paragraph III. pages 474 to 481) is better determined by the Bearings which Captain LARKINS took from the point where he remained aground for three days, and from which he at the same time set GASPAS Island and TREE Island: I shall not here repeat what I have said of the presumed identity of this Shoal and of the Breakers which Captain STEPHEN WILLIAMS of the SULLIVAN perceived at about the distance of 6 miles to the west south-west of his ship, from which, at the same moment, he set GASPAS Island south-east distant 3 leagues, and TREE Island south half east (pages 488 to 491).

The Shoal to which I have given the name of  
the

the WARREN HASTINGS, lies, by Captain LARKINS's account, nearly north and south; it is about  $1\frac{1}{2}$  or 2 miles in length, but with an arm extending to the eastward, about the middle of the *Rock*; and it was on the extremity of this arm that the WARREN HASTINGS struck (page 1 and following of his Journal.)

"Our endeavours to get the ship off," says he, "proving ineffectual before the tide fell, I went in the cutter, and sounded many parts of the *Sboal* to the northward and westward of us, and had in many parts of it only 2 fathoms, and in two places  $1\frac{1}{2}$  fathoms." (*Ibid.* page 1.)

"The next day," says Captain LARKINS, "the winds prevailing northerly, and not being able to attempt getting to the northward of the *Sboal*, I went in the cutter to sound between the Island (GASPAR) and the *Sboal*; steering from the ship S. S. E. until the *Island* bore east; then east, until the ship bore N. W. then N. W. on board; having the whole way had regular soundings from 16 to 18 fathoms: from which I was so far convinced there was *Channel* between them, that had the wind remained northerly, I was determined to go, especially as the HAWKE and SULLIVAN had gone that passage before, and by their Bearings must very narrowly have escaped that *Rock*. A breeze springing up

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“ fotherly, I founded the north end of the shoal,  
“ and anchored on the BANKA *Sboar* in 18  
“ fathoms.” (*Ibid.* page 2.)

Although Captain WILSON, in the CARNATIC, did not pass between GASPAR and TREE Island, but at about a mile to the westward of the latter, he must, as well as the ships quoted by LARKINS, have passed at a very little distance to the eastward of the WARREN HASTINGS'S Shoal.

“ After making PULO TOTI,” continued Captain LARKINS, “ I would advise every ship to  
“ steer from thence a course midway between  
“ GASPAR Island and the east Point of BANKA,  
“ there being about 7 leagues between them  
“ (more exactly 8 miles from coast to coast);  
“ she will most likely see them both together, I  
“ would then advise her to keep the EAST Point  
“ of BANKA between south by east and south by  
“ west, as, by our bearings, she will avoid the  
“ *Sboal*, on which we unfortunately struck, and by  
“ the other, the very *dangerous Rocks* on the  
“ BANKA Side. We rounded the EAST END of  
“ BANKA between 3 and 4 miles distance and car-  
“ ried very good soundings. In the evening we  
“ anchored as per log, about 3 leagues short of  
“ the *narrow entrance* of the *Straits* of GASPAR.”  
(Page 4 of his Journal.)

It appears from these directions, that Captain LARKINS is particularly anxious to warn ships of

the shoal on which he struck; and he is in the right, for this shoal is the more dangerous as it is not visible, and as a navigator can have no knowledge of it till his ship strikes. But he need no longer be under any apprehension of it as soon as he has brought GASPAR to bear east; for this island is more to the southward than the Shoal; and then he ought to steer so as to pass in mid-channel between TREE Island and the EAST Point of BANCA, and borrow nearer to the Rock than to the Island, if he perceive that the currents set into the gulf.

Captain STEPHEN WILLIAMS of the SULLIVAN, anchored in 15 fathoms, fine stiff clay, GASPAR Island bearing south-east by south, distant about 4 leagues. From this point, he says that he "kept standing in for the Strait of BILLITON, "with GASPAR Island about 2 points on the lar-"board bow (in the east-south-east) had very re-"gular soundings, but mostly rocky ground, until "abreast of the island, when we had mud." (See his Journal \*.)

It may be remarked that this track of the SULLIVAN passes between the WARREN HASTINGS'S Shoal and GASPAR Island, which lie, with respect to each other, west-north-west and east-south-east; and it is probable that she passed within a very little distance of the shoal, when GASPAR bearing

\* *Memoirs published by Alexander Dalrymple. Appendix to Memoir of Chart of Sunda, and Banca page 16.*

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east-south-east, she found rocky ground, but having got abreast, or to the westward of GASPAR, and having passed beyond the rocky ledge, she met with a muddy bottom.

4. *GASPAR Island and the Rock to the westward of that Island.*

"GASPAR Island," says Captain WILSON, "is pretty high, covered with trees, with a hummock in the middle, and may be seen 10 leagues. There is a small Rock off GASPAR Island, which in one with the south end of it bore east by south  $\frac{1}{4}$  south. It seems to be some distance off, as, shut in upon the island, it appeared very plain, a black spot in the front of it, it may probably be 3 or 4 miles off." (Page 22 of his Journal). But he says in another place (page 4. *ibid.*) that "the Rock off GASPAR Island is laid down by its bearing from *It*; the two in one, west. I guess," adds he, "its distance off to be about 2 or 3 miles. It is larger than a long-boat, and has some trees on it."

By Captain COOPER's account, GASPAR Island is moderately high; it seems to be five miles (two miles\*) in extent from south-east to north-west;

\* The length indicated by Cooper appears much too great. Captain Wilson does not fix it; but it is seen in his Journal, (page 23) that at the moment when Tree Island bore in one with

west; it is well wooded, with many *waterfalls*\*; he saw no *Breakers*, but those on the *Rock* west-north-west of it. (Page 24 of his Journal.)

An officer dispatched by DORDELIN to visit GASPAR Island, while he lay at anchor in the channel between GASPAR and TREE Island, there discovered a deep cavern, full of those birds' nests which the Chinese consider as such a dainty and for which they give a high price †.

5. *TREE ISLAND, the ROCHER NAVIRE of the French.*

Of this island Captain WILSON's Journal gives us a gradual description that indicates the different

the Hummock or Peak on *Gaspar* Island N. 62° E. the extent of *Gaspar*, measured with a sextant, was seen under an angle of 8° 58': the ship was then 1 mile to the westward of *Tree* Island. From another point, being 7 or 8 miles' distance from the island, it bore from N. 76° E. to S. 87° E.: the island was then seen entirely under an angle of 17°. According to this latter bearing, we cannot give it more than 2 miles in length; and it would have less by the former.

\* Thus says the original: yet I do not presume that these are *cascaides*.

† These are the nests of the *Salangane*, a species of *alcyon*, the swallow peculiar to the shore of CONCHIN-CHINA. Numberless stories have been told and repeated respecting the nature and the properties of these nests: it appears at the present day beyond all doubt, that this bird composes its nest with the fish spawn, which, in the seas of *Asia*, covers the surface of the water in certain times of the year.

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aspects under which it presents itself to ships coming from the northward, in proportion as they approach it.

" At 2 P. M." says WILSON, " we saw a small island from the mast-head, bearing south-south-east, which looked like a ship sailing before the wind, and was for some time taken for one.

" At  $\frac{1}{4}$  past 3, this island, which is a very remarkable one, having two or three trees at the very top of it, it is formed like a dome, and is about as high out of the water as our poop, having a small rock, a cable's length or so distant, bore south-south-east: at the same time GASPARD Island bore south  $73^{\circ} 20'$  east.

" At  $\frac{1}{2}$  past 4, TREE Island bore east by south distant 1 mile: the *Rock* off it open to the southward east by south  $\frac{1}{4}$  south.

" *Breakers* seem to extend about half a mile to the northward, and the same distance to the southward of this *Island*, but beyond that distance the passage is apparently quite clear: excepting a patch of green moss, with the two or three trees which are on the top of it, it is a hoary, barren, clefted rock; the trees upon it are pretty high, so that it may be seen 5 leagues off. (At that distance, as he says, it looks like a ship sailing before the wind). The *Rock*, which lies to the south-east of *It*, is about



" as high out of the water as a ship's long-boat." (See WILSON'S Journal, pages 21 to 23—and also page 4).

A ship coming from the northward, says Captain CHANAL, at first discovers the first islot of ROCHER NAVIRE (TREE Island), and an hour and a half after, its southern islot. When the latter and the south Point of GASPAR Island bore, in one, east  $23^{\circ}$  north, we distinguished from the SOLIDE a chain of *Breakers* which connect the first islot to the second.

Captain COOPER, who made TREE Island when coming from the southward, merely says (page 24 of his Journal) that when seen from that side, it appears like a *sail*, and has a *large tree* on the middle: other navigators say a *clump of trees*.

If they do not agree as to the number of trees, they at least agree as to the figure of the island; all the descriptions accord in giving it, when seen at a certain distance, the appearance of a ship under sail. It seems to me that the name of ROCHER NAVIRE, which may be expressed in English by SAIL ISLAND, ought to be adopted in preference to TREE ISLAND, which in French signifies ILE DE L'ARBRE or ILE AUX ARBRES; for the rock will always preserve its form of a ship under sail, while the remarkable trees will fall with age, and with

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on the French charts,  
(Great Tree Island.)

with them will fall the distinctive sign by which it is known\*.

6. *Passage between GASPARD Island and TREE Island*  
(ROCHER NAVIRE.)

We might consider it as certain that the Passage is clear on both sides of TREE Island. Captain WILSON who, as has been seen, passed to the westward of it at the distance of a mile carrying from 19 to 20 fathoms; on the other hand, DORDELIN, who passed between TREE Island and GASPARD, as well outward as homeward bound, and anchored on coming out of the channel, had constantly 20 fathoms, whether he passed farther from or nearer to the one or the other. COOPER, who passed there when coming from the southward, likewise had 19 or 20 fathoms; and four other ships known, the ROYAL ADMIRAL, the HAWKE, in company with the PONSBORNE, and the SULLIVAN, found the same depth of water.

However, Captain LARKINS tells us in his Journal (page 4) that "having had some conversation on the subject of this passage with Don JUAN D'URELLA, who commands the St.

\* It appears to me the more expedient to adopt the name of *Rocher Navire*, or *Sail Island*, as, at no great distance from the Strait *Between Billiton and Banca*, in latitude  $4^{\circ} 50'$  south, on the east coast of *Sumatra*, is situated another *Tree Island*, which, on the French charts, bears the name of *Ile aux Grand Arbres* (*Great Tree Island*.)

“ LOUIS, she had been through GASPAR STRAITS, seven times, *Twice* having passed to the eastward of TREE Island, *one* of which times she had several casts of 4 fathoms, so that although the SULLIVAN and HAWKE passed that way without meeting with any accident, it can by no means be an advisable passage.”

To this conclusion we may oppose, that, out of twelve known tracks in GASPAR Strait, five only pass between TREE Island and the EAST Point of BANCA : and the seven others between GASPAR and TREE Island ; and that none of the ships that have taken this last-mentioned passage found there less than *nineteen* fathoms. Is it not possible that LARKINS and URELLA might have misunderstood each other ? that the latter may have had, as he said, some casts of *four* fathoms, but that he did not get them *till after he was clear of the passage?* and, in fact, he may have had this little depth of water, if, after having cleared the passage, he continued to steer north and north by west, and approached too near the shoals, which are situated in those directions, for a ship that comes out by the channel between TREE Island and GASPAR. Moreover, I see no reason for preferring this narrow passage to the fine and wide passage which is open between TREE Island and the EAST Point of BANCA, unless the direction of the wind, or some particular circumstance, should determine a

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7. *The Mountain*  
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preference to be given to the former. The rather doubtful position of the large shoal on which the WARREN HASTINGS struck, and the suspected existence of some others in its vicinity, must deter ships that come from the northward from taking the passage between GASPAR and TREE Island; which, besides, serves only to lengthen the way to no purpose: and those that come from the southward, if they sail out of it at the close of the day, must be afraid of finding themselves entangled in the night among the Breakers to the northward of GASPAR, the number and position of which are not yet well determined. But it was expedient to establish as a truth, in opposition to the doubt suggested by Captain LARKINS from the account of Don JUAN D'URLELA, that ships which should be obliged to pass between GASPAR and TREE Island might run through there with safety, and that, throughout, they will find a good depth of water.

7. *The Mountain* serving as a land-mark on BANCA, (called by the Malays TANJONG BREKAT).

Captain WILSON appears convinced that the mountain which serves as a *land-mark* on BANCA for ships coming from the northward, is "the same, both from its shape and situation," he says, "as the one which he has called Mount PARMASAN (or rather PARISSANG or PERMISSANG),

'SANG), which is seen in the STRAIT OF BANCA." (Pages 5 and 21 of his Journal).

I cannot coincide in this opinion. The two mountains are, indeed, situated on the same parallel (about  $2^{\circ} 36'$  south), at least to judge of them by the latitude which the charts assign to the PERMISSANG of the STRAIT OF BANCA and by that which various bearings give to the remarkable mountain of GASPAR'S STRAIT; but, on consulting the same charts, we see that the mount PERMISSANG of the STRAIT OF BANCA, situated to the south and very near the river that bears the same name, is at a very little distance from the coast of the Strait; and if we admit that its situation is well laid down on the charts, it would be at a distance of upwards of *fifty* miles from the EAST point of BANCA in GASPAR'S Strait; and yet the cross bearings of WILSON, as well as those of CHANAL, give but twenty or twenty-one miles at most, for the distance from the EAST point of BANCA, to the mountain serving as a land-mark; there remains therefore between this mountain and Mount PERMISSANG of the STRAIT OF BANCA, a distance of *twenty-nine* or *thirty* miles.

Be it as it may with respect to this opinion of Captain WILSON, this much is certain, that he perceived the mountain of GASPAR'S STRAIT, from the parallel of  $2^{\circ} 3'$ , that is, about the distance of 10 leagues; and he adds that "it may be seen  
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“ much farther off,” (page 4 of his Journal).  
“ The SOLIDE,” says Captain CHANAL, “ was at  
“ the distance of no more than 7 leagues from  
“ it, and 3 or 4 leagues only from the coast, when  
“ he began to discover the mountain from the  
“ deck.” It appears that the distance at which it  
may be perceived varies considerably according as  
the weather is more or less clear, more or less hazy;  
for Captain COOPER in the SULLIVAN saw the  
Breakers situated to the northward of the north-  
ern coast of BANCA, and one of the small islands  
which are more to the southward than these Break-  
ers, without its being possible for him to see the  
land of BANCA (farther back, page 464).

TANJONG BREKAT is a high regular mountain  
(Wilson's Journal, page 5).

8. *East Point of BANCA.*

“ The east point has a high bummock over it,  
“ covered with trees, which makes it seem a long  
“ way off; and, at first, whether from the north-  
“ ward or southward, it makes like an island.”  
(Wilson's Journal, pages 5, 21, and 27).

“ Off this point is seen, in coming from the  
“ northward, a remarkable white perpendicular  
“ rock, looking like a sail.” (*Ibid.* page 25).  
“ High, white, needle rocks, bound the coast off  
“ the EAST Point of BANCA, but do not seem to  
“ extend far off.” (*Ibid.* page 4.)

Captain

Captain CHANAL, at the moment when GASPARD in one with TREE Island bore east-north-east, and the EAST point of BANCA south-south-west half south, perceived an islot to the southward of this point.

9. *MIDDLE OF PASSAGE ISLAND, sometimes called LONG ISLAND, (by the Malays named PULO-LEAT.)*

It is HERE, between the south-west point of MIDDLE Island and the NORTH-EAST point of the peninsula of SEL, that is properly the WEST PASSAGE OF GASPARD'S STRAIT. Its length, is about 6 miles, and the two points lie, in regard to each other, south  $36^{\circ} 15'$  west and north  $56^{\circ} 15'$  east. The SOLIDE anchored in the middle of the passage in 17 fathoms water, over a bottom of sand and gravel.

WILSON, who, like Captain MARCHAND, took his route through the middle of the channel and kept in it, had very regular soundings; and the boat, which sounded a cable's length within the ship, had the same soundings. (Page 25 of his Journal)

" MIDDLE OF PASSAGE Island is a long island covered with trees, having many hummocks or risings on it, which makes its first appearance like several islands." (*Ibid*).

" The island off of PASSAGE Island does not appear as one till you are to the southward of  
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" it, and then the *Rocks* are seen projecting from  
" some distance off to the westward. They are  
" high, white, needle rocks of the description of  
" those which bound the coast of the EAST Point  
" of BANCA," *Ibid.* page 5. It is, no doubt,  
these very rocks that WILSON means, when he  
says, page 27, " There are several curious white  
" rocks, which seem detached from the shore of  
" PASSAGE Island to some distance, they are erect  
" spirally rocks, like needles."

Captain Chanal in like manner remarks that he  
did not see the small island begin to appear de-  
tached from the large one, till the former bore  
north 17° east.

Captain STEPHEN WILLIAMS of the SULLIVAN  
(being nearly in the middle of the Passage) had  
MIDDLE Island, which he calls LONG Island bear-  
ing from south 9° west to south 79° east, and  
from this angle of bearing, " LONG Island" says  
he, " was shutting in with it a small island which  
" lays off the south end of Do. distant off shore 4  
" or 5 miles." (This distance is not 2 miles taken  
from the south-west point of the large island to  
the north point of the small one). " A ridge of  
" rocks," continues he, " runs off the south end  
" of Do. 1½ mile, and another off the north end,  
" about 1 mile, with a small white sandy island in  
" the middle. Found a current setting so strong  
" right



“right in shore that I could but just weather the  
“southernmost extreme\*.”

Captain COOPER says, in a Note written on his chart, that the SOUTH-EAST point of BANCA is formed by rocks on which the sea beats and that they seemed perfectly white, as if covered with salt. This south-east point is remarkable only for ships which take the EAST PASSAGE, called CLEMENTS' STRAIT to the eastward of MIDDLE Island.

#### 10. *Peninsula of SEL.*

Several old charts and plans make of this peninsula an island under the name of ILE DE SEL (SALT ISLAND of the English); but the bearings and remarks of modern navigators have nearly reduced it to a certainty that this portion of land is connected to the main land of the island of BANCA, by lands so low that, from a certain distance, they cannot be perceived: this is particularly the opinion of Captain COOPER who entered the straits from the southward; he says “the Land forms a considerable projection, from the South point of BANCA to the Eastward, Mr. GASPAR makes *this land*, an island; I think to the contrary, as *low land* was seen to join to the *high land*.” (Page 21 of his Journal).

\* *Memoirs published by Alexander Dalrymple, Appendix to Memoir of Chart of Sunda and Banca, page 18.*

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The two islands situated to the northward of the northern coast of the peninsula of SEL afford not room for any particular remark : I refer the reader to what I have before said of their position in regard to the main land of BANCA (page 503, paragraph ix.) “ The largest, which is the easternmost, “ is moderately high, and is covered “ with trees.” (WILSON, page 25).

The gulf or bay which runs far inland between the EAST point of BANCA and the NORTH-EAST point of the Peninsula of SEL has not yet been examined ; but there is reason to believe that it is full of overfalls and strewn with shoals, if we may judge of it from the soundings which Captain WILSON had, when, wishing to borrow upon BANCA, the weather shore to anchor, he hauled in too much to the westward to the south-east by south of the EAST point of the island ; but, shoaling his water very suddenly, he was obliged to anchor and relinquish the project of standing into the bay. (Farther back, page 554, note \*).

On GASPAR'S chart (N<sup>o</sup> 48 of the 2nd edition of D'APRÈS' *Neptuue Oriental*), the Peninsula of SEL is represented as an island separated from BANCA by a channel from 10 to 12 miles wide ; its eastern coast is furnished with a great number of islots ; and, between its western coast and the east coast of BANCA is scattered an archipelago of other small islands : but it appears that these islots and

this archipelago are the produce of GASPAR'S imagination; and it is seen, from his track marked on his chart, that he had it not in his power to examine the Gulf, nor to see distinctly a part of the east coast of BANCA, which modern navigators affirm cannot be distinguished from the middle of the channel. WILSON tells us that when "the EAST point of BANCA bore north  $84^{\circ}$  west of him estimated distance 5 or 6 miles, there was no land visible betwixt the south-west and south-west  $\frac{1}{4}$  west, and that the coast trenches away into a deep bay," (page 23 of his Journal). It was not till he brought the EAST point of BANCA to bear north  $28^{\circ}$  west that "the land at the bottom of the bay was seen from the mast-head, but not from the deck." (*Ibid*, page 25).

The reef off the NORTH-EAST point of the peninsula of SEL merits particular attention.

"High, white, needle Rocks" says WILSON (*Ibid*, page 4) "bound the coast of the east point and south-east Point of Banca, but do not seem to extend far off. They are the most striking peculiarity belonging to this coast and the islands about it; they shew themselves in front as white patches upon the land, which forms the back-ground\*, and appear off the points, high, bold,

\* It is probable that the colour of these rocks, which have the appearance of rocks of salt, occasioned the name of *Ile de Sel* to be originally given to this projecting part of Banca, which was taken for an island.

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“ not dangerous.”

This is not the case with the reef, which takes its rise at the same point. It runs off a mile and a half, at least, to the eastward,” says WILSON (*Ibid.* page 32), “ and makes the Passage “ betwixt *It* and the south-west end of PASSAGE “ Island not more than 5 miles; wide many of the “ rocks are as high out of the water as a pinnacle, “ though they may be more covered at a different “ time of tide, as, whether it was high or low “ water,” continues WILSON, “ when we were “ abreast of them, I know not. The soundings “ abreast of the reef are upon a rocky bottom, “ which, probably extends all the way across to “ PASSAGE Island.” We are very much inclined to adopt this opinion of WILSON, when we see that off the south part of PASSAGE Island, opposite to it, lie rocks detached from the island, which have the same form, and the same appearance as those which surround the NORTH-EAST point of the peninsula of SEL. (WILSON'S Journal, page 32.)

We are ignorant how far the reef may extend to the southward ; but its extent to the northward is better known: Captain LARKINS had it in his power to examine it much closer than he would have wished ; for his ship struck on the head of the Reef.

After

After having, with considerable difficulty, succeeded in heaving his ship off the reef, which we have termed the WARREN HASTINGS'S Shoal, he says " In the morning at day-light I weighed, " and, at first, steered a mid-channel course; but " getting a cast of 10 fathoms, I then determined " to keep at the distance of about five miles from " the *weathermost* shore \*, or Salt Island (the Peninsula), and steered accordingly, with very regular *Soundings*, of 15 from 5 fathoms, for 3 leagues, the Deep-Sea-Lead constantly going in one Chain, and a Hand-Lead in the other. " We had a very fine breeze at N. N. E. was going 5 Knots, and was from 15 fathoms alarmed by the Ship taking the ground, although it stopped her way very little. The Man in the Starboard Chains had *four* fathoms, and the Man in the Larboard Chains (next to the peninsula) *eleven* fathoms. I immediately brought up with a

\* Captain *Larkins* tells us, a few lines farther on, that the wind was at *north-north-east*; therefore the *weathermost* shore, with respect to the ship, would be rather that of *Middle* Island than that of the peninsula; no doubt, by the expression of *weathermost* shore, he means that part of the peninsula which, with the wind from the north-east quarter, is to windward of the rest of this same land, that is to say, its *north-east* point. But we do not yet well understand how *Larkins*, who by his own account, intended to keep in the *middle* of the channel, which is scarcely *six* miles wide would keep at the distance of *five* miles from one of its sides; all that can be concluded from his account, is that he had got *too much to the westward*.

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“ Bower-Anchor in  $9\frac{1}{2}$  fathoms. I sent the Cutter to sound in shore of us, and had 7 and 10 fathoms: but observing a *Rock*, not before seen, bearing S. by E.; called the Boat back, and determined to cast to the Eastward, and keep more mid-channel, by which we fortunately got out safe.” (See LARKINS's Journal, pages 3 and 4).

## II. *South Coast of the Island of BANCA.*

Captain COOPER has laid down on his Chart, parallel to the south-east coast of the Island of BANCA, and at 3 or 4 miles' distance, a line of soundings, varying from 8 to 12 fathoms: he has drawn it from the account of a Portuguese Pilot, Sr. BARBE\*, who likewise indicated to him two long shoals parallel to this line, and about 3 miles more to the offing. The Portuguese told him that sometimes the sea breaks on these shoals. (*Note written on COOPER's Chart.*)

It will not be useless to indicate here the different lands which present themselves to the view, when a ship gets out of GASPAS'S STRAIT in coming from the northward: this indication may likewise serve for ships that are bound through the STRAITS from the southward.

At the moment when Captain WILSON set the most eastern of the two islands situated to the

\* Thus written in the original: *Sr.* is, no doubt, the abbreviation of *Senhor*, *Monsieur* in French, Mr. in English.

northward of the Peninsula of SEL in one with the North-east Point of this Peninsula, north-west by west, and that the small island situated to the westward of PASSAGE Island, barely visible, bore north half west, he also set:

A very small low island

covered with trees. . . . N.E. by N.

Another . . . . . N.E.  $\frac{1}{2}$  N.

Another at a distance . . . . N.E.  $\frac{3}{4}$  E.

Another larger; and one;

beyond it, in one with it N.E. by E.

An island also in sight,

from the deck, looking

like single trees\*, bear-

ing . . . . . S.E.  $\frac{1}{2}$  E.

The Extremes of PASSAGE

Island, almost hidden in

a mist . . . . . from N. to N. by E.  $\frac{1}{2}$  E.

At the same time, he set

on the west side, the

South-west Point of

Banca in sight, so dis-

tant as to be disjoined W.  $\frac{1}{4}$  S.

The south end of BANCA, which extends from the south-east Point of the Peninsula to the last-mentioned south-west Point of BANCA, in sight,

\* These small islands compose the two groups situated to the south-east of Passage Island, and form with this island the Passages of Clements' Strait.

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forms a Bay which must be rather deep; for, from the deck, the land did not appear to join; and it was only from the mast-head that the head of the bay could be perceived. This part of the Island of BANCA presents a somewhat wide opening, in the midst of which rises a very remarkable hummock that bore west by north  $\frac{1}{4}$  north from the ship: WILSON had set it previously, before he had passed the Strait south  $50^{\circ}$  west in one with the most eastern of the two islands which are situated to the northward of the Peninsula. This hummock serves, with the ILES DE LA RECONNOISSANCE (SHOAL-WATER Island) which bear nearly east-south-east from it, to distinguish the two Straits, when bound through either from the southward\*.

From the position where WILSON was, there was also in sight from the mast-head, an island about half a point of the compass to the southward of what he set for the south-west Point of BANCA, which bore west half south.

Two hours and a half after having taken the Bearings which I have just mentioned, and at the

\* On casting an eye on the View of the south part of the Straits, taken by Dordelin (Plate VII), it is seen that it is easy for a ship coming from the southward to distinguish Gaspar's Strait which is the first opening that presents itself to the westward; and through which is perceived in the distance the open sea to the northward of the Straits.



moment when the south-west Point of BANCA bore west-north-west half north, and PASSAGE Island, appearing in lumps, like several small islands, north by east, WILSON set a small island just visible, north-east half north, and another east half south. He adds that the officer from the mast-head reported that he saw *high land* bearing about east, which must be BILLITON.

In this position, the soundings were 13 fathoms. (See WILSON's Journal, pages 31 and 32).

12. *Irregularity of the soundings to the southward of the Straits.*

Captain LARKINS, from his experience, points out to navigators the track which they have to follow when, coming from the northward, they have passed through GASPAR'S STRAIT. "I would advise ships that are bound through the *Straits*," says he, "not to steer *too southerly* a course, as it is to that I impute the very *irregular Soundings* we had, which so alarmed us that we came to an anchor; and from the cutter's *Soundings* in shore (near BANCA) it may be concluded that  $5\frac{1}{2}$  or 4 leagues' distance from the south coast of SAL (the Peninsula of SEL; he does not say in what bearing), there is very good soundings. I would therefore advise any ship after having an offing of 4 leagues from the Straits' mouth, (no doubt to

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“ the southward of the mid-channel where he had  
“ determined to keep, (farther back, page 576),  
“ not to steer to the southward of South-west \*,  
“ until she meets with a *muddy bottom*.” (See LAR-  
KINS's Journal, page 4).

It has been seen in the *narrative* of Captain  
MARCHAND's Voyage (page 143 of this Vol.)  
that, on the 23rd of December, the SOLIDE after  
having cleared the Strait, and being to the south-  
south-east and south by east of the south Point of  
the Peninsula of SEL, shoaled her water suddenly  
from 17 fathoms to 9, bottom of sand and gravel,  
and that from half past 10 in the morning to half  
past 11, the soundings varied only from 8 to 9  
fathoms; and from 10 fathoms to 11 till noon: at  
this last period, she had, by observation, reached  
the latitude of 3° 30', and no longer perceived  
any other lands than the south coast of BANCA ex-  
tending from north-west by west to north-north-  
west half north.

\* These are the words of the Original.—I own that I do not  
understand what Captain *Larkins* means, when he advises a ship  
*not to steer to the southward of South-west*, which signifies, in  
other terms, that taking the *South-west* as a fixed point, you  
must steer, with respect to it, rather towards the *West* than the  
*South*: for, on looking at the chart of the Straits, it should  
seem, on the contrary, that one ought to steer *more to the south-  
ward than south-west*, since a course to the *westward of south-  
west* would bring a ship too near the shoal the vicinity of which,  
it appears, ought to be carefully avoided. (See farther on what  
*Wilson* says on this subject.)

Captain WILSON, after having given the bearings from his station *e.*\*, which place it on his chart south 14° east, and at about the distance of 16 miles from the SOUTH-EAST Point of the Peninsula of SEL, adds: "South-south-west half west 3 miles from this station, shoaled our water suddenly to 7 fathoms, *hard bottom*; hawled the point off south-east by south, for about 10 minutes, and then deepened to 11 fathoms, *muddy bottom*; steered afterwards south. By these *irregularities* in the *soundings*, the *shoalness* of the *water*, and the *hard bottom*, I take it," adds he, "that we must have been upon the *edge* of the *shoal*, which stretches so far to the southward of BANCA." (Page 3 of his Journal.)

Mr. DALRYMPLE observes in a note, that "the *Extent* and *Nature* of this *Shoal* is not well ascertained, nor is it certain that it unites to BANKA." (*Ibid.*)

13. Of CLEMENTS' STRAIT, or the EAST PASSAGE in coming from the Southward, or in coming from the Northward.

The track of Captain COOPER, in coming from the southward, is that which passes the nearest to

\* The south-west Point of Banca N. 62° W.—The land between the North-east Point and south-east Point of the Peninsula N. 11° W.—And Passage Island, appearing in lumps like several small islands, N. 11° E. (*Wilson's Journal*, page 3.)

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MIDDLE Island, at the distance of 2 miles only from its south-east Point, and leaving on the star-board hand, on entering, all the small islands which are seen at the southern mouth of CLEMENTS' STRAIT or the EAST PASSAGE.

COOPER says that the channel, by which he entered, is very good; that he had constantly from 19 to 23 fathoms, and that he passed within  $1\frac{1}{2}$  mile of the small island, which he names SANDY-BEACH Island, but which CLEMENTS or ROBERTSON, simply calls SANDY Island. He adds that to the southward of this island, he saw the water of a green colour, and that the Portuguese Pilot, Sr. ST. BARBE, in company with whom he was sailing, told him that the sea was frequently seen to break in this part. (Page 22 of COOPER'S JOURNAL.)

I observe that it may be true, as the Portuguese Pilot said that, somewhere to the northward of SANDY-BEACH Island, the sea breaks sometimes; but that, however, the track of the ROYAL ADMIRAL which is marked on ROBERTSON'S Charts and large Plan, does not pass at the distance of more than 1 mile to the northward of SANDY-BEACH, with a depth of water of 19—20—19 and 22 fathoms; and that this ship anchored in 19 fathoms, to the north-west of this island, and 1 mile only from the sand-bank which surrounds it. But in ROBERTSON'S same charts is laid down to the northward of the island, at 2 miles distance

from the northern part of its shoal, a string of Breakers which occupy a space of upwards of  $2\frac{1}{2}$  miles on a north and south line: and this Reef is placed between the track of the ATLAS, Captain COOPER, and that of the ROYAL ADMIRAL, Captain . . . . ., at about the distance of half a mile from each other in their greatest proximity. It appears therefore that, in fact, there exists a Reef to the northward of SANDY-BEACH Island, as the Portuguese Pilot told Captain COOPER, but that this Reef leaves between it and the island, a good passage, over 19—20—22 and 23 fathoms, through which the ROYAL ADMIRAL passed.

COOPER thus describes the passage by which he entered; in going from the southward to the northward, "you pass within  $1\frac{1}{2}$  mile of a *small sandy beach Island*, on the starboard hand, with a "cluster of islands well wooded; on the other "hand, you have MIDDLE Island\*, which is of considerable extent." (Page 22 of his Journal).

\* On Cooper's Chart, is written *Middle Island* or *Salt Island*; it is improper in him to confound these two denominations, and suppose that *Middle Island* and the Peninsula of *Sel* are a same land, a same island. The former, which the English commonly call *Passage Island* and sometimes *Long Island*, is the large island which divides into two arms the whole Strait between *Banca and Billiton*, and the island, or rather the Peninsula of *Sel*, is as has been seen, that projecting part of *Banca*, which, with *Middle Island* forms the *West Passage*, or *Gaspar's Strait*.

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It appears that the Strait BETWEEN BANCA AND BILLITON was known to Captain COOPER only by the copy which Mr. DALRYMPLE had caused to be engraved on the defective chart of GASPAR, published by D'APRÈS in his *Neptune Oriental*; for he tells us in his *journal* (page 22) before he had reached the Passage through which he passed that "there seems to be a good Passage between MIDDLE Island and BANCA (this is GASPAR'S STRAIT). "It seems to me," adds he, "to deserve the preference; it being wide, I should have pursued this track, but my friend, the *Portuguese* (Sr. ST. BARBE) said it was not good."

It may have been conceived from the description which has been given of the WEST PASSAGE, and it may be seen, by the inspection of the Chart, that the Portuguese, although a Pilot for these seas, was ill informed; but doubtless that, like many others, his laziness, and his indifference found it more convenient to take the passage which he had always used, than to ascertain whether that with which he was not acquainted was not less difficult and better: Captain COOPER who passed the Strait for the first time, saw and judged better than the Portuguese Pilot; instead of following the *Senhor* ST. BARBE he ought to have guided him.

On ROBERTSON'S Charts and Plan, I remark to the north by east  $\frac{1}{4}$  east of SADDLE Island (which

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is COOPER'S FLAT Island), and on the parallel of ROBERTSON'S BARN Island (COOPER'S BUTTON Island) a *dangerous Rock* which is not at the distance of a mile to the westward of CLEMENTS'S track. We find on this subject, what follows in the Sailing Directions which are engraved on the *Plan of Clements' Strait* which Mr. DALRYMPLE had inserted, in 1786, in his *Collection*, two years before the publication of the same Plan by ROBERTSON :

“ The passage through the small Islands is between THWART-THE-WAY and SOUTH Island to the eastward, and SADDLE Island to the westward, about mid-channel, or rather nearer to THWART-THE-WAY side, on account of a rock with *one foot and a half* water on it: the rock is not bigger than a long-boat, and has 5 or 10 fathoms all round it, with no appearance of danger. Bearings, THWART-THE-WAY east by north  $3\frac{1}{2}$  or 4 miles; SADDLE Island (COOPER'S FLAT Island) south by west  $\frac{1}{4}$  west  $3\frac{1}{2}$  or 4 miles; BARN Island (COOPER'S BUTTON Island) west by south; south point of MIDDLE Island west-north-west. In going through this Strait, it is necessary to have a boat always ahead sounding.”

Captain CLEMENTS, in coming from the northward, in order to pass between the Islands of BILLITON and BANCA by the Passage or Strait which

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which has received his name, made the land on the north-west point of BILLITON, and found himself entangled, with the fleet which he commanded, in a Bay situated to the south-west of this point, which he named, with reason, TREACHEROUS BAY.

“ In coming through these Straits from the northward, you must take care, and not get far into TREACHEROUS BAY, as it is all over *foul*, some of the banks just appearing at low water : others  $1\frac{1}{2}$  and 2 fathoms under water ; they are small with good soundings between them, as 10, 9, and 8 fathoms sand, and without the least appearance of rippings, or danger owing to the smoothness of the water, which led us to believe it to be a safe bay, till the EARL MANSFIELD struck upon the rock to the southward of the VANSITTART's anchorage in the bay, distance about 2 cables' length. The PIGOT, in sailing out, half a cable's length to the northward of the VANSITTART at anchor, struck and with some difficulty, got off, it being ebb tide at the time she got on. At the same time saw the reef to the north-ward of the PIGOT's rock, in many places dry, to which he must have passed very close in coming in.”



14. *The Strait BETWEEN BANCA and BILLITON, to be preferred to the Strait of BANCA.*

The opinion of Captain WILSON must here be of great weight. This navigator had been specially charged by *Instructions* from the Court of Directors of the East-India Company, to examine carefully the STRAIT TO THE EAST OF BANCA, in order to fix a yet doubtful opinion, and to ascertain whether this Strait ought to merit a preference to that of BANCA, as well for ships bound to CHINA, as for those returning thence. Captain WILSON, in a letter which he writes to Mr. DALRYMPLE, on addressing to him his chart of GASPAR'S STRAIT and his remarks on this passage, observes that, "the knowledge of this track at the back of BANCA is now become doubly desirable, since the Honourable Company have come to the resolution of employing such large ships in their CHINA Trade. The danger of the passage by LUCEPARA (Strait of BANCA) is obvious from the many ships which have grounded near it, particularly this last season." (See page iv of his Journal). This letter is dated in November 1787.

"For myself," says WILSON, "I prefer this passage coming from CHINA, to the one through the Straits of BANCA. This strait is very short  
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“ compared with *that*, and it is even possible for  
 “ a ship to pass it without anchoring at all; but  
 “ at most she can have no occasion to anchor  
 “ more than one night, if she has wind and clear  
 “ weather.” (Page 34 of his Journal.)

“ The eligibility of this passage, for ships out-  
 “ ward bound, is another consideration, and here  
 “ I must confess,” says WILSON, “ I cannot give  
 “ it the same preference. Besides, that I believe  
 “ ships would hardly ever be able to fetch it from  
 “ the BROTHERS \* (these are LES DEUX SŒURS on  
 “ the French Charts); till the extent of the dan-  
 “ gers of the South end of BANCA are better  
 “ known, the approach to it must be very dan-  
 “ gerous, and we seem to be equally ignorant of  
 “ what dangers may lie off the numerous islands  
 “ lying to the south-east of PASSAGE Island, which  
 “ make the East side of the Strait. Were the  
 “ entrance once explored and found safe, the  
 “ Passage would deserve every preference.”

It appears that Captain WILSON at the time  
 when he wrote, had no knowledge of the tracks  
 of the ship TRITON, commanded by DORDELIN,  
 having under his orders the PROVENCE and the

\* Mr. Dalrymple observes in a note, that “ The ships out-  
 ward bound, that have gone this way, did not find any difficulty;  
 but certainly ships, intending to go this passage ought to pass to  
 the eastward of the Brothers.” (Page 36 of Wilson's Journal.)

SAGITTAIRE, of the ROYAL ADMIRAL, Captain . . . . ., of the ATLAS, Captain COOPER, and of all the Portuguese ships of whose names we are ignorant, all which, and in different seasons, have entered the Straits from the southward, and experienced no difficulty, nor run any danger in the passage. We must even observe that they were not assisted by the information of their predecessors, and that, at this day, when the instructive journals, and plans drawn by intelligent and enlightened navigators have made known minutely the different Passages which are open between BANCA and BILLITON, a ship may enter them with safety from the southward as well as from the northward. The uncertainty which still prevails respecting the real extent of the shoals situated to the southward of the Peninsula of SEL, and of those which may exist to the south and to the south-west of SHOAL-WATER Island, requires that navigators should be cautious in making the land when they come from the southward; as the Breakers situated to the northward of BANCA, to the north by west and west-north-west of GASPARD Island require that they should navigate with prudence, and keep a good look-out, when they are bound through the Straits from the northward. But has not the Strait of BANCA also its dangers and its shoals, to which must be added the difficulties and the length of its navigation? At least these

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these two last mentioned inconveniencies are not annexed to the first, in the STRAIT BETWEEN BANCA AND BILLITON, whether the navigator take the EAST PASSAGE (CLEMENS' STRAIT) or prefer the WEST PASSAGE (GASPAR'S STRAIT) which, in general, appears to merit the preference to the other, as well by ships coming from the southward, as by those coming from the northward.

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## EIGHTH RUN.

*From the Isle of RÉUNION to the Island of ST. HELENA.*

1. *From the Isle of RÉUNION to within sight of the Coast of AFRICA.*
2. *From within sight of the Coast of AFRICA to within sight of the Island of ST. HELENA.*

### NOTE LXIII.

On the 21<sup>st</sup> of April, at half past seven in the evening, the SOLIDE took her departure from within sight of Port ST. DENIS in the Isle of RÉUNION, in longitude  $53^{\circ} 8' 00''$  east from the Meridian of PARIS (Port ST. DENIS is in  $53^{\circ} 10' 00''$  *Connaissance des Temps*, Year VIII.)

On

On the 28th, the result of four sets of distances of the sun and moon, observed in the morning, and reduced to noon of this day, gave for the longitude of the ship, at that instant,  $42^{\circ} 44'$  east; and, on comparing it to that of the point of departure on the 21st in the evening, which was  $53^{\circ} 8'$ , we see that her longitude had diminished, or, which amounts to the same thing, that her progress towards the west had been  $10^{\circ} 24'$ .

According to the dead reckoning, this progress was only  $8^{\circ} 17'$ : thus the ship had been carried to the westward, or *abead* of her apparent run,  $2^{\circ} 7'$ , or 115.5 miles.

In the first five days of this period, the currents had carried the ship to the *southward*: 2—6— and 2 minutes, from the 21st to the 24th, 34 minutes from the 24th to the 25th, and in the last two days, 9 and 12 minutes to the *northward*. A compensation having taken place of the quantities which do away each other, the movement had been 23 minutes, or 23 miles to the *southward*.

On combining the 23 miles southing with the 115.5 miles westing, we find that the mean direction of the current had been west  $11^{\circ} 15'$  south, and its effect on the way of the ship which it carried in that direction, 117.2 miles in 6 days  $\frac{1}{2}$  16 hours, or, mean term, 17.57 miles in twenty-four hours.

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## NOTE LXIV.

On the 29th of April, fresh lunar observations, the result of which was reduced to noon, shewed that the longitude of the ship ought to be  $39^{\circ} 22'$  east, and on comparing it to that of the 28th, it was concluded that the progress towards the west, in twenty-four hours, had been  $3^{\circ} 22'$ .

The reckoning gave only  $2^{\circ} 58'$  thus the ship had made an imperceptible progress towards the west, beyond that of the dead reckoning of 24 minutes, or 21.25 miles; at the same time that, according to the observation of latitude, she had been carried 7 minutes or 7 miles to the northward.

The direction of the current had therefore been west  $18^{\circ} 30'$  north, and its effect on the ship's way 22.25 miles in twenty-four hours.

## NOTE LXV.

On the 9th of May, a bearing of the land taken at noon, in sight of the eastern coast of AFRICA, at a little distance from the meridian of the Cape of GOOD HOPE, whose longitude is determined by good observations, shewed that the longitude of the ship, at that period, was  $25^{\circ} 57'$  east; and on comparing it to that which had been given by the observations made at sea and reduced to noon of the 29th of April, that is, to  $39^{\circ} 22'$ , we find

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that, in the interval of 10 days, the longitude diminished, or that the progress towards the west was  $13^{\circ} 25'$ .

If we compare with each other the longitudes deduced from the dead reckoning for the same periods of the 29th of April, and the 9th of May,  $41^{\circ} 53'$  and  $29^{\circ} 28'$ , we find that the apparent progress towards the west was only  $12^{\circ} 25'$ ; that is, that it was smaller than the progress deduced from the observations of the 29th and of the bearing of the 9th by 1 degree, or  $51\frac{1}{2}$  miles.

In the beginning of this period of ten days, the currents had set to the *Northward*; 13 minutes, from the 29th to the 30th of April;—3 minutes, from the 30th of April to the 1st of May;—and 11 minutes from the 1st to the 2nd; but, on the following days, they had set to the *Southward* with great velocity, and particularly from the 2nd to the 3rd, 33 minutes; from the 4th to the 5th, 16 minutes; from the 7th to the 9th 40 minutes. The sum of the errors towards the *South* was 100 minutes, and if we deduct the 27 minutes *Northward*, there will remain for the effect of the current towards the *South*,  $1^{\circ} 13'$ , or 73 miles.

On combining the 73 miles southing with the  $51\frac{1}{2}$  miles westing, we find that the direction of the current was south  $35^{\circ} 15'$  west, and the whole of its effect on the ship's way had been  $89\frac{3}{4}$  miles.

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miles, and its mean effect, near 9 miles in twenty-four hours.

This rapid motion of the waters towards the south, declining towards the west, cannot be matter of astonishment, if we take notice that, during this period, the ship was crossing the great current which issues from the MOZAMBIQUE Strait, whose general direction is nearly north-north-east and south-south-east.

The longitude given by the dead reckoning, followed up from the departure taken from the I<sup>le</sup> of RÉUNION, on the 21st of April, to the bearing of the coast of AFRICA, on the 9th of May, was, at this latter period,  $29^{\circ} 28'$  and if we compare it to the true longitude deduced from the bearing,  $25^{\circ} 57'$ , we see that, in the interval of 18 days, the error of the reckoning was  $3^{\circ} 31'$ , or 181.5 miles *astern*, owing to the effect of the currents which daily carried the ship to the westward beyond her apparent progress towards that coast.

#### NOTE LXVI.

According to the observations for the longitude made on the 12th of May in the morning and reduced to noon of that day, the progress towards the west, since the bearing taken of the land, on the 9th in sight of the coast of AFRICA, was  $4^{\circ} 8'$ ; and according to the reckoning,  $1^{\circ} 9'$ ,



thence it was concluded that, in the interval of 3 days, the ship had been carried to the westward, beyond the apparent run towards that side,  $2^{\circ} 59'$ , or 147.4 miles.

During the same time, the ship according to the observations of latitude, had been carried  $1^{\circ} 43'$ , or 103 miles to the southward.

On combining the 147.4 miles westing with the 103 miles southing, we find that the direction of the current, during these three days, was west  $35^{\circ}$  south, and its total effect on the ship's way in that direction, 180 miles, or 60 miles in twenty-four hours: this is at the rate of  $2\frac{1}{2}$  miles an hour.

#### NOTE LXVII.

Fresh observations made on the morning of the 13th and reduced to the moment of noon, indicated that, from the noon of the preceding day, the progress towards the west had been  $0^{\circ} 48'$ : and as it was  $0^{\circ} 45'$  according to the dead reckoning, we may conclude that the current, whose tendency had before been towards the west and towards the south, had been nearly null during the last twenty-four hours, in the former direction, since the difference is only 3 minutes or 2.45 miles.

At the same time, it had ceased to set to the southward, and had even set, from the one noon to

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to the other, 17 minutes, or 17 miles to the northward \*; and this setting of the current, in an opposite direction to the former, may be attributed to a heavy swell from the south-west, which must have set to the northward, and, perhaps, had set to the north-east; but the part of the movement which belonged to the easting might have escaped observation. It ought to be remarked that the ship having now advanced sufficiently to the eastward to be sheltered from the action of the MOZAMBIQUE current, she must have ceased to feel its effect on the direction of her course and on the velocity of her progress.

## NOTE LXVIII.

By the observations of the 15th of May, in the morning, reduced to noon, the progress towards the west, from the 13th to the 15th, had been  $1^{\circ} 4'$ , and according to the dead reckoning,  $1^{\circ} 22'$ : it would therefore appear that, in the interval of these two days, the ship had been carried 18 minutes, or 14.7 miles to the eastward.

In the same interval, she appears to have been carried 3 minutes, or 3 miles, to the northward.

\* If we wished to combine these 2.45 miles, westing, with the 17 miles northing, we should find that the ship had been carried 17.2 miles to the north  $8^{\circ} 30'$  west: but this would be to suppose that the observations may be sufficiently exact for leading to the discovery of very small errors in longitude.

These differences are, perhaps, so small as not to deserve attention; for the observations of longitude, on the one hand, and, on the other, those of latitude, are not susceptible of a degree of precision sufficiently great to enable us to attribute decisively the differences to the error of the reckoning: and it cannot be doubted that, in these seas, the currents set to the eastward.

If, however, we are willing to admit the results of the observations as fixed terms of comparison, and combine the 14.7 miles easting with the 3 miles northing; we shall find that, in the two days, the ship was carried out of her apparent course, 15.2 miles, or 7.6 miles a day, to the east  $12^{\circ} 20'$  north.

#### NOTE LXIX.

From the 15th to the 16th, at noon, the progress towards the west was, according to the lunar observations made on the two days,  $2^{\circ} 10'$  and according to the dead reckoning,  $2^{\circ} 12'$ : it is therefore greater by dead account than by observation, by 2 minutes or 1.6 miles. Thus, the observations of this day confirmed those of the preceding, and indicated a small effect of the current whose tendency would be towards the east, in a contrary direction to the general tendency of the currents in these latitudes.

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The observations of latitude proved that, in the twenty-four hours, the ship had been carried to the southward 9 minutes, or 9 miles, beyond the apparent progress towards that side.

On combining the two differences, 1.6 miles towards the west, and 9 miles towards the south, we have, for the action of the current, 9.2 miles to the south  $10^{\circ}$  east.

#### NOTE LXX.

The result of the lunar observations of the afternoon of the 25th of May, reduced to noon of that day, and compared to that of the observations of the 16th likewise reduced to its noon, give  $13^{\circ} 5'$  progress towards the west; and according to the dead reckoning, the progress was only  $11^{\circ} 59'$ : thus, in the interval of nine days, the ship had been carried to the westward  $1^{\circ} 6'$ , or 56.5 miles beyond her apparent progress.

The observations of latitude shewed that, at the same time, the ship had been carried almost constantly to the northward beyond her reckoning; she had been accidentally carried to the southward, 1 minute, from the 17th to the 18th, and 9 minutes from the 22nd to the 23rd: after having deducted the 10 minutes southing, from 50 minutes, the sum of the errors of northing, there will remain 40 minutes, or 40 miles, for the

the quantity which the ship was carried to the northward by the currents.

On combining these 40 miles northing with the 56.5 miles westing, it will be found that the currents set to the west  $35^{\circ} 25'$  north that their effect on the ship's way was 69.3 miles in the course of the period; and their mean effect, 7.7 miles in twenty-four hours.

#### NOTE LXXI.

From the 25th to the 28th of May, at noon, the progress towards the west had been, according to the lunar observations,  $3^{\circ} 44'$ ; and according to the reckoning,  $2^{\circ} 35'$ : the difference of these two quantities,  $1^{\circ} 9'$  or 62.5 miles, expresses the quantity which the ship had, in three days, been carried to the westward, beyond her apparent progress.

In this same interval, the same cause had, according to the observations of latitude, carried her 35 minutes or 35 miles to the northward.

The 62.5 miles westing, combined with the 35 miles northing, give for the direction of the current, west  $29^{\circ} 20'$  north; for its effect on the ship's way, in three days, 71.5 miles; and for its mean effect in twenty-four hours, 23.8 miles.

#### NOTE LXXII.

From the 28th to the 29th of May, at noon, progress

June 1791.

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progress towards the west, according to the lunar observations,  $1^{\circ} 13'$ , and according to the dead reckoning  $1^{\circ} 5'$ : the ship had therefore been carried to the westward 8 minutes, or 7.27 miles.

The latitude by account, on the 29th, agrees with the latitude by observation.

We may therefore consider the action of the currents as null during these twenty-four hours; for the difference of 8 minutes, between the account and the observation, in the progress towards the west, may be attributed to the one as well as to the other.

#### NOTE LXXIII.

The observations for the longitude made on the 30th, gave for the progress towards the west in the last twenty-four hours,  $1^{\circ} 28'$ , and the dead reckoning gave  $1^{\circ} 29'$ . This trifling difference of 1 minute or 0.94 miles, in excess on the side of the reckoning, is not worth attention; but if we chose to combine it with the 6 minutes or 6 miles, which the ship had been carried to the northward in the same interval, we should find that the current set to the north  $8^{\circ} 30'$  east, and that its effect on the ship's way was, in this direction, 6.1 miles.

#### NOTE LXXIV.

The observations of latitude shewed that, on the 30th

30th of May, the currents had continued to set to the northward: from the 30th to the 31st, 13 minutes;—from the 31st of May to the 1st of June, 6 minutes;—from the 1st to the 2nd, 11 minutes;—from the 2nd to the 3rd, 3 minutes:—in all 33 minutes or 33 miles in the interval of four days.

On the 3rd of June, half an hour before noon, our navigators got sight of the Island of *St. HELENA*; and its eastern extreme bore west by south, at about the distance of 12 leagues; thus the ship was 6 or 7 minutes to the northward of the point whence the bearing was taken.

But this Point is situated nearly in the Parallel of *JAMES TOWN*, the principal place in the island, whose latitude the observations of the astronomer royal *NEVIL MASKELINE* have fixed at  $15^{\circ} 55'$ : the latitude of the ship must therefore be  $15^{\circ} 49'$  or  $48'$ , and it was observed in  $15^{\circ} 49'$ .

On the 4th, at nine o'clock in the morning, *SUGAR-LOAF Point* bore west-south-west; and the eastern extreme in sight, directly south. From the point whence this bearing was taken till the moment when the *SOLIDE* dropped anchor in the road of *JAMES TOWN*, the ship had advanced 4 or 5 miles, or about 5 minutes to the westward: we may therefore reckon that the point on whose meridian she was, is situated 5 minutes to the eastward of *JAMES TOWN*; and as the longitude of

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of this town, fixed by the observations of MAS-  
KELINE, is  $8^{\circ} 9' 00''$  west from PARIS, the longi-  
tude of the point set which was also that of the  
ship, is  $8^{\circ} 4'$ .

Since the 30th of May there had been no  
opportunity of making lunar observations: but as  
two sets of observations, on two successive days,  
proved that, from the 28th to the 30th, the cur-  
rents had in a very small degree affected the ap-  
parent progress of the ship to the westward, we  
may with some confidence employ the dead reck-  
oning, from the 30th of May, the last day of ob-  
servation, to 9 o'clock in the morning, on the 4th  
of June, the period at which the calculation was  
stopped. The progress of the ship towards the  
west, in this interval, is, according to the reckon-  
ing,  $6^{\circ} 21'$  (See the JOURNAL OF THE ROUTE, on  
the 30th of May and 4th of June): if we add  
these to the longitude deduced from the lunar  
observations, for the noon of the 30th of May,  
which was  $1^{\circ} 43'$  west, we shall have for the lon-  
gitude of the ship, on the 4th of June, at 9 o'clock  
in the morning,  $8^{\circ} 4'$ ; and this is exactly the  
same as that which was given by the bearing:  
which proves that the result of the observations of  
the 30th from which our navigators had begun  
to regulate the course in standing to make St.  
HELENA, was as correct as can be desired for the  
safety of navigation.



This is not the case with the longitude which they would have supposed, if, for directing their route, they had had only the result of the dead reckoning from the point of departure taken in sight of the coast of AFRICA, on the 9th of May, in  $25^{\circ} 57'$  east longitude: for, according to this calculation, the longitude of the ship, on the 4th of June, at 9 o'clock in the morning, ought to be  $3^{\circ}$  west: and as it has been seen that the true longitude, at this period, was  $8^{\circ} 4'$ , it follows that the longitude by account was *astern*, after twenty-five days only,  $5^{\circ} 4'$  or  $97\frac{1}{2}$  leagues on the parallel of ST. HELENA. If we add to this error that of  $3^{\circ} 31'$ , which the dead reckoning was already *astern* when it was corrected on the 9th of May, in sight of the coast of AFRICA, we shall have for the total error of the Run, till the period of the last observations, on the 30th of June  $8^{\circ} 35'$ , or upwards of 167 leagues in thirty-nine days.

On recapitulating all the errors of the reckoning in the course of the Run, from the Isle of REUNION to the Island of ST. HELENA, we shall have the following Table, the result of which agrees with the account that I have just presented.

June 1792.]

1. From the

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From the 29

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2. From with

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From the 9th

From the 12th

From the 13th

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From the 16th

From the 25th

From the 28th

From the 29th

Remainder, in

\* The error *Abec  
solide* was sailing:  
which, for want of

1. From

1. From the Isle of REUNION to within sight of the Coast of AFRICA.

Errors towards the East or <i>Astern</i> .	Days. ° ' "	Errors towards the West or <i>Ahead</i> *.
From the 21st to the 28th in	7...2 7	
From the 28th to the 29th in	1...0 24	
From the 29th } MAY } to the 9th }	..... in 10...1 0	
in 18 days		3 31

2. From within sight of the Coast of AFRICA to the 30th of May, the period of the last observations made before making the land on ST. HELENA.

Days. ° ' "	Errors
From the 9th to the 12th in	3... 2 59
From the 12th to the 13th in	1... 0 3
From the 13th to the 15th in	2... .. 0 18
From the 15th to the 16th in	1... .. 0 2
From the 16th to the 25th in	9... 1 6
From the 25th to the 28th in	3... 1 9
From the 28th to the 29th in	1... 0 8
From the 29th to the 30th in	1... .. 0 1
-----	
<i>Astern</i>	8 36 ahead 21
-----	

Remainder, in 39 days, Error *Astern* .... 8° 35'

\* The errors *Ahead* appear extraordinary in the seas where the *Solide* was sailing: they may possibly belong to the observations which, for want of precision, cannot reach the little differences.

From

The

The first part of this Run, from the Isle of REUNION, to within sight of the Coast of AFRICA, exhibits to us the great effects of the movement of the waters, which produce derangements so considerable on the course of the ship, as long as she remains exposed to the action of the current of the MOZAMBIQUE Strait: it may be seen in the *NARRATIVE* (page 169 of this volume) that these derangements are sometimes still more considerable than that which the SOLIDE experienced, and which was increased in the beginning of the second Part of the Run, from the 9th to the 12th of May.

In this second part (from within sight of the Coast of AFRICA to the Island of ST. HELENA) the currents set almost constantly to the westward, with unequal degrees of velocity, and declining sometimes towards the north, sometimes towards the south. But it appears that, from the 28th of June, when the ship had reached the South Tropic, the waters ceased to carry the ship to the westward, or that at least their effect was so imperceptible, that it escaped observation: and this must appear extraordinary; for it is reckoned that between the tropics, the waters have a general movement from east to west; and it is supposed that this movement increases the apparent progress of the ship towards the west, 8 or 9 miles in twenty-four hours: it is, on the contrary, to the  
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southward of the tropic that the ship was carried to the westward, and we are nearly convinced that she experienced no such tendency between the tropics; for, on applying to the longitude observed at sea on the 30th of May, the progress towards the west as it was given by the dead reckoning during the interval of five days, we find, on the 4th of June, off JAMES TOWN in the Island of St. HELENA, exactly the same longitude as that which had been determined by the astronomical observations of MASKELINE. If the ship were carried to the westward, for this effect to have occasioned no error in her longitude on making the land, the error on the result of the observations made at sea, on the 30th must have been counterbalanced by an error precisely equal, and in a contrary direction, in the reckoning from the 30th of May to the 4th of June; which would not be absolutely impossible, but which, however, is improbable.

The movement of the waters which deranged the ship in the direction of the latitude was almost constant during the Run, but unequal in velocity, and sometimes towards the north, sometimes towards the south: it may be said, however, that once out of the reach of the current of the MOZAMBIQUE Strait, which, from the 9th to the 11th of May, had set her to 103 miles to the southward, the ship was carried almost constantly to the northward till she reached the parallel of  
St.

ST. HELENA. (See at the end of the NOTES, the GENERAL TABLE VIIIth Run.)

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## NINTH AND LAST RUN.

*From the Island of ST. HELENA to the Strait of GIBRALTAR and to TOULON.*

### NOTE LXXV.

The SOLIDE had quitted the Road of ST. HELENA on the 5th of June, at half past ten o'clock in the evening. On the 6th at noon, the island bore from her from south-south-east  $4^{\circ}$  east to south-east by east  $2^{\circ}$  south; and from the observation of latitude and the dead reckoning, it was concluded that, from half past ten o'clock the preceding evening, she had advanced 7 minutes to the northward, and that the progress towards the west had been 5 minutes. But, in order to avoid the uncertainty of the dead reckoning, we shall take the ship getting under way in the Road of ST. HELENA, on the 5th at half past 10 P. M. and her point of departure will be  $15^{\circ} 55' 0''$  south latitude, and  $8^{\circ} 9' 0''$  longitude west from PARIS (farther back, pages 602,3). Thus the first observa-

July 1792.

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tions of longitude having been made on the 10th of July, and reduced to noon on that same day, we shall reckon that, between the departure from ST. HELENA and the period of these observations, there had elapsed thirty-four days and a half, or more exactly, 34.56 days.

On the 10th of July, the mean result of four sets of distances observed from the moon to the sun, reduced to noon, gave for the longitude of the ship at that moment,  $46^{\circ} 27'$ ; and on comparing it to that of ST. HELENA  $8^{\circ} 9'$ , it is seen that the ship's progress towards the west in the interval of thirty-four days and a half, had been  $38^{\circ} 18'$ .

The longitude deduced from the daily reckoning since the departure, was  $43^{\circ} 30'$ ; thus the progress towards the west, according to the reckoning, was only  $35^{\circ} 21'$ : the reckoning was therefore in error, after a run of thirty-four days and a half,  $2^{\circ} 57'$ , or (by a mean parallel between that of the point of departure and that of the point arrived at) about 160 miles, which the ship had been carried to the westward beyond her apparent progress towards that side.

On examining, in the JOURNAL OF THE ROUTE, the effect of the currens in the direction of the latitude, we make the following remarks :

From  $15^{\circ} 55'$  to  $12^{\circ} 21'$  south latitude, the cur-

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rents

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rents carried the ship to the *Northward* 22 minutes, or 22 miles, in 4 days ;

From  $12^{\circ} 21'$  to  $8^{\circ} 29'$ , they carried the ship to the *Southward* 9 miles in 3 days :

From  $8^{\circ} 29'$  to  $6^{\circ} 55'$ , no difference between the dead reckoning and the observations ;

From  $6^{\circ} 55'$  to  $3^{\circ} 8'$ , they carried the ship to the *Northward* 19 miles in 3 days ;

From  $3^{\circ} 8'$  to  $0^{\circ} 57'$ , to the *Southward*, 32 miles in 2 days.

On ascending from the Equator towards the north, the currents constantly set to the *Northward*; their direction was only once towards the *South*, between the latitude of  $21^{\circ} 25'$  and  $23^{\circ} 3'$ , and their effect 3 miles only in twenty-four hours: but I observe that at this period, from the 4th to the 5th of July, our navigators had, at noon, the sun very near the zenith; and this accidental deviation of the currents towards the south, might probably have been only apparent, and be the effect of some small error in the observation; for with the exception of this single day, since the ship had passed the line, the tendency of the currents had been constant towards the north, and their velocity had been considerable, as may be conceived in consulting the *JOURNAL OF THE ROUTE*.

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From  $0^{\circ} 5'$ From  $0^{\circ} 3'$ From  $2^{\circ} 3'$ From  $4^{\circ} 34'$ From  $8^{\circ} 15'$ From  $9^{\circ} 21'$ From  $12^{\circ} 20'$ From  $26^{\circ} 0'$ From  $36^{\circ} 5'$ 

I have not noted the effects: these effects.

ROUTE.

If we recapitulate the quantities which were carried *Northward* in excess of the other, towards the *Southward*, in the course of the voyage, we find that, in the space of 12 days and a half, the ship was carried 32 miles, and that the error arising from the smaller quantities of current had in latitude, had been corrected by the current. At present, in nothing with that, in the interval, the currents

From  $0^{\circ} 57' S.$  to  $0^{\circ} 38' N.$  15 miles in 1 day :  
 From  $0^{\circ} 38' N.$  to  $2^{\circ} 34'$  .. 28 miles in 1 day :  
 From  $2^{\circ} 34'$  .. to  $4^{\circ} 34'$  .. 15 miles in 1 day :  
 From  $4^{\circ} 34'$  .. to  $8^{\circ} 15'$  .. 43 miles in 3 days :  
 From  $8^{\circ} 15'$  .. to  $9^{\circ} 21'$  .. no difference :  
 From  $9^{\circ} 21'$  .. to  $11^{\circ} 5'$  .. 22 miles in 1 day :  
 From  $12^{\circ} 20'$  .. to  $13^{\circ} 33'$  .. 9 miles in 1 day :  
 From  $26^{\circ} 0'$  .. to  $27^{\circ} 50'$  .. 21 miles in 1 day :  
 From  $30^{\circ} 5'$  .. to  $32^{\circ} 23'$  .. 13 miles in 1 day, &c.

I have not made mention of the less considerable effects : these may be seen in the *JOURNAL OF THE ROUTE*.

If we recapitulate, on the one hand, all the quantities which the ship was carried to the *Northward* in excess of her apparent progress ; and on the other, those which she was carried to the *Southward*, in defect of this same progress ; we find that, in the course of the period of thirty-four days and a half, the sum of the former was 242 miles, and that of the latter, 44 miles : subtracting the smaller from the greater, we have 198 miles for the error which the ship would have had in latitude, if the error of each day had not been corrected by the observation.

At present, if we combine these 198 miles northing with the 160 miles westing, we find that, in the interval of thirty-four days and a half, the currents carried the ship 255 miles to the



north  $39^{\circ}$  west, or north-west  $6^{\circ}$  north, beyond her apparent run the direction of which, during that period, differed little from that of north-west.

It may therefore be concluded that, from St. HELENA to the Point where the SOLIDE was arrived on the 10th of July ( $32^{\circ} 23'$  north latitude and  $46^{\circ} 27'$  west longitude) the almost constant tendency of the currents was towards the north-west, and that their effect on the ship's run was, in increase of this run, 7.4 miles in twenty-four hours, which must be added to the apparent run in order to have the true progress.

#### NOTE LXXVI.

On the 23d of July, the result of the observations of that day, reduced to noon, placed the ship in longitude  $34^{\circ} 32'$  west; and, on comparing this position to that of the 10th at noon  $46^{\circ} 27'$ , we find that, in the interval of 13 days, the progress towards the east was  $11^{\circ} 55'$ .

If we compare with each other the longitudes deduced from the dead reckoning, for the same periods,  $32^{\circ} 3'$  on the 23rd, and  $43^{\circ} 30'$  on the 10th, we shall find that, according to the reckoning, the progress towards the east had been only  $11^{\circ} 27'$ : the difference between the apparent progress and the real progress was therefore 28 minutes, or 22.4 miles, which it appears that the currents carried the ship to the eastward.

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The daily differences between the latitude by account and the latitude by observation in the course of the period, shewed that, 2 days excepted, the tendency of the currents was towards the north :

The first two days, they set to the northward 10 and 8 miles in twenty-four hours :

From the 13th to the 14th, 12 miles to the southward in 2 days ;

They resumed their direction to the northward, from the 14th to the 21st, and in these seven days, they set towards that side, 5—10—9—5—2—0— and 6 miles a day.

But from the 21st to the 22d 8 miles to the southward :

And lastly from the 22nd to the 23rd no difference.

In deducting the 20 miles southing from the 55 miles northing, there remains 35 miles which, in 13 days, the currents carried the ship to the northward beyond her apparent progress towards that side.

If we combine these 35 miles northing with the 22.4 miles easting, we find that the general direction of the currents was north  $32^{\circ} 30'$  east, their effect, in 13 days, on the ship's way,  $41\frac{1}{2}$  miles, and mean effect, 3.2 miles in twenty-four hours.

## NOTE LXXVII.

The result of the observations of the 24th of July confirms in general the result of those of the 23rd: for, on comparing the longitude observed on the 24th and reduced to noon, which is  $32^{\circ} 18'$ , with that of the 10th, which was  $46^{\circ} 27'$ , we find that the progress towards the east was  $14^{\circ} 9'$ ; and according to the dead reckoning, which gave for the longitude on the 24th  $29^{\circ} 55'$ , and for the 10th  $43^{\circ} 30'$ , the apparent progress was only  $13^{\circ} 35'$ : the difference is therefore  $34'$ , or 27.5 miles, which the currents carried the ship to the eastward in the interval of the 14 days.

It has been seen (preceding Note) that, from the 10th to the 23rd, a compensation having taken place, the ship had been carried 35 miles to the northward: if we thence take away 8 miles which she was carried to the southward, from the 23rd to the 24th there will remain 27 miles for the quantity which the ship was set to the northward from the 10th to the 24th.

On combining these 27 miles northing with the 27.5 miles easting, we find that the currents carried the ship  $38\frac{1}{2}$  miles in 14 days, or 2.75 miles in twenty-four hours, to the north  $45^{\circ} 30'$  east\*.

These

\* The progress towards the east, from the 23rd to the 24th, is, according to the observations,  $2^{\circ} 14'$ ; and according to the reckoning,

July 1792.

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These results differ so little between themselves, with respect to the longitude, that we should be justified in relying on the correctness of the observations of the 23rd and 24th, which reciprocally serve as a proof to each other. We may therefore conclude that, during this period of 14 days, from the 10th to the 24th of July, the currents set to the eastward, 1.35 miles in twenty-four hours by the observations of the 23rd, and 1.95 miles by those of the 24th; the mean time is  $1\frac{3}{4}$  miles.

We ought not, as I have said, to expect perfect accuracy from the results of lunar observations for determining the *small* differences in longitude, and it can be obtained only from time-pieces or chronometers; but the former is sufficient here for proving that the currents which, since the 6th of June, the time of the departure from ST. HELENA, had set to the westward, began on the 10th of this last month to set to the eastward, and continued to the 4th, to act on that same side. Let us observe that, on the 10th, the ship had already reached the latitude of  $32^{\circ} 30'$  north, and although the ship was on a meridian about 600 leagues

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reckoning,  $2^{\circ} 3'$ : the difference is therefore 6 minutes, or 4.5 miles, which the progress by observation is greater. If we combine these 4.5 miles easting with the 8 miles, which the ship was carried to the southward through the effect of the current, we shall find that she appears to have been carried, in these 24 hours, 9.2 miles to the south  $29\frac{1}{2}$  east.

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distant from that of the Strait, it would not be surprising that between the parallel of Cape CANTIN, on the coast of AFRICA,  $32^{\circ} 30'$ , and that of Cape ST. VINCENT, on the south coast of SPAIN  $37^{\circ}$ , which the SOLIDE crossed in her route from the 10th to the 24th of July, and which comprise the great mouth of the Strait, the general movement of the waters, whose tendency ought to be towards the east in order to flow afterwards into the MEDITERRANEAN \*, began to be felt in the offing, at that distance of six hundred leagues.

#### NOTE LXXVIII.

The observations of the 27th of July, placed the SOLIDE, at noon, in  $25^{\circ} 32'$  west from Paris: and as, by those of the 24th she was in  $32^{\circ} 18'$ , it was concluded that her progress towards the east, in 3 days, had been  $6^{\circ} 46'$ .

According to the dead reckoning, it was  $7^{\circ} 20'$ : the ship had therefore been carried 34 minutes, or 25.5 miles to the westward.

In the interval from the 24th to the 27th, the

\* See the *Voyage de l'Isis* in 1768, Vol. I. page 178 and 179, we find there, in a run from Cadix to Santa Cruz in the Island of Teneriffe, the daily comparison of the progress in longitude, such as it was deduced from the dead reckoning, with the real progress, such as it was determined by means of the time-keepers of Ferdinand Berthou; it is there seen that the effect of the current towards the east diminishes gradually, in proportion as the ship approaches the tropic.

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ship was carried, on the first day, 2 minutes to the northward, and on the second and third day, 5 and 6 minutes to the southward: which gives for the 3 days, 9 miles southing.

On combining these 9 miles with the 25.5 miles westing, it will be found that the direction of the currents was west  $19^{\circ} 15'$  south, and its effect on the ship's way, 27.2 miles, or about 9 miles in twenty-four hours.

Here the direction of the currents appears to have changed: for it has been seen (preceding Note) that, from the 10th to the 24th of July, their tendency was towards the *East*; and from the 24th to the 27th they resumed their course towards the *West*, as they had set from the 5th of June to the 10th of July. This return towards the west would, at first sight, seem to contradict what I have before advanced, that the *SOLIDE* might have experienced at a very great distance in the offing, the setting of the currents towards the east; but to prove that there is no contradiction in this, it will be sufficient for me to observe that the ship was in two different positions, relatively to the STRAIT OF GIBRALTAR, which determines this setting of the currents towards the east: in the former period, from the 10th to the 24th of July, she had crossed the parallels comprised between  $32^{\circ} 30'$  and  $37^{\circ}$ , which are those which comprehend the great mouth of the Strait; but, from the

24th to the 27th, she had sailed between those of  $41^{\circ} 40'$  and  $41^{\circ} 20'$ ; there she was 3 or  $4^{\circ}$  to the northward of the highest parallel where the movement of the waters towards the east can still be felt, more northerly by  $2^{\circ}$  than the parallel of the most northern of the WESTERN Islands; and in this position, she may have met with currents whose direction was towards the west, and which carried her towards that side. Therefore there is no contradiction.

## NOTE LXXIX.

On the 2d of August, at noon, Cape ST. VINCENT, on the coast of PORTUGAL, bore east half south, at the distance of two leagues and a half estimated by the eye: the ship was therefore more to the northward than this Cape, by 0.75 miles, and more to the westward by 7.45 miles, or 9 minutes and 20 seconds.

According to the observations of BORDA in 1776:

Cape ST. VINCENT  $\left\{ \begin{array}{l} \text{Latitude . } 37^{\circ} 2' 20'' \text{ north;} \\ \text{Longitude } 11^{\circ} 21' 36'' \text{ west.} \end{array} \right.$

Thus, according to the bearings, this ought to be

For the SOLIDE . .  $\left\{ \begin{array}{l} \text{Latitude . . } 37^{\circ} 3' 5''; \\ \text{Longitude } 11^{\circ} 30' 56''. \end{array} \right.$

The latitude was observed on board the ship, in  $37^{\circ} 2'$ : difference in defect  $1' 5''$ .

The

Aug. 1792.

The luna SOLIDE had July at no thence dedu east in the ir and of August will remain, latter period bearing of the thus, in the 2d of August the eastward  $1^{\circ} 26' 4''$ , or 6 In the first by account ha but from the ship to the sou the 1st to the This movem cannot be ma August: the m LAND, ICELAN cessarily produc current which ships that have the northern movement of the aishes gradually

I

The lunar observations made on board the *SOLIDE* had given for the longitude of the 27th of July at noon (preceding *Note*)  $25^{\circ} 32'$ : if we thence deduct the progress by account towards the east in the interval from the 27th of July to the 2nd of August at noon, which was  $12^{\circ} 35'$ , there will remain, for the longitude of the ship at the latter period,  $12^{\circ} 57'$ . But, according to the bearing of the land, it ought to be only  $11^{\circ} 30' 56''$ : thus, in the interval from the 27th of July to the 2d of August, in 6 days, she had been carried to the eastward or *ahead* of the apparent progress,  $1^{\circ} 26' 4''$ , or 66.5 miles.

In the first two days of the period, the latitude by account had agreed with that by observation; but from the 29th to the 31st, the currents set the ship to the southward 20 miles, and 12 miles from the 1st to the 2nd: in all, 32 miles in 6 days.

This movement of the waters towards the south cannot be matter of surprize at the beginning of August: the melting of the ice and snow of GREENLAND, ICELAND, LAPLAND, NORWAY, &c. necessarily produce towards the south, an accidental current which must carry towards that side the ships that have reached the parallels situated above the northern tropic, beyond which the general movement of the waters from east to west diminishes gradually in proportion as the latitudes are higher



higher, and end by being absolutely imperceptible two or three degrees north of the tropic.

In the position where the *SOLIDE* was, at the latter end of July and the beginning of August, out of the limits of the general current of the tropics, she must have yielded to two causes which combined for driving her from her apparent course; to the southerly current, produced by the melting of the ice, and to the easterly current, which occasions the tendency of the waters towards the *STRAIT OF GIBRALTAR*.

If we combine the effects resulting from these two causes, 66.5 miles easting and 32 miles southing, we find that the ship was carried 74 miles, in the interval of 6 days, or 12.3 miles in twenty-four hours, in the direction of east  $25^{\circ} 30'$  south.

#### NOTE LXXX.

On the 4th of August, at five o'clock in the morning, Captain *SPARTEL*, (on the coast of *AFRICA*) bore south-east, estimated distance  $2\frac{1}{2}$  miles.

According to the observations of *BORDA*, in 1776:

Cape *SPARTEL* { Latitude ..  $35^{\circ} 49' 20''$  north;  
                  { Longitude ..  $8^{\circ} 14' 00''$  west.

The ship, according to the bearing, was more to the northward than the cape by 1.6 miles, or  $1' 40''$ , and more to the westward by 1.6 miles or 2 minutes.

Thus

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If, at pre-  
ship, on the  
morning, to  
noon, in fig  
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 $2^{\circ} 38'$ : thus,  
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be necessary to  
of the *NOTES* t  
The errors of  
in the last Run  
to the *STRAIT*  
the following T

Aug. 1792.]

Thus, for the SOLIDE  $\left\{ \begin{array}{l} \text{Latitude} \dots 35^{\circ} 49' 00''; \\ \text{Longitude} \quad 8^{\circ} 16' 00''. \end{array} \right.$

If, at present, we compare this longitude of the ship, on the 4th of August, at five o'clock in the morning, to her true longitude, on the 2nd at noon, in sight of Cape ST. VINCENT, which was (preceding *Note*)  $11^{\circ} 30' 56''$ ; it is seen that, in the interval of 1 day 17 hours, the real progress towards the west had been  $3^{\circ} 15'$ ; and according to the reckoning, the apparent progress was only  $2^{\circ} 38'$ : thus, in the interval of 41 hours, the ship had been carried to the eastward, by the movement of the waters,  $0^{\circ} 37'$ , or 30 miles beyond her apparent progress: this is at the rate of upwards of  $17\frac{1}{2}$  miles in twenty-four hours. The cause of this current is too well known for it to be necessary to recall it to mind. (*See at the end of the NOTES the GENERAL TABLE, ixth Run.*)

The errors of the dead reckoning in longitude in the last Run from the Island of ST. HELENA to the STRAIT OF GIBRALTAR, are assembled in the following Table,

June

	The Ship advancing towards the West.		The Ship advancing, towards the East.	
	ERRORS of the RECKONING.		ERRORS of the RECKONING.	
	<i>Astern.</i>	<i>Ahead.</i>	<i>Astern.</i>	<i>Ahead.</i>
June				
From the 5th	} In 34½ Days 2° 57'			
July to the 10th				
From the 10th to the 23d.	} In 13 .....		0° 28'	
From the 23rd to the 24th		} In 1 .....		0° 6'
From the 24th to the 27th	} In 3 .....			
From the 27th August to the 2d.		} In 6 .....		1° 26'
From the 2nd to the 4th.	} In 2 .....			0° 37'
Minus West.....			2.57	
Minus East 2° 34' }		} Difference	East 2. 3	
Plus East 0° 37' }				
Sum of the errors of the Reckoning in 59½ days,			<i>Astern</i>	5.00

The

Aug. 1792.]  
 This sum  
 compensation  
*ahead*, with  
 towards which  
 The SOLID  
 on the 4th o  
 anchored in the  
 up the MEDIT  
 for any observ  
 the Reader, for  
 the JOURNAL o  
 at the end of the  
 CURRENTS.

1794.

dvance  
ards the  
of the  
NING.

Ahead.

Aug: 1792.]

MARCHAND'S VOYAGE.

This sum of errors is reduced by the effect of compensations, to  $0^{\circ} 54'$  to the eastward, or *ahead*, with respect to the MEDITERRANEAN towards which the ship was directing her course.

The SOLIDE passed the STRAIT OF GIBRALTAR on the 4th of August, and on the 14th she anchored in the road of TOULON. As this Run up the MEDITERRANEAN neither gave occasion for any observation nor for any remark, I refer the Reader, for the last ten days of the voyage, to the *JOURNAL OF THE ROUTE* which is to be found at the end of the *TABLE OF THE EFFECT OF THE CURRENTS*.

$0^{\circ} 37'$

2.57

2. 3

5.00

This

TABLE

## T A B L E

## OF THE EFFECT OF THE CURRENTS

ON THE COURSE AND RATE OF SAILING OF THE SOLIDE, according to the Observations of Latitude and Longitude, made on board the Ship in the Course of her Voyage ROUND THE WORLD, in 1790, 1791, and 1792.

The first column shews the Periods of the Observations the Results of which are compared with those of the *Reckoning*, or the calculation of the ship's run at the same periods.

The 2nd and 3rd present the Latitude and Longitude observed at the extreme limits of each Period, in order that the Reader may be able to judge at first sight between what Parallels and what Meridians the ship experienced the various effects of the Current specified in the *TABLE*.

The 4th—5th—6th—and 7th Columns give the difference that was found in comparing the progress in latitude, and the progress in longitude with the progress, in both directions, such as they were deduced from the daily observation of latitude and from the observations of longitude, made at the two extreme limits of the period: these are

the errors  
*Dead Reckoning*  
*Observations*.  
 (Ind. Run,  
 February 17  
 west; these  
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 latitude deduc  
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 terval, was gr  
 Results of th  
 made at the tw  
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 progresses, whi  
 the reckoning;  
 feet of the cur  
 results of the  
*Observations*, we  
 southward and to  
 by these differen  
 For forming t  
 lumns, I have c  
 tributed to the  
 latitude, with th  
 direction of the  
 continue the prec  
 (8th Column) tha  
 VOL II.

the errors that were found in the results of the *Dead Reckoning* compared with those of the *Observations*. Thus, for example, when you read (Ind. Run, Period from the 16th to the 25th of February 1791): 67 miles south and 94.2 miles west; these expressions signify that, in the interval from the first to the last day of the Period, the ship was carried to the southward 67 miles more than was indicated by the sum of the daily progress in latitude deduced from the simple reckoning; and that the progress towards the west, in the same interval, was greater by 94.2 miles according to the Results of the observations for the longitude, made at the two extreme limits of the Period, than it would have been in adding up the sum of the progresses, which was deduced every day from the reckoning: and, in attributing to the effect of the currents these differences between the results of the *Dead Reckoning*, and those of the *Observations*, we say that the Currents set to the southward and to the westward, quantities expressed by these differences.

For forming the 8th—9th—10th and 11th Columns, I have combined the effect which is attributed to the current in the direction of the latitude, with that which is attributed to it in the direction of the longitude: and if it be wished to continue the preceding example, it will be found (8th Column) that the current which occasioned a

difference or error to the southward, of 67 miles, and another error to the westward of 94.2 miles, carried the ship to the west 36 degrees south; and that by an imperceptible movement (9th Column), it occasioned her to make, in that direction 115.7 miles, which could not be accounted for by the *Dead Reckoning*.

By then dividing this last number by 9, the number of days of the Period (10th Column) it is found that the mean progress of the ship, in the direction mentioned in the ninth column, was 12.8 miles in twenty-four hours (11th Column).

The Twelfth refers to the *NOTES*, in which are detailed the operations of the calculation that has led to the results presented in the *TABLE*; and the *Data* of the calculation are to be found in the *JOURNAL OF THE ROUTE* printed at the end of this *TABLE*.

FIRST

## FIRST RUN.

From the STRAIT OF GIBRALTAR to the CAPE DE VERD Islands.

10	6	5	38	27	58
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# FIRST RUN.

From the STRAIT OF GIBALTAR to the CAPE DE VERD Islands.

PERIODS.	Latitude observed		Longitude observed	DECOMPOSED EFFECT according to the Observations.				COMPOUND EFFECT		Duration of the Period.	Mean Drift in One Day.	Reference to the Notes.
	NORTH.	WEST.		N.	S.	E.	W.	On the Course.	On the Rate of Sailing.			
	0	0	Miles.	Miles.	Miles.	Miles.	Rumb.	Miles.	Days.	Miles.	Numb.	
1790. Decem. From 29	In sight of Cape Spardel. 35 52	8 14		.....	9	38	.....	E. 13° ½ S.	39	7	5,8	I. and II.
1791. January to 5	30 08	18 38										
From 5 to 9	30 08 21 24	18 38 21 46		.....	12	49	.....	E. 13° ½ S.	50,5	4	12,6	III.
From 9 to 14	21 24 15 02	21 46 25 29		.....	18	.....	30,	W. 30° ½ S.	35,5	5	7,1	IV.

# SECOND RUN.

From the CAPE DE VERD Islands to within sight of STATEN LAND.

PERIODS.	Latitude observed		Longitude observed	DECOMPOSED EFFECT according to the Observations.				COMPOUND EFFECT		Duration of the Period.	Mean Drift in One Day.	Reference to the Notes.
	NORTH.	WEST.		N.	S.	E.	W.	On the Course.	On the Rate of Sailing.			
	0	0	Miles.	Miles.	Miles.	Miles.	Rumb.	Miles.	Days.	Miles.	Numb.	
At La Praya.												
From 18 to 28	14 53 3 36	25 51 35		.....								V.
to 31	2 26	21 29	50.	.....				North.	50	3	16,6	



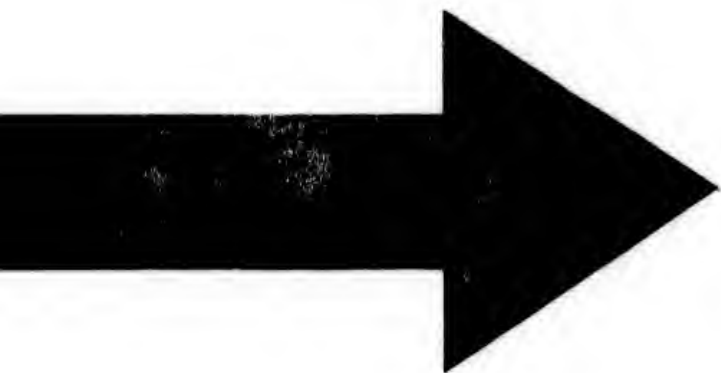
Periods.	Latitude observed South.	Longitude observed West.	DECOMPOSED EFFECT according to the Observations.				COMPOUND EFFECT				Reference to the Notes.
			N Miles.	S. Miles.	E. Miles.	W. Miles.	On the Courfe.	On the Rate of Sailing.	Duration of the Period.	Mean Difference in One Day.	
1791.	0 1	0 1	Miles.	Miles.	Miles.	Miles.	Round.	Miles.	Days.	Miles.	Numb.
From 15 February.	18 53	35 56	.....	10	.....	24,5 or 14,0	W. 220 ½ S. or W. 360 S.	26,5 or 17,8	1	26,5 or 17,8	X.
to 16	20 01	37 06	.....	67	.....	94,2	W. 360 S.	115,7	9	12,8	XI.
From 16 to 25	20 01 31 45	37 06 47 56	.....	22	0	0	South.	22	1	22,	Ditto.
From 25 to 26	31 45 32 30	47 56 48 23	.....	.....	.....	.....	.....	.....	.....	.....	.....
From 26 March to 8	32 30 36 48	48 23½ 48 06	89	.....	187,5	.....	E. 230 N.	204,0	10	20,4	XII.

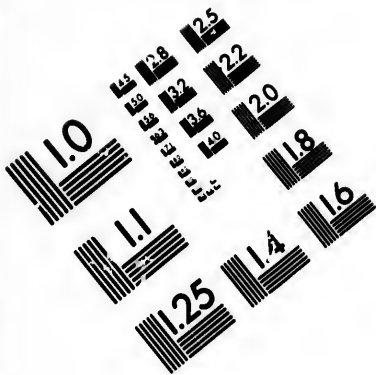
From 8 to 10	36 48 38 44	48 06 53 16	.....	29,0	.....	11,0	S. 20° ½ W.	31,0	2	15,5	XIII.
From 10 to 11	38 44 40 03	53 16 55 51	.....	38,0	.....	34,0	S. 42° W.	51,0	1	51,0	Ditto.
From 11 to 12	40 03 40 48	55 51 56 28	4,0	.....	18,5	.....	E. 120° ½ N.	18,6	1	18,6	Ditto.
From 12 to 15	40 48 40 59	56 28 57 46	23,0	.....	.....	0,76	N. 10° ½ W.	23,0	3	7,6	Ditto.
From 15 to 23	40 59 43 26	57 46 62 15	60,0	.....	58,4	.....	N. 44° ½ E.	83,75	8	10,4	XIV.
From 23 to 25	43 26 43 55	62 15 63 23	11,0	.....	.....	36,0	W. 130° ½ N.	37,0	2	18,5	XV.
From 25 to 27	43 55 47 03	63 23 64 48	.....	2,0	32,2	.....	E. 30° ½ S.	32,3	2	16,1	XVI.
From 27 to 28	47 03 47 55	64 48 65 08	5,0	.....	2,5	.....	N. 26° ½ E.	5,6	1	5,6	XVII.
From 28 to 30	47 55 51 06	65 08 67 41	.....	22,0	.....	.....	South.	22,0	2	11,0	XVIII.
From 30 April to 1	51 06 53 56	67 41 66 08	12,0	.....	3,8	.....	E. 170° ½ N.	33,25	2	16,6	XIX.
From 25, A. to 1, A	43 55 53 56	63 23 66 08	.....	7,0	65,5	.....	E. 60° ½ S.	66,0	7	9,5	Ditto.

MARCHAND'S VOYAGE.

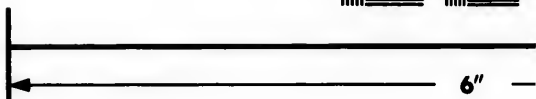
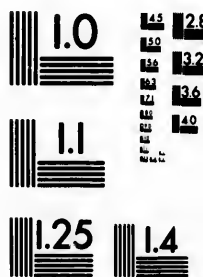
Periods.	Latitude observed south.	Longitude observed west.	DECOMPOSED EFFECT according to the Observations.				COMPOUND EFFECT				Reference to the Notes.	
			N. Miles.	S. Miles.	E. Miles.	W. Miles.	On the Course.	On the Rate of Sailing.	Duration of the Period.	Mean Drift in One Day.		
1791. February.												
From 15 to 16	18 53 20 01	35 56 37 06	.....	10	.....	24,5 or 14,0	W. 22° ½ S. or W. 36° S.	26,5 or 17,8	1	26,5 or 17,8	X.	
From 16 to 25	20 01 31 45	37 06 47 56	.....	67	.....	94,2	W. 36° S.	115,7	9	12,8	XI.	
From 25 to 26	31 45 32 30	47 56 48 23	.....	22	0	0	South.	22	1	22,	Ditto.	
From 26 to 8 <i>March</i>	32 30 36 48	48 23½ 48 06	80	.....	187,5	.....	E. 23° N.	204,0	10	20,4	XII.	
From 8 to 10	36 48 38 44	48 06 53 16	.....	39,0	.....	11,0	S. 20° ¾ W.	31,0	2	15,5	XIII.	
From 10 to 11	38 44 40 03	53 16 55 51	.....	38,0	.....	34,0	S. 42° W.	51,0	1	51,0	Ditto.	
From 11 to 12	40 03 40 48	55 51 56 28	4,0	.....	18,5	.....	E. 120° ½ N.	18,6	1	18,6	Ditto.	
From 12 to 13	40 48 40 59	56 28 57 45	23,0	.....	.....	0,76	N. 10° ½ W.	23,0	3	7,6	Ditto.	





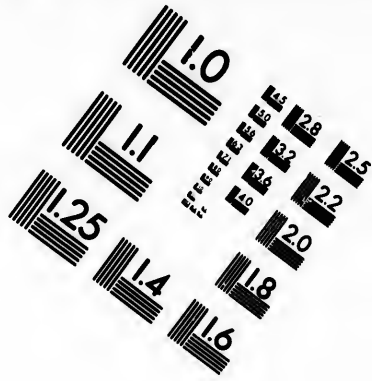


**IMAGE EVALUATION  
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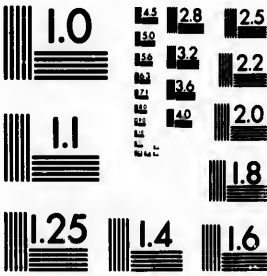


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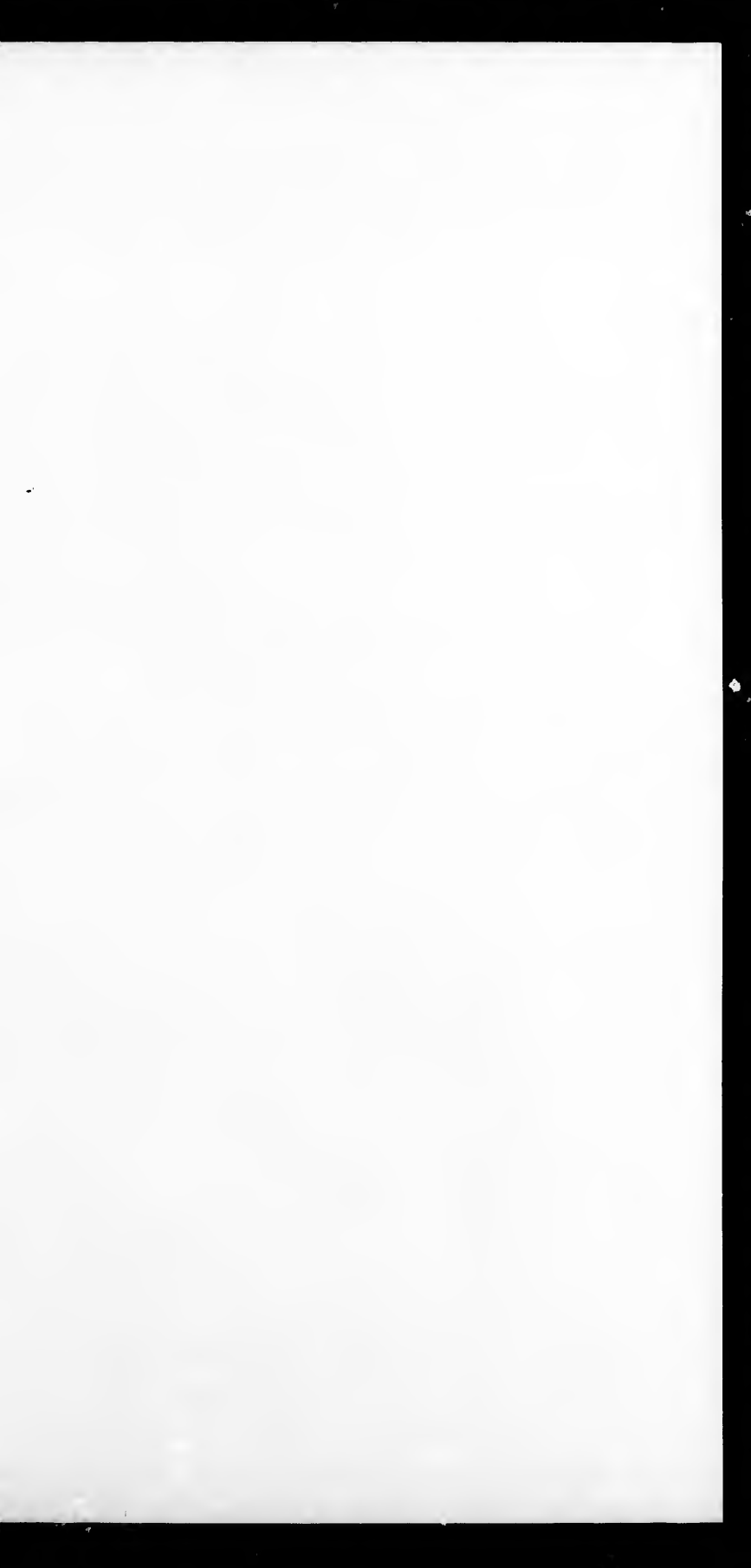


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# T H I R D R U N .

*From STATEN LAND to the MARQUESAS DE MENDOÇA.*

PERIODS.	Latitude observed SOUTH.	Longitude observed WEST.	DECOMPOSED EFFECT according to the Observations.				COMPOUND EFFECT.		Duration of the Period.	Mean Drift in One Day.	Reference to the Notes.
			N.	S.	E.	W.	On the Course.	On the Rate of Sailing.			
			Miles.	Miles.	Miles.	Miles.	Rumb.	Miles.	Days.	Miles.	Num.
1791.											
<i>In sight of Cape San-Juan.</i>											
From 8	53 56	66 08	28,0	68,6			E. 22° ½ N.	73,5	10	7,4	XX.
to 11	59 44	77 03									
From 11	59 44	77 03									
to 19	52 33	93 19			80,0	71,5	S. 41° ½ W.	107,5	8	13,4	XXI.
From 19	52 33	93 19									
to 25	46 02	95 46			17,0	0,65	S. 2° ½ W.	17,02	6	2,8	XXII.
From 25	46 08	95 46									
<i>May.</i>											
to 9	30 02	96 48									
From 9	30 02	96 48	15,0	93,0			E. 9° ½ N.	95,25	14	6,8	XXIII.
to 12	28 25	98 31			10,0	7,0	S. 34° ½ W.	12,2	3	4,0	XXIV.
From 12	28 25	98 31									
to 23	23 05	111 56			52,0	173,0	W. 16° ½ S.	180,5	11	16,4	XXV.
From 23	23 05	111 56									
to 27	19 32	116 34			26,0	54,0	W. 23° ½ S.	59,0	4	14,75	XXVI.



# FOURTH RUN.

*From the MENDOCA Islands to the NORTH-WEST Coast of AMERICA.*

Period.	Latitude	Longitude	DECOMPOSED EFFECT				COMPOUND EFFECT		Duration of the Period.	Mean Drift in One Day.	Reference to the Necess.
	observed SOUTH.	observed WEST.	N. Miles.	S. Miles.	E. Miles.	W. Miles.	On the Course.	On the Rate of Sailing.			
1791.	0 1	0 1	Miles.	Miles.	Miles.	Miles.	Rounds.	Miles.	Days.	Miles.	Numb.
At <i>Jan.</i>	<i>La Madre de Dios.</i>										
From 20 to 22	9 55 1/2 9 21	141 29 142 27	..... .....	..... .....	2,96 .....	..... .....	..... East.	..... 2,96	..... 1 1/2	..... 1,97	XXX. XXXI.
From 22 to 24	9 21 7 54	142 27 143 10	..... .....	6,9 .....	..... .....	6,9 .....	W. 41° S.	9,1	2	4,56	XXXII.

On correcting the error of the sand-glass which measured time while the log was measuring the ship's way through the water, we should have :

From 25 July to 20	SOUTH. 5 43 28 42	145 49 156 02	58,0	.....	45,0	N. 36° $\frac{1}{2}$ W.	72,3	25	2,9	Ditto.
From 20 to 23	28 42 32 10	156 02 154 25	11,0	.....	2,6	N. 150° $\frac{1}{2}$ W.	11,3	3	3,76	XXXV.
From 23 to 24	32 10 34 05	154 25 153 32	21,0	.....	1,67	N. 40° $\frac{1}{2}$ W.	21,0	1	21,0	XXXVII.
From 24 to 26	34 05 37 49	153 32 152 17	15,0	.....	13,6	N. 42° $\frac{1}{2}$ W.	20,25	2	10,12	XXXVII.
From 26 Aug <sup>st</sup> to 5	37 49 35 12	152 17 143 46	54,0	.....	43,9	N. 39° $\frac{1}{2}$ E.	69,25	10	7,0	XXXVIII.
From 5 to 7	55 12 57 18	143 46 139 26 $\frac{1}{2}$	25,9	.....	.....	North.	25,9	2 $\frac{1}{2}$	11,5	XXXIX.

At 6 P. M. at the Point whence  
Cape del Negro was lost.





# FIFTH RUN.

From 23 to 30	28 30 21 02	143 47 149 27	.....	3.0	18.0	.....	E. 10° S.	18.3	7	2.6	XLVIII.
From 30 October to 1	21 02 19 41	149 27 150 59	.....	5.0	0.93	.....	S. 10° ½ E.	5.1	1	5.1	XLIX.
From 1 to 3	19 41 19 14	150 59 155 07	.....	3.0	.....	7.53	W. 21° ½ S.	8.1	2	4.0	L.
From 3 to 4	19 14 19 06	155 07 157 10½	4.0	.....	.....	8.66	W. 24° ¾ N.	9.6	1½	8.2	LI.

At 4 P. M. on the meridian of the  
East point of *O. Wyber*.







to 20	13 32	179 41	.....	.....	5,8	W. 11°	5,8	1	3,0	
From 20 to 23	13 32 13 40	179 41 172 33	.....	.....	7,0	W. 6°	7,0	3	24,0	L.V.
From 23 to 2	13 40	172 33	3,0	.....	97,0	W. 10 3/4 N.	97,0	10	9,7	L.VI.
From 2 to 4	14 26 14 50	148 14 144 13	4,0	21,25	.....	E. 11° N.	21,75	2	10,87	L.VII.
From 4 to 16	14 50 21 34	144 13 122 06	21,0	.....	126,25	W. 9° 3/4 N.	128,0	12	10,66	L.VIII.
From 16 to 18	21 34 21 48	122 06 118 28	17,0	.....	3,72	N. 12° 1/2 W.	17,4	2	8,7	L.IX.
	In fight of the S. W. Point of the Island of <i>Romjofa</i> .									

## SEVENTH RUN.

*From MACAO to the Isle of FRANCE.*

*N. B.* For the effect of the *Currents*, I refer the Reader to the Narrative itself, under the dates of the 15th, 18th, 19th, and 25th of December, Vol. II, pages 144, 145, 148 to 157, 151 and following; and to *NORR L.X*, farther back, page 430.



# EIGHTH RUN.

*From the Isle of RÉUNION to ST. HELENA.*

From 12	35 00	21 49	17,0	.....	2,45	N. 80° $\frac{1}{2}$ W.	17,2	1	17,2	LXVII.
to 13	34 38	21 01								
From 13	34 38	21 01	3,0	.....	14,7	E. 120° $\frac{1}{2}$ N.	15,2	2	7,6	LXVIII.
to 15	35 19	19 57								
From 15	35 19	19 57	.....	9,0	1,6	S. 10° E.	9,2	1	9,2	LXIX.
to 16	35 44	17 47								
From 16	35 44	17 47	40,0	.....	56,5	W. 35° $\frac{1}{2}$ N.	69,3	9	7,7	LXX.
to 25	25 28	4 42								
From 25	25 28	4 42	35,0	.....	62,5	W. 27° $\frac{1}{2}$ N.	71,5	3	23,8	LXXI.
to 18	22 06	0 58								

(\*) See the *Narrative*, Vol. II, at the date of the 12th of May, 1792.



# EIGHTH RUN.

From the Isle of RÉUNION to ST. HELENA.

## 1. From the Isle of RÉUNION to the Coast of AFRICA.

PERIODS.	Latitude observed SOUTH.	Longitude observed EAST.	DECOMPOSED EFFECT according to the Observations.				COMPOUND EFFECT		Duration of the Period.	Mean Drift in One Day.	Reference to the Notes.
			N.	S.	E.	W.	On the Course.	On the Rate of Sailing.			
			Miles.	Miles.	Miles.	Miles.	Rumb.	Miles.	Days.	Miles.	Numb.
1792.											
April.		In sight of									
From 21	20 48	the Isle of Réunion.									
	27 11	53 08	.....	23,0	.....	115,5	W. 11° ½ S.	117,2	6 ¾	17,57	LXIII.
		42 44									
From 28	27 11	42 44									
	27 50	39 22	7,0	.....	.....	21,25	W. 18° ½ N.	22,25	1	22,25	LXIV.
From 29	27 50	39 22									
May		In sight of									
to 9	33 33	the Coast of Africa.	.....	73,0	.....	51,5	S. 35° ½ W.	89,3	10	9,0	LXV.
		25 57									

2. From within Sight of the Coast of AFRICA to the Island of ST. HELENA.

to 29	27 50	39 12	7,0	.....	21,25	W. 180° $\frac{1}{2}$ N.	22,25	1	22,25	LXIV.
From 29 May to 9	27 50	39 22	.....	73,0	51,5	S. 35° $\frac{1}{2}$ W.	89,3	10	9,0	LXV.
	In sight of the Coast of Africa.									
	33 33	25 57								

2. From within Sight of the Coast of AFRICA to the Island of St. HELENA.

From 9(*) to 12	33 33	25 57	.....	103,0	.....	147,4	W. 35° S.	180,0	3	60,0	LXVI.
From 12 to 13	35 00	21 49	.....	17,0	.....	2,45	N. 80° $\frac{1}{2}$ W.	17,2	1	17,2	LXVII.
	34 38	21 01									
From 13 to 15	34 38	21 01	.....	3,0	14,7	.....	E. 120° $\frac{1}{2}$ N.	15,2	2	7,6	LXVIII.
	35 19	19 57									
From 15 to 16	35 19	19 57	.....	9,0	1,6	.....	S. 10° E.	9,2	1	9,2	LXIX.
	35 44	17 47									
From 16 to 25	35 44	17 47	.....	40,0	.....	56,5	W. 35° $\frac{1}{2}$ N.	69,3	9	7,7	LXX.
	25 28	4 42									
From 25 to 18	25 28	4 42	.....	35,0	.....	62,5	W. 27° $\frac{1}{2}$ N.	71,5	3	23,8	LXXI.
	22 06	0 58									

(\*) See the *Narrative*, Vol. II, at the date of the 12th of May, 1792.

PAROISS.	observed SOUTH.	observed WEST.	according to the Observations.				On the Course.	On the Rate of Sailing.	the Period.	One Day.	the Notes.
			N. Miles.	S. Miles.	E. Miles.	S. Miles.					
1793. May. From 28	22 06.	EAST. 0 58 WEST.	.....	.....	.....	7.27	West.	7.27	1	7.27	LXXIII.
to 29	20 52	0 15	.....	.....	.....	.....	.....	.....	.....	.....	.....
From 29 to 30	20 52 19 13	0 15 1 43	6.0	.....	0.94	.....	N. 80 1/2 E.	6.1	1	6.1	LXXIII.
From 30 July to 3	19 13 In sight of St. Helena. 15 49	1 43 7 27	33.0	.....	.....	.....	North.	33.0	4	8.25	LXXIV.

NINTH AND LAST RUN.

From the Island of St. Helena to the Strait of Gibraltar and to Toulon

From 5 July to 10	St. Helena Road. 15 55 NORTH. 32 33	8 09 46 27	198,0	.....	160,0	N. 39° W.	255,0	344	7,6	LXXV.
From 10 to 13	32 23 41 42	46 27 34 32	350	.....	22,4	N. 32° E.	41,6	13	3,2	LXXVI.
From 13 to 24	41 42 41 42	34 32 32 18	.....	8,0	4,5	S. 29° E.	9,2	1	9,2	LXXVII.
From 24 to 27	41 42 41 13	32 18 25 32	.....	9,0	25,5	W. 19° S.	27,2	3	9,0	LXXVIII.
From 27 to 2	41 13 Cape St. Vincent.	35 32 Length of Cape St. Vincent.	.....	32,0	66,5	E. 25° S.	74,0	6	12,3	LXXIX.
From 2 to 4	From within sight of Cape St. Vincent, 37 03   11 31. to within sight of Cape Serrat, 5 P. M.   8 16	37 03   11 31 11 31	.....	30,0	.....	East.	30,0	12	17,5	LXXX.

For the Run from the STRAIT OF GIBALTRA to TOURON, where the Sloop anchored on the 14th of August, for the *Journal* of THE ROYAL.

{ Paris, 20th of Germinal, year V. of the French era.  
9th of April, 1797.

ADDITIONS



# ADDITIONS

TO THE

## RESULTS OF THE OBSERVATIONS

FOR THE

### LATITUDE AND LONGITUDE.

*For the Analysis of the general Chart of the two Straits situated between the Island of BANCA and that of BILLITON. (Farther back, Note LXII. pages 456 to 591\*).*

THIS Analysis had been printed several months, and the general Chart, as well as the particular Chart of the STRAITS, had been engraved, before I had an opportunity of procuring the new Edition (*London, 1791*) of a Memoir of GEORGE ROBERTSON, entitled: *A short Account of a Passage from China, &c.*† with the new Edition of his

\* We have thought that these Additions which, in the Original, are at the end of Vol. II. because they were not written till after the impression was completed, would with more propriety be placed at the end of the RESULTS OF THE OBSERVATIONS, to which they serve as a Supplement. — *Translator.*

† A short Account of a Passage from *China*, late in the season; down the *China Seas*, through the Southern *Natuna* Islands, along the Coast of *Borneo* through the Straits of *Billiton* (or *Clements' Straits*) to the Straits of *Sunda*, &c. 2nd Edition, *London. 1791. 4to.*

Chart and of his Plan of the same STRAITS, the first of which had appeared in 1788.

1. On examining the corrections which ROBERTSON has made in his copper-plates (for they are the same), it appears that he has entirely changed the part of the Island of BANCA, comprised between Point PESANT and the Point which he names the NORTH-EAST POINT, and which I have called the EAST Point of BANCA. He has placed on this portion of the east coast of the island, three small islands on which it is said that the VANSITTART was lost; and  $6\frac{1}{2}$  miles to the north-north east of the middle of these islands, Rocks or BREAKERS near which are found 6 fathoms water. Although his chart and mine give to these islands (which were not laid down in his first edition) positions which differ from each other; it appears, however, that they are the same that were set from the SOLIDE's anchorage in 14 fathoms: but ROBERTSON carries them nearer to the main land of BANCA than they appeared to be from the point whence the SOLIDE's bearings of them were taken. The new shoal which he lays down to the north-north-east of these islands, appears to be also one of the four between which the MASCARIN passed in 1773, and the SOLIDE in 1791, and part of which had been seen, in 1784, by the SULLIVAN.

2. ROBERTSON has added a shoal, under the

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name of VANSITTART Rock, which he places at the distance of 29 miles to the north-west of GASPAS Island, in latitude  $2^{\circ} 9'$ . I have, on my chart, a shoal seen by Captain CROZET in the MASCARIN in 1773 (Position doubtful) at the distance of 28 miles to the west-north-west of GASPAS: it appears that the distances are the same within a mile, but the bearings differ by two Points. The VANSITTART Rock is situated in the latitude of  $2^{\circ} 9'$  on ROBERTSON'S Chart, and that of CROZET is in  $2^{\circ} 9' 30''$ : the latitudes would therefore be the same, if we supposed that, on the English chart, the shoal was laid down according to an *observed* latitude, and that its position was not subjected by Bearings to that of GASPAS; for ROBERTSON having placed this island in  $2^{\circ} 30'$ , while the observations and the Charts of COOPER, WILSON, MARCHAND, CHANAL, &c. (farther back, pages 465 to 472) place it in  $2^{\circ} 21'$ , that is 9 minutes less to the southward, the same difference ought to be found in the latitudes of the shoal, if, in fact, the two shoals be the same: but if, in order to preserve this difference of 9 minutes which exists in this quarter, between ROBERTSON'S latitudes and those which I have thought it proper to prefer, CROZET'S shoal be carried on my chart to the latitude of  $2^{\circ} 0'$ , and the distance to GASPAS, if from 28 to 29 miles, common to the two charts, be employed, the shoal will be placed nearly to



the north-west of GASPAR, as on ROBERTSON'S chart.

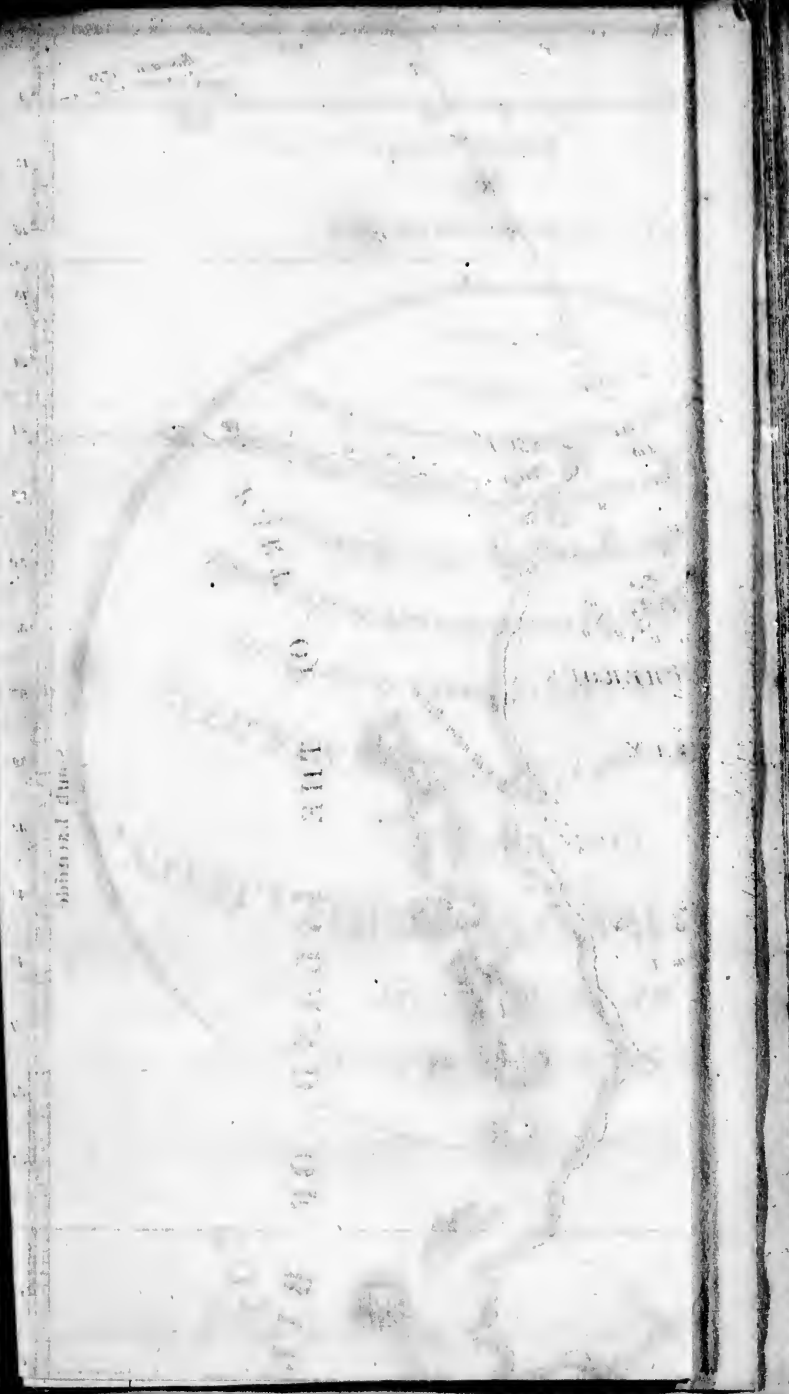
ROBERTSON confirms by a Note written on his chart, in the corrected part of the Coast of BANCA, what I have said (farther back, page 556), from the opinion of the Captain of the SULLIVAN, that in sailing along this coast, ships ought not to come nearer the shore than 15 fathoms.

The WARREN HASTINGS'S *Shoal*, which was not mentioned on ROBERTSON'S old Charts, is laid down on the Chart and the Plan of the second Edition; and it is placed, very nearly, in the position which I have assigned to it on my Chart, and which is very different from that which LARKINS, Captain of the WARREN HASTINGS, had given it on his: I have exposed at some length the trigonometrical operations that determined a change which had appeared to me indispensable. (Farther back, pages 474 to 481; and for the figure *PLATE VII.*)

3. Another correction, and this is the last which the new edition of ROBERTSON'S Chart and Plan presents, is the addition of a large rocky shoal or ledge, under the name of the VANSITTART'S SHOAL, situated (at its middle) to the south east by east of the SOUTH-EAST Point of the Peninsula of SEL and 17 miles from this Point. It is placed on my Chart, according to the bearings which are mentioned by ROBERTSON, in his *Short Account*

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View of the Mountain serving as a Land-Mark



S. 80° E.

Views of Gaspar Island taken from different directions



at 5 P.M.

at 4 P.M.

The Peak S. 30° E. and the Rock S.W. by W.

S. 30° E. at 10 o'clock and the Island S. by E. 3° E. 2 Leagues

N.E. by S. 3° E.

17°  
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15°  
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9°  
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86°  
87°  
88°  
89°  
90°  
South Latitude

Point Pesant or Tong Macoda

at 12 o'clock

at 11 o'clock

PART OF

OF

THE

ISLAND OF

BANCA

Point Bineer or Tong Rivet

Tanjong Brekat

Mountain serving as a Land mark

East Point of Banca

Remarkable Mountain

Ships Captains

Mountain serving as a Land-Mark taken from Point H.



S.E. 1/2 N.

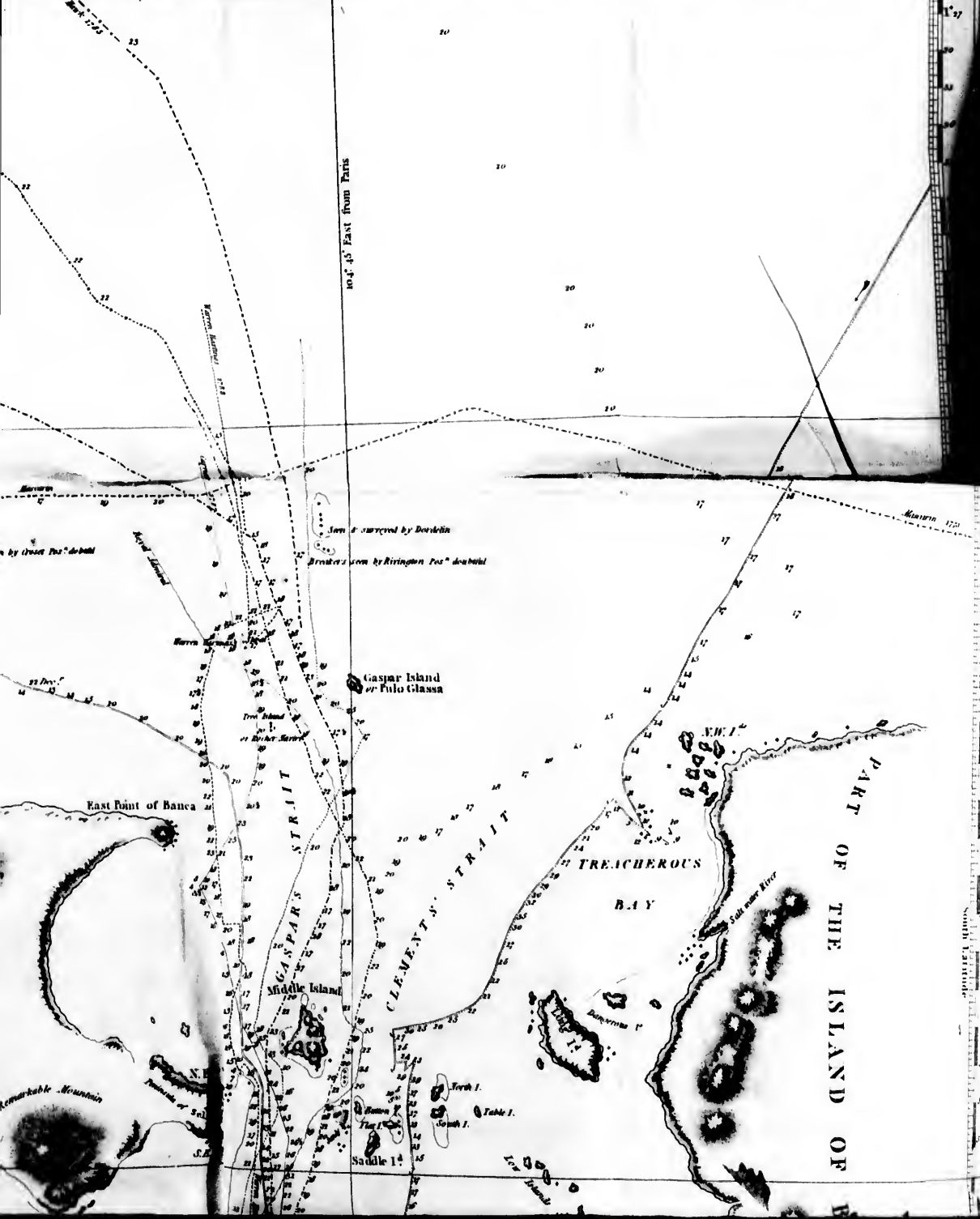
Island taken from different Points by Dordelin



View of the same Island by Marchand

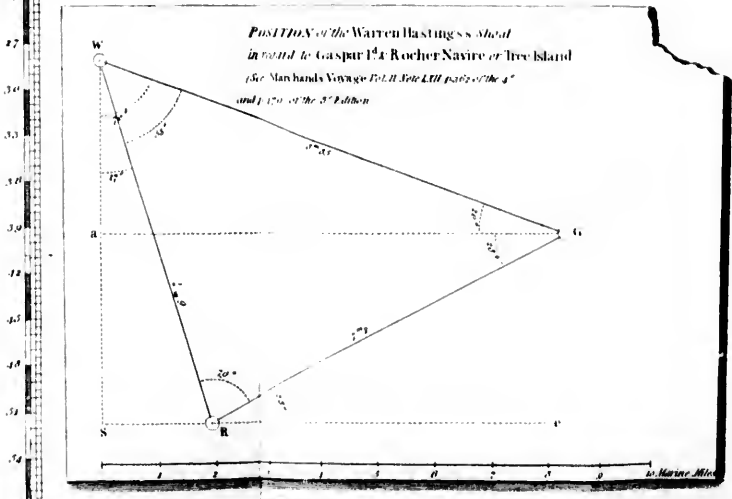


2 Leagues SE by S. 3/4 E. Distance 1 League SE by S. 2/3 N. SSE. taken from Point I.



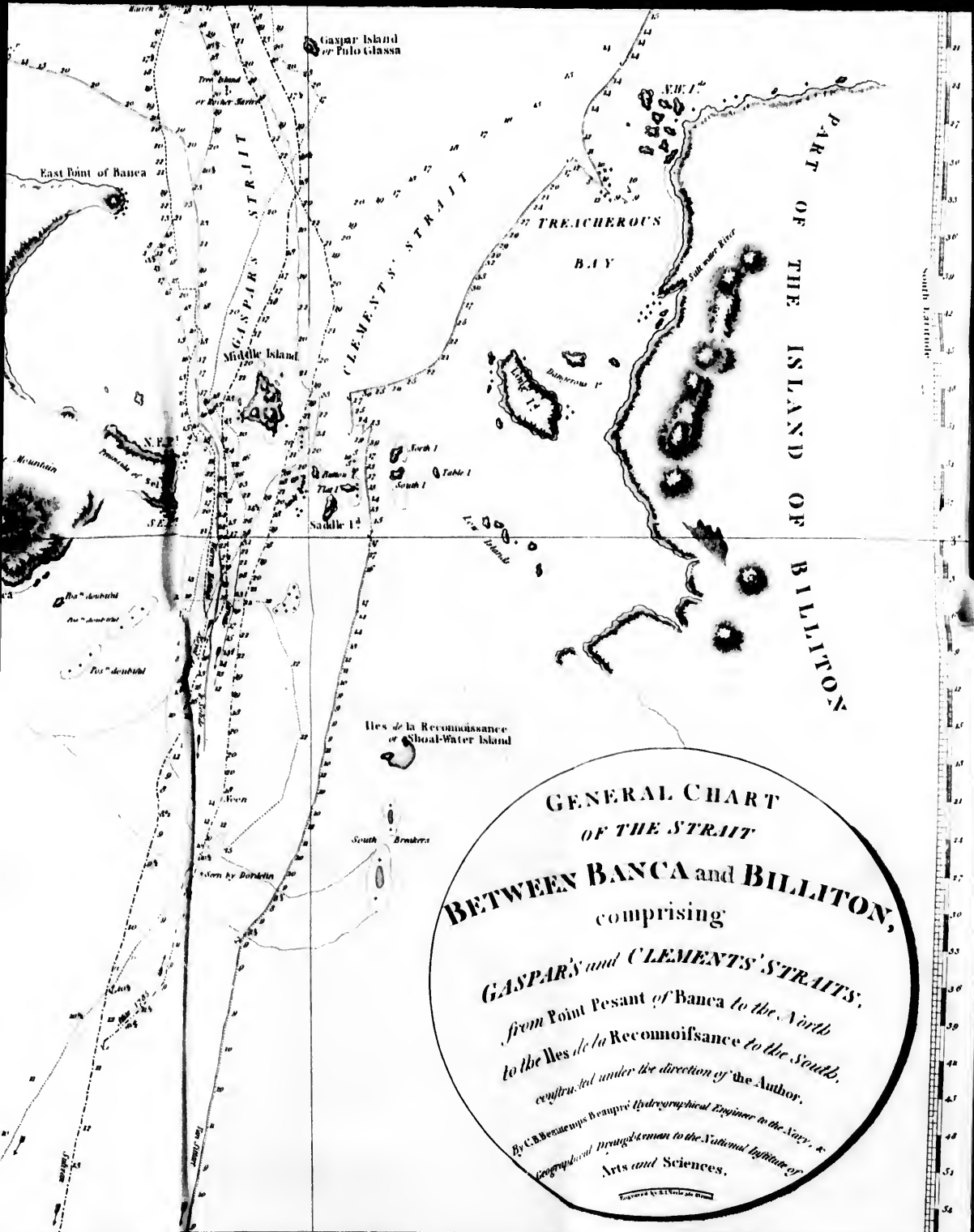


Ships	Captains
Mercurius	Crozet
Van Simar & Priten	Dorde-Bis
Sullivan	Step. Williams
Atlas	Cooper
Royal Admiral	
Pensborne	W Hammet
Hawk	Rob. Rivington
Giraffe	Wilson
Warren Hastings	Larkins
Le Solide	Marchand

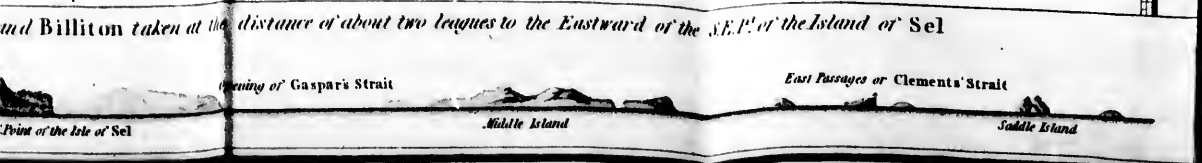


View of the South Entrances of the Great Strait between Banca and Billiton taken at the distance of 10 Miles





**GENERAL CHART**  
**OF THE STRAIT**  
**BETWEEN BANCA and BILLITON,**  
 comprising  
*GASPAR'S and CLEMENTS' STRAITS,*  
*from Point Pesant of Banca to the North*  
*to the Isles de la Reconnaissance to the South,*  
*constructed under the direction of the Author.*  
*By C.B. Beaufort Esqre Hydrographical Engineer to the Navy, &*  
*Geographical draughtsman to the National Institute of*  
**Arts and Sciences.**  
London: Printed at the Admiralty.



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&c. page 10. I cannot do better, for the information of French navigators, than present to them a transcript of it:

“ The bearings of this dangerous shoal are as follow \* :

“ 1. The Peak of SADDLE ISLAND (OR L'ILE AUX MAMMELLES) in one with the centre of the SHOAL North  $28^{\circ}$  east; at the same time SHOAL-WATER ISLAND (OR L'ILE DE LA RECONNOISSANCE) South  $43^{\circ}$  east;

“ 2. By another bearing, the South-west extreme of it bears in one with the Peak of SADDLE ISLAND, North  $33^{\circ} 15'$  east, SHOAL-WATER Island South  $45^{\circ} 50'$  east.

“ By these cross-bearings it lies south a little westerly from SANDY ISLAND (on my Chart, SANDY BEACH Island); and in latitude, according to Captain CUMMING,  $3^{\circ} 12'$  south †.”

For

\* The bearings were not taken by *Robertson* who does not more here than report them. It is very probable that the island the nearest to the Shoal was set; and on *Robertson's* Chart and Plan, this island would be his *Low Island*: for I have remarked (farther back, page 515) that he has transposed the names of the two islands to the south-east of the west group. But it appears beyond a doubt that it is of our *Ile aux Mammelles*, *Cooper's Saddle Island*, the southernmost of the two islands, that the bearing was taken, since the Peak is mentioned, which implies a second elevation, as in *Saddle Island*, and cannot be applied to a low, flat island. Moreover, whichever of the two islands *Robertson* meant, as they bear in one with each other, with respect to the position to be fixed, there is no error to be dreaded.

† *Robertson*, on his Chart, gives this latitude to the north extremity of the shoal; which places its middle in  $3^{\circ} 14'$  or  $15'$



&c. page 10. I cannot do better, for the information of French navigators, than present to them a transcript of it:

“ The bearings of this dangerous shoal are as follow \*:

“ 1. The Peak of SADDLE ISLAND (OF L'ILE AUX MAMMELLES) in one with the centre of the SHOAL North  $28^{\circ}$  east; at the same time SHOAL-WATER ISLAND (OF L'ILE DE LA RECONNOISSANCE) South  $43^{\circ}$  east;

“ 2. By another bearing, the South-west extreme of it bears in one with the Peak of SADDLE ISLAND, North  $33^{\circ} 15'$  east, SHOAL-WATER Island South  $45^{\circ} 50'$  east.

“ By these cross-bearings it lies south a little westerly from SANDY ISLAND (on my Chart, SANDY BEACH Island); and in latitude, according to Captain CUMMING,  $3^{\circ} 12'$  south †.”

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† *Robertson*, on his Chart, gives this latitude to the north extremity of the shoal; which places its middle in  $3^{\circ} 14'$  or  $15'$ ,

*For* CLEMENTS' STRAITS.

ROBERTSON, page 5 of his *Short Account*, adds a few remarks to those which I have mentioned (further back, pages 582 to 587) for the information of navigators who intend to pass through CLEMENTS' STRAIT.

“Of all the different passages between MIDDLE and LONG ISLAND,” says he, “that the fleet came through is by far the widest and best, and what I would advise ships to take, in preference to any other, between BANCA and BILLITON\* ;  
the

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and gives it about 6 miles extent. The middle is on my Chart in 3° 6'; but it has been seen that, in general, my latitudes are less southerly by 9 minutes, than those of *Robertson*. I have subjected the shoal to the bearings of the small islands of *Clements' Strait*, which I have mentioned above; and it is placed, on my Chart, according to the bearing and distance at which it is laid down on *Robertson's* Chart, relatively to *Sandy Beach* Island, without attending to *Cummings's* latitude: it is not mentioned whether this latitude was observed on the very parallel of the shoal, or whether it was obtained from a bearing reduced to the point where the observation was taken: however, what is of importance is to place it in the position which it ought to have in regard to the small islands that form the Passages of *Clements' Strait*; and this is what I have done.

\* I am entirely of *Robertson's* opinion when he says that, for ships which intend to take *Clements' Strait*, the best passage is between *North* and *South* Islands, on the east side, and *Saddle* Island and others on the west side; this is the passage of Captain *Clements*, and I think it preferable to that of the *Atlas*, Captain *Cooper*, and to that of the *Royal Admiral* (See their

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“ the Passage is between NORTH and SOUTH  
 “ Islands on one hand, and SADDLE Island, which  
 “ forms an appearance of a saddle both when  
 “ to the northward and southward of it, on the  
 “ other.

“ The best track to keep is mid-channel, or  
 “ nearly so, between the aforesaid islands, in or-  
 “ der to avoid a funken rock, which is about  
 “ the size of two long-boats, on which there is  
 “ only one half fathom, and no appearance of dan-  
 “ ger, five fathoms alongside of it, and eight,  
 “ nine and ten fathoms sand all round.” I have  
 given, (farther back, pages 485 and 586,) the de-  
 scription and the bearings of this Shoal such as they  
 are engraved on the Plan of CLEMENTS' STRAIT,

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tracks marked on the charts, which passed between *Sandy-  
 Beach* and *Button* Islands, and *Middle* Island); but I am not  
of *Robertson's* opinion, when he says that *Clement's Passage*  
should be taken in preference to any other between *Banca* and  
*Billiton*. I think that, if he had used *Gaspar* Strait, between  
*Middle* Island and *Banca*, as the *Sulivan*, Captain *Stephen*  
*Williams*, as the *Triton*, and the *Prevence*, Captain *Dordelin*,  
in coming from the southward, and afterwards, in going to the  
northward, as the *Carnatic*, Captain *Wilson*, the *Warren* *Haf-*  
*tings*, Captain *Larkins*, the *Solide*, Captain *Marchand*, &c. he  
would advise navigators to prefer *Gaspar's* Strait to all the  
Passages of *Clements' Strait*, whether they are coming from  
the northward, or the southward. I refer the Reader to what  
I have said of both in the *Analysis of my general Chart of the*  
*Straits between Banca and Billiton*.

published

published in 1786 by ALEXANDER DALRYMPLE : the bearings given by ROBERTSON differ not from those there mentioned.

“ It lies nearly north from the Reef that extends a mile and a half to the East of SADDLE ISLAND (which is FLAT ISLAND on my chart) : to the westward of that Reef there seemed deep water between the island and it. I know of no other danger in this track from TREACHEROUS BAY, it having been well explored by the boats of the fleet.”

ROBERTSON (page 6 of his Memoir mentions some remarks made by English Captains on others of the EAST PASSAGES, besides that through which CLEMENTS came out with his fleet.

The passage which opens between the group of the four western islands and MIDDLE Island, that is, between this last mentioned island and SANDY-BEACH, through which the ATLAS, the ROYAL ADMIRAL, &c. passed, is divided into two passages, namely, one between SANDY-BEACH and, the SHOAL \* situated to the northward of this small island between this SHOAL and MIDDLE Island. “ Captain COOPER,” says ROBERTSON,

\* This Shoal is that of which I have spoken (farther back, pages 583 and 584) on which Captain Cooper saw the water have a green colour, and the Portuguese Captain, in company with whom he was then sailing, told him that the sea was often seen to break in this quarter.

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" in going out to CHINA, in 1785, followed a  
 " Portuguese to the West of it: and Captain  
 " EASTERBROOKE, in coming home, came the  
 " same way; Captain HUDDART, homeward, in  
 " 1785, passed to the East. It is a very narrow  
 " passage, and consequently a more dangerous  
 " one, although good soundings and deep water,  
 " owing to the said SHOAL, on which the sea does  
 " not at all times break, and which was the case  
 " when these ships passed it; but it broke very  
 " high when the fleet passed (CLEMENTS' Fleet an-  
 " chored to the north-east and east-north-east  
 " of this shoal); and from where I took the bear-  
 " ings, seemed to block up the whole passage.  
 " I think, although these ships have gone that  
 " way, it is by no means to be preferred. The  
 " two small islands to the NORTH-EAST and SOUTH-  
 " EAST of MIDDLE Island were not seen to break,  
 " but they certainly *increase* the number of dan-  
 " gers in that track. Captain EASTERBROOKE ob-  
 " serves, the south-eastermost or small shoal is  
 " in one with GASPAN Island \*, bearing north half  
 " west;

\* This *south-eastermost Shoal* would be, on my Chart,  
 south  $\frac{1}{2}$  west of *Gaspar*, rather than south  $\frac{1}{2}$  east. It is probable  
 that Captain *Easterbrooke* deduced this bearing, and observed it  
 not: the distance of 10 leagues at which this *Shoal* is from *Gasp-*  
*par* admits not of this island being seen when you are near  
 enough to distinguish the place occupied by the shoal, which  
 does not always break, and which did not break when Captain  
*Easterbrooke*

“ west; and he advises keeping the large or MID-  
 “ DLE SHOAL on board in preference of being too  
 “ near the small ones, which cannot at all times  
 “ be so well *discovered* as the large one, which  
 “ when it don't break shews a strong rippling and  
 “ has but a few feet water on it.

“ Captain HUDDART observes, in his remark  
 “ of that passage, there are two dangerous shoals  
 “ to the eastward of MIDDLE Island, and scarce  
 “ two miles asunder, which renders it more diffi-  
 “ cult: I passed *between* them in 1788, but to  
 “ the eastward of both in 1785, which passage I  
 “ should always prefer as the safest, on account of  
 “ the strong currents that set athwart to the south-  
 “ eastward during the North-east monsoon, some-  
 “ times above three knots *per* hour.”

*Remarks on the course to be held on coming out of the  
 STRAITS, when bound to the southward, after  
 passing the parallel of the SOUTH-EAST POINT of  
 BANCA.*

The Reader has seen (farther back, pages 580  
 to 582) the remarks of LARKINS, WILSON, and  
 MARCHAND, respecting the depth of water and

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*Easterbrooke* passed. The relative bearings of *Middle Island*,  
*Gaspar Island*, the *East Point* and the *South-east Point of Banca*,  
 &c. such as they are given by the cross bearings of *Wilson*,  
*Marchand*, *Cooper*, &c. place the South-east part of *Middle*  
 Island south  $\frac{1}{2}$  west from *Gaspar*, and not south  $\frac{1}{2}$  east.

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the quality of the ground to the southward of the Straits, to these we may add those mentioned by ROBERTSON in his *Short Account*, Pages 5 and 6,

“ From SADDLE ISLAND, steer down;” says he, “ for the two small islands called BREAKER Islands, in my Chart (by some called SHOAL-WATER Island) keep to the westward of them: “ *they* are distant from SADDLE Island about six “ or seven leagues, and bear nearly south from it “ (south by east on his chart).

“ In following this route, you leave to the “ westward the VANSITTART’S Shoal, the only known danger in this quarter.”

After having passed beyond the parallel of the southern extreme of the Shoal, “ we met with “ nothing particular,” continues ROBERTSON, “ in “ our run to the southward, except the two shoals, “ which are to the southward of BREAKER Islands, “ on the southernmost of which is a small dry “ white sand, distant nearly ten miles from the “ islands; I make no doubt but they are the south- “ ernmost shoals that surround BILLITON on that “ side.”

I refer the Reader to what I have said farther back (pages 442 and 544) of another SHOAL seen by DORDELIN, in 1784, which appears to be situated 14 miles to the westward of the middle of the southernmost of the two preceding Shoals.

“ We found all along good regular soundings,” says

the

says ROBERTSON : " eight fathoms was the least  
 " water when to the south-west of the southern-  
 " most Shoal, which bank runs across to the north-  
 " west with eight and seven fathoms upon it, sand  
 " and ouze, until it joins FOUL POINT Bank \*  
 " to the southward of BANCA ; which may be  
 " observed upon the Chart by the soundings of  
 " the different ships' tracks ; it then gradually  
 " deepens to 13 fathoms, to within sight of the  
 " NORTH WATCHER, whose latitude I make  
 "  $5^{\circ} 12' 30''$  south, bearing from BREAKER ISLANDS  
 " south  $24^{\circ}$  west 124 miles."

The following remarks particularly concern  
 ships that are come out of the CHINA SEA by  
 GASPAR STRAIT.

" Having got to the southward of MIDDLE  
 " Island," says ROBERTSON, (page 10 of his *Short*  
 " *Account*), pass the SOUTH-EAST Point of BAN-  
 " CA at a moderate distance, and keep a southerly  
 " course, so as not to get to the westward of  
 " the SOUTH-EAST Point of BANCA, until you  
 " lose sight of the low land of the coast which  
 " joins the hummocks, that is to say, when the  
 " south coast of BANCA appears like separate  
 " islands, you are then far enough to the south-  
 " ward, and may haul as much westerly as neces-

\* This is the name which *Robertson* gives to the whole of  
 those shoals, breakers, &c. which are situated to the South-east  
 of the South Point of Banca.

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“fary. In the next place, great care must be taken to avoid the VANSITTART’S Shoal, which lies to the eastward of this track, and to the southward (or rather to the south by east) of MIDDLE Island. To keep clear of this shoal, steer a course so as to keep MIDDLE Island always a little to the eastward of north, which will carry you wide of it to the westward.

“Having passed these dangers, a south-south-west course made good, will carry you up to the BROTHERS, the northernmost of which lies in latitude  $5^{\circ} 9'$  south, and bears from MIDDLE Island south  $23^{\circ}$  west, about 50 leagues. “I know of no other danger in these tracks,” adds he, “so that the same caution is necessary to be observed in going to the northward as here described in sailing from the northward.”

*Remarks on GASPAR’S STRAIT.*

Although ROBERTSON never passed through GASPAR STRAIT OF THE WEST PASSAGE, yet he gives some hints (taken, no doubt, from the journals of his countrymen) respecting the precautions which are to be taken by ships coming from the northward and bound through this Strait.

“If coming from the northward or AURO Islands with an intent of passing through the GASPAR Strait,” says he, (page 8 of his Memoir) “get sight of PULO TOTY, whose latitude

“fary.

“is

" is  $0^{\circ} 58'$  south; pass it to the east, and steer  
 " down for GASPAR Island; taking care not to  
 " come nearer to the BANCA shore than 16 fa-  
 " thoms. GASPAR bears from PULO TOTY south-  
 " east distance about 40 leagues, the fair way  
 " soundings between them is 17 and 18 fathoms,  
 " which is a very good guide to go by at night  
 " or in thick hazy weather; however, I would  
 " advise by no means to come nearer GASPAR  
 " in the dark than 7 leagues, which will keep you  
 " perfectly clear of the shoals to the northward of  
 " it, on which the BELVIDERE and WARREN  
 " HASTINGS struck\*.

" The BELVIDERE'S Shoal was first seen by  
 " the SULLIVAN, HAWKE, and PONSBORNE, 1784,  
 " 1785; GASPAR Island bears from south-south-  
 " east 4 or 5 leagues, and the NORTH-EAST Point  
 " (the EAST POINT on my Chart) of BANCA,  
 " south by west  $\frac{1}{2}$  west distance about 7 leagues."

I know not from what journal ROBERTSON has  
 taken the preceding bearings, but I have men-  
 tioned (farther back, page 365) those which were

\* It seems to me that this is a very incorrect expression, which  
 may lead navigators into an error, to say in general terms that  
 the Shoals are to the northward of *Gaspar*; for the middle of  
 the *Warren Hastings's* Shoal lies west-south-west from that island,  
 and thus it is that *Robertson* himself has laid it down in the new  
 edition of his Chart and of his Plan: and the *Belvidere's* shoals,  
 as he himself is going to tell us, is situated to the north-north-  
 west of *Gaspar*.

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\* Extract  
 Rivington.—  
 Dalrymple :  
 page 28.

taken by the **SULIVAN**, such as I have found them in her original Journal, published by Mr. **DALRYMPLE**. Those of the **HAWKE**, likewise taken from the Journal of that ship are as follows \* :

- 1785, Jan. 16, at 5 P. M.  
 " Saw the north-east part of **BANCA** (its East Point)..... S. W. 4 leagues.  
**GASPAR** Island ..... S. S. E.  $\frac{1}{2}$  E. 3 leagues.  
**BREAKERS** on Larboard quarter ..... N. E. 2 leagues.  
**BREAKERS** on the beam.. E. by N. 1 league."

In the position in which the **HAWKE** was, having **GASPAR** north-south-east half east distant 3 leagues, the *Breakers* which Captain **RIVINGTON** saw on the larboard quarter, 2 leagues to the north-east, appear to me, beyond a doubt, to be the same as those which **DORDELIN** had seen, and along which he had ranged throughout their whole length, (farther back, page 482).

As to the *Breakers* which the **HAWKE** had at the same time on her beam, east by north 1 league, I do not believe that they have been seen by any other ship; and I have determined to suppress those which are indicated in the Journal of the Su-

\* Extract from the Journal of the *Hawke*, Captain *Robert Rivington*.— See Collection of *Memoirs* published by *Alexander Dalrymple*: *Appendix to Memoir of Chart of Sunda and Banca*, page 28.

SULIVAN, and which I had announced (farther back, pages 485 to 487) as proper to be preserved on my Chart: for the *Breakers* of the SULIVAN, if they are not those of DORDELIN, might be the *Breakers* seen on the HAWKE's beam, with which they are confounded: the distance at which the SULIVAN was in regard to GASPAR is the same as that of the HAWKE, and the bearing differs only by about a point.

The bearings of the PONSBORNE which failed in 1785, in company with the HAWKE, make no mention of *Breakers* \*: were they not seen from the PONSBORNE while they were set by the HAWKE? This is very possible, if the *Breakers* did not break, or broke but little, and if the PONSBORNE was farther from them than the HAWKE.

I resume ROBERTSON'S remarks respecting the shoals against which it is necessary for the navigator to be on his guard, if he intends to pass through GASPAR Strait, in coming from the northward.

“ The WARREN HASTINGS'S Shoal,” says he, “ was first seen by the HAWKE, in 1785†. The  
“ bearings

\* Same Collection, same *Appendix*, page 25.

† I know not whether *Robertson*, in saying that the *Warren Hastings's* Shoal had been seen, in 1785, by the *Hawke*, means that this is one of the *Breakers* which this ship had set on the 5th of June at 5 P. M.; but it has just been seen above, that one of these shoals of the *Hawke* appears to be the same as the

*Breakers*

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*Breakers* of  
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seen a shoal.

"bearings of the land from where the HASTINGS  
"struck, is;" viz.

These are the same that I have reported farther  
back (Page 474) Column from LARKINS's Jour-  
nal; but, if ROBERTSON, in order to laying down  
this Shoal in the new edition of his Chart and of  
his Plan of the STRAITS, has made use of the  
distances given in this Journal, and which he has  
copied into his Memoir: namely, 6 miles from  
GASPAR; 9 miles from TREE Island; I am at a  
loss to conceive how he can have assigned to it a  
position which differs very little from that I give it  
according to the result of my trigonometrical ope-  
rations, which carries the distance from GASPAR  
to 8.85 miles, and that from TREE Island to 6.7  
miles (farther back, page 491).

ROBERTSON continues: "The BELVIDERE'S  
"Shoal and this were both seen to break, when  
"the HAWKE and PONSBORNE passed, but suppose  
"they were not in that state when the above ships  
"grounded: these shoals are in general coral rock  
"and steep to."

I shall take the liberty of making two observa-  
tions on this passage of ROBERTSON:

I. It has appeared to me that the BELVIDERE'S

*Breakers of Dordelin*; and that the other is to be found in a  
position where it does not seem that any other vessel has ever  
seen a shoal.

Shoal and that of the WARREN HASTINGS are but one and the same shoal (farther back, pages 492 and 493).

2. I did not know that the BELVIDERE had grounded on the shoal that is mentioned in the Extract from her Journal which I took from the *Memoirs* published by ALEXANDER DALRYMPLE (farther back, page 491): it is there mentioned that "the BELVIDERE being *at anchor* in 10 fathoms, GASPAR east-south-east  $3\frac{1}{2}$  leagues, TREE Island south by east, had the *Shoal* about a cable's length distant, north-north-east and south-south-west from the ship, &c." But it is not said that the BELVIDERE grounded on this shoal; it is even said that she was *at anchor* in 10 fathoms water when she discovered it. This is the case with another *Shoal* which she discovered, when at anchor in 16 fathoms, at the distance of 12 miles to the west-north-west of GASPAR; and which I presume to be the northern part of the WARREN HASTINGS's Shoal (farther back, page 492); but it is not said that she grounded on either of the shoals of which she took the soundings.

ROBERTSON, still in the supposition that the BELVIDERE and the WARREN HASTINGS saw two different Shoals, which I believe to be the same, interrupted, perhaps, by channels where a great depth of water is found (farther back, pages 492 and 493) adds:

" Having  
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 " south-east  
 " between it  
 " also the  
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“ Having got sight of **GASPAR** Island, steer  
 “ down for it, keeping it to the eastward of south-  
 “ south-east to avoid the **BELVIDERE**'s Shoal, go be-  
 “ tween it and **TREE** Island, taking care to avoid  
 “ also the **WARREN HASTINGS**'s Shoal, or pass  
 “ **TREE** Island to the West, as occasion offers ;  
 “ there is 20 fathoms to the West of it, and I  
 “ should think it is the best track as both the  
 “ **WARREN HASTINGS**, and **BELVIDERE**'s Shoals  
 “ are, in that case, left on the east.”

On account of the reputation of **Mr. ROBERTSON** and the numerous researches that he has made for constructing his Chart and his Plan of the **STRAITS**, I have thought it my duty to report his opinions respecting the tracks to be followed in standing for **GASPAR**'s Strait, when coming from the northward although, not having himself frequented this track, he cannot instruct us here from his own experience. For more ample directions, I refer the Reader to the general remarks on making the land in coming to the Straits from the northward and on the navigation in **GASPAR**'s Strait or the **WEST PASSAGE**.

For the rest, I am of opinion that when navigators shall have compared what is said, on the one hand, of **GASPAR**'s Strait, with what is said on the other of **CLEMENTS**' Strait, they will not hesitate to prefer the former whenever the wind

and tide shall leave them the option. (*See farther back, pages 148 to 150.*)

PARIS, the 15th of Prairial, Year VII.  
(3rd of June, 1799.)

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\* For the  
 a translation  
 M. Fleurieu,  
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NOTE



See far-

ear VII.

## NOTE

### FOR THE STRAITS TO THE EAST OF BANCA\*.

“ IN making known to me, Sir, the new chart  
“ which Captain WILSON has constructed of  
“ the Strait to the EAST of BANCA, and the new  
“ Memoir which Mr. DALRYMPLE has published,  
“ you ask me whether I have any thing to add  
“ to the Analysis of the Chart of the same Strait,  
“ that I have placed at the end of the Narrative  
“ of MARCHAND'S Voyage, which you honour  
“ me by translating. You have been enabled to  
“ judge from the result of my labour, that I had  
“ no knowledge either of the Chart or of the  
“ Memoir which you have been so good as to  
“ address to me: I should certainly have made  
“ use of them, and the former Chart which  
“ Captain WILSON had published, had given me  
“ too high an opinion of his knowledge and ta-  
“ lents, not to have been anxious to employ  
“ his new observations which afford a degree of  
“ correctness still superior to that which had made  
“ me distinguish his preceding ones.

\* For the satisfaction of the nautical reader, we here give a translation of a letter which, we have lately received from M. *Fleurieu*, in answer to one accompanying Captain *Wilson's* last Chart of the Strait to the east of *Banca*.—*Translator*.

NOTE

“ On examining my Chart, as if it were the  
 “ work of another, and on comparing it with the  
 “ new chart of Captain WILSON, the follow-  
 “ ing are the principal remarks which have pre-  
 “ sented themselves to my mind :

“ 1. Latitude of GASPARD Island, which Cap-  
 “ tain WILSON designates on his new chart, by  
 “ the name of PULO GLASSA.

“ It has been seen (page 470 and 471 of this  
 “ Volume) that I had thought that, although  
 “ we had a rather considerable number of ob-  
 “ servations for the latitude of that island, it did  
 “ not appear that we were able to determine  
 “ it with exactness. I have pointed out the rea-  
 “ sons which had decided me to fix on  $2^{\circ} 21'$  :  
 “ This is the latitude which had been con-  
 “ cluded from the observations of the SOLIDE,  
 “ made on the very parallel of the island, and  
 “ at one of the periods of the year the most  
 “ favourable; at the very period of the solstice,  
 “ Captain WILSON had observed it  $2^{\circ} 21'$ , and  
 “ made it  $2^{\circ} 20'$  on his former chart (mean  $2^{\circ}$   
 “  $21'$ ). DORDELIN, in 1784, in going to CHINA,  
 “ had observed  $2^{\circ} 21' 15''$  : Captain COOPER'S  
 “ chart gives  $2^{\circ} 21'$  : At this day, Captain WIL-  
 “ SON, according to his new observations, carries  
 “ it to  $2^{\circ} 25' 35''$  (difference with respect to the  
 “ latitude observed on board the SOLIDE,  $4' 35''$ ).  
 “ Will not subsequent observations again change

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" this determination?—I need not say that, what-  
 " ever may be the latitude admitted for GASPAR  
 " Island, it must affect that of all the points  
 " which have been or shall be subjected to it.  
 " —It appears that the latter observations of  
 " Captain WILSON were made in the month of  
 " August, which is not the period of the year  
 " the most favourable, if he did not make use of  
 " the meridian altitudes of the sun.

" 2. Longitude of GASPAR Island.

" As for the longitude of that island, I had  
 " from calculations (page 474 of this Vol.) made  
 " it  $104^{\circ} 45'$  east from PARIS, or  $107^{\circ} 5' 15''$  east  
 " from GREENWICH. It is seen in the Memoir of  
 " Mr. DALRYMPLE, relative to the latter opera-  
 " tions of Captain WILSON (Page XII. of the  
 " Memoir) that this navigator has likewise made  
 " it from his observations and his chronometers,  
 "  $107^{\circ} 5' 15''$ .

" 3. The position of the Shoal situated to the  
 " north-west by west of GASPAR Island, which  
 " had been seen or reconnoitred for the first  
 " time, in 1784, by DORDELIN, and which Cap-  
 " tain WILSON at this day names the BELVIDERE'S  
 " SHOALS, seems to require a verification. The  
 " French navigator who saw at the same time the  
 " *Rock which does not appear above water* (on the  
 " northern part of the shoal), and GASPAR Island,  
 " places

“ places this rock to the north  $10^{\circ}$  west and at  
 “ the distance of 17 miles from GASPARD Island:  
 “ According to Captain WILSON's new Chart,  
 “ the bearing should be north  $16^{\circ}$  west, and the  
 “ distance  $14\frac{1}{2}$  miles.

“ 4. The *Breaker* which I have marked *seen by*  
 “ RIVINGTON (commander of the HAWKE) *po-*  
 “ *sition doubtful*, might be the south part of DOR-  
 “ DELIN's Shoal (the BELVIDERE's Shoal). It  
 “ is well known that these sorts of overfalls or  
 “ quays, formed by coral rocks, and steep to,  
 “ leave clear passages between their most elevated  
 “ parts: it is possible that DORDELIN and RI-  
 “ VINGTON may have passed between two por-  
 “ tions of the large *Shoal*, separated by a chan-  
 “ nel. But, as it would be highly imprudent for  
 “ a navigator to entangle himself voluntarily in  
 “ these passages, even were they well known, on  
 “ the chart is comprised in the same enclosure *not*  
 “ *navigable*, the space of sea occupied by the  
 “ whole of the group composed of scattered  
 “ *Breakers*.

“ 5. The *Breakers* which I have marked *seen*  
 “ *by* CROZET, *position doubtful*, can be no other,  
 “ methinks, than those on which the VANSITTART  
 “ was lost. The position which Captain WIL-  
 “ SON assigns to them on his new Chart, must  
 “ be preferred, without hesitation, to the doubtful

“ position,  
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 “ shoal, ha  
 “ 8. It has  
 “ Vol.) wh  
 “ adopt the  
 “ MIDDLE  
 “ the NORT  
 “ SEL, such  
 “ his form  
 “ Point nor  
 “ at the di  
 “ bearings

position, which had been indicated to me only  
 " from the line of CROZET's track, which is simply  
 " marked on one of D'APRÈS' charts.

" 6. The *four Breakers* between which the SOLIDE passed, and which had been seen antecedently by CROZET, commander of the MASCARIN, are not comprised in the space of sea which the new chart of Captain WILSON has represented: if this able navigator had had an opportunity of examining them, he would have been enabled to verify their situation, relatively to the EAST point of BANCA and GASPARIAN Island.

" 7. The new chart confirms the position which I had given to the WARREN HASTINGS'S SHOAL, different from that which Captain COOPER, who had remained aground for several hours on this shoal, had assigned to it on his chart.

" 8. It has been seen (pages 506 and 508 of this Vol.) what motives had determined me not to adopt the position of the SOUTH-WEST point of MIDDLE or PASSAGE Island, with respect to the NORTH-EAST point of the PENINSULA OF SEL, such as Captain WILSON had fixed it from his former operations, namely SOUTH-WEST Point north  $74^{\circ}$  east of the NORTH-EAST point, at the distance of six miles and a half. The bearings taken on board the SOLIDE, and the series

" series of my trigonometrical operations had led  
 " me to give for the bearing north  $56^{\circ}$  east, and  
 " the distance is likewise  $6\frac{1}{2}$  miles. On the new  
 " chart, the bearing is north  $65^{\circ}$  east (that is  $9^{\circ}$   
 " less than on the old one) and the distance there  
 " is carried to  $8\frac{1}{2}$  miles. I am disposed to believe  
 " that Captain WILSON is in the right; but I  
 " observe that no inconvenience can arise from a  
 " chart representing a passage *narrower* than it  
 " really is: the contrary defect would present a  
 " danger.

" 9. Captain WILSON marks *three* islands of the  
 " gulf: they were only two in number on his old  
 " chart and on others, and the SOLIDE saw but  
 " *two*: but this difference deserves little atten-  
 " tion; navigation does not extend into the gulf  
 " where they are situated.

" 10. It does not appear to me doubtful, from  
 " the latter operations of Captain WILSON that  
 " SADDLE Island (ILE AUX MAMMELLES) is *more*  
 " *to the northward* and more to the eastward than  
 " FLAT or LOW Island, a relative position which  
 " G. ROBERTSON had given to those islands on  
 " his Plan. I had been justified in believing that  
 " the names had been interchanged on this plan,  
 " because DORDELIN and COOPER (page 389 of  
 " this volume) who had both entered into the  
 " Strait by the southward, had, both, placed L'ILE

AUX

" AUX MA  
 " southward  
 " or Low I  
 " 11. Or  
 " a few isla  
 " in the fa  
 " south poi  
 " point of  
 " point of F  
 " DLE Island  
 " These bea  
 " well as tho  
 " sitions of t  
 " east of M  
 " respect to  
 " island.  
 " 12. SAND  
 " on the new  
 " ern island o  
 " the distance  
 " Captain  
 "  $2^{\circ} 59' 40''$ :  
 "  $20''$ —differ  
 " ference of 4  
 " ing the latit  
 " results that  
 " islands is evi  
 " 13. It has  
 " lume) that

“ AUX MAMMELLES (SADDLE Island) more to the  
 “ *southward* and more to the westward than FLAT  
 “ or Low Island.

“ II. On WILSON'S new chart are seen lines of  
 “ a few islands *in one* with each other: he has set  
 “ in the same direction (east  $21^{\circ} 30'$  north) the  
 “ south point of SOUTH Island, the north-east  
 “ point of SADDLE Island, and the north-west  
 “ point of FLAT Island, the south point of SAD-  
 “ DLE Island, and the middle of TABLE Island.  
 “ These bearings are worthy to be preserved, as  
 “ well as those by which he fixed the relative po-  
 “ sitions of the small islands situated to the south-  
 “ east of MIDDLE or PASSAGE Island, both with  
 “ respect to each other and in regard to the large  
 “ island.

“ 12. SANDY BEACH or SANDY Island, is placed  
 “ on the new chart with respect to the most south-  
 “ ern island of the group, in the bearing and at  
 “ the distance which I had assigned to them.

“ Captain WILSON places SANDY BEACH in  
 “  $2^{\circ} 59' 40''$ : this island is on my chart in  $2^{\circ} 55'$   
 “  $20''$ —difference  $4' 20''$ —but as we have a dif-  
 “ ference of  $4' 35''$  in the same direction, respect-  
 “ ing the latitude of GASPARD Island, it thence  
 “ results that the difference between the two  
 “ islands is evidently the same on the two charts.

“ 13. It has been seen (page 483 of this vo-  
 “ lume) that I had no knowledge of the large  
 “ shoal,

“ shoal, called the VANSITTART'S SHOAL, and  
 “ situated to the south of MIDDLE Island, but  
 “ from the second edition of the Plan and Me-  
 “ moir of G. ROBERTSON who places the northern  
 “ part of it 4 or 5 minutes more to the south-  
 “ ward than the most southern islands: but, on  
 “ the new chart of Captain WILSON, who was not  
 “ acquainted with this shoal at the period of his  
 “ former operations in the Strait, the northern  
 “ part of the VANSITTART'S Shoal is not 2 mi-  
 “ nutes more southerly than the most southern  
 “ part of the Group: it occupies, besides  $6\frac{3}{4}$  miles  
 “ in latitude, by  $4\frac{3}{4}$  in longitude: its position  
 “ must be fixed according to the new bearings:

“ 14. Captain WILSON'S last chart presents  
 “ sets of soundings extremely interesting to the  
 “ southward of the south coast of BANCA, a por-  
 “ tion of sea respecting which we had as yet no  
 “ satisfactory detail. His labour in this part  
 “ proves, as I had thought, that after having  
 “ got clear of the land, at the southern outlet of  
 “ the Strait, you must not endeavour to make  
 “ southing and westing, before you have reached  
 “ the latitude of three degrees and a half.

“ 15. I had taken the liberty (page 485 note \*  
 “ of this volume) to combat the opinion of G.  
 “ ROBERTSON, who says that CLEMENTS' Strait is  
 “ preferable to all others between BANCA and  
 “ BILLITON, and I had claimed the preference

“ for

“ for GA  
 “ present  
 “ pears th  
 “ doubt, f  
 “ selves p  
 “ Instructi  
 “ WILSON  
 “ DALRYM  
 “ operation  
 “ GASPAR'



" for GASPAR'S PASSAGE which the English at  
 " present call MACCLESFIELD'S Passage; it ap-  
 " pears that the English East-India Company, no  
 " doubt, from the advice of their captains, them-  
 " selves prefer it for their ships; for, in the  
 " Instructions which they had given to Captain  
 " WILSON, and which were drawn up by Mr.  
 " DALRYMPLE, the principal object of all the  
 " operations pointed out was the exact survey of  
 " GASPAR'S PASSAGE."

PARIS, 23rd of Germinal. Year IX.  
 (13th of April 1801.)

JOURNAL







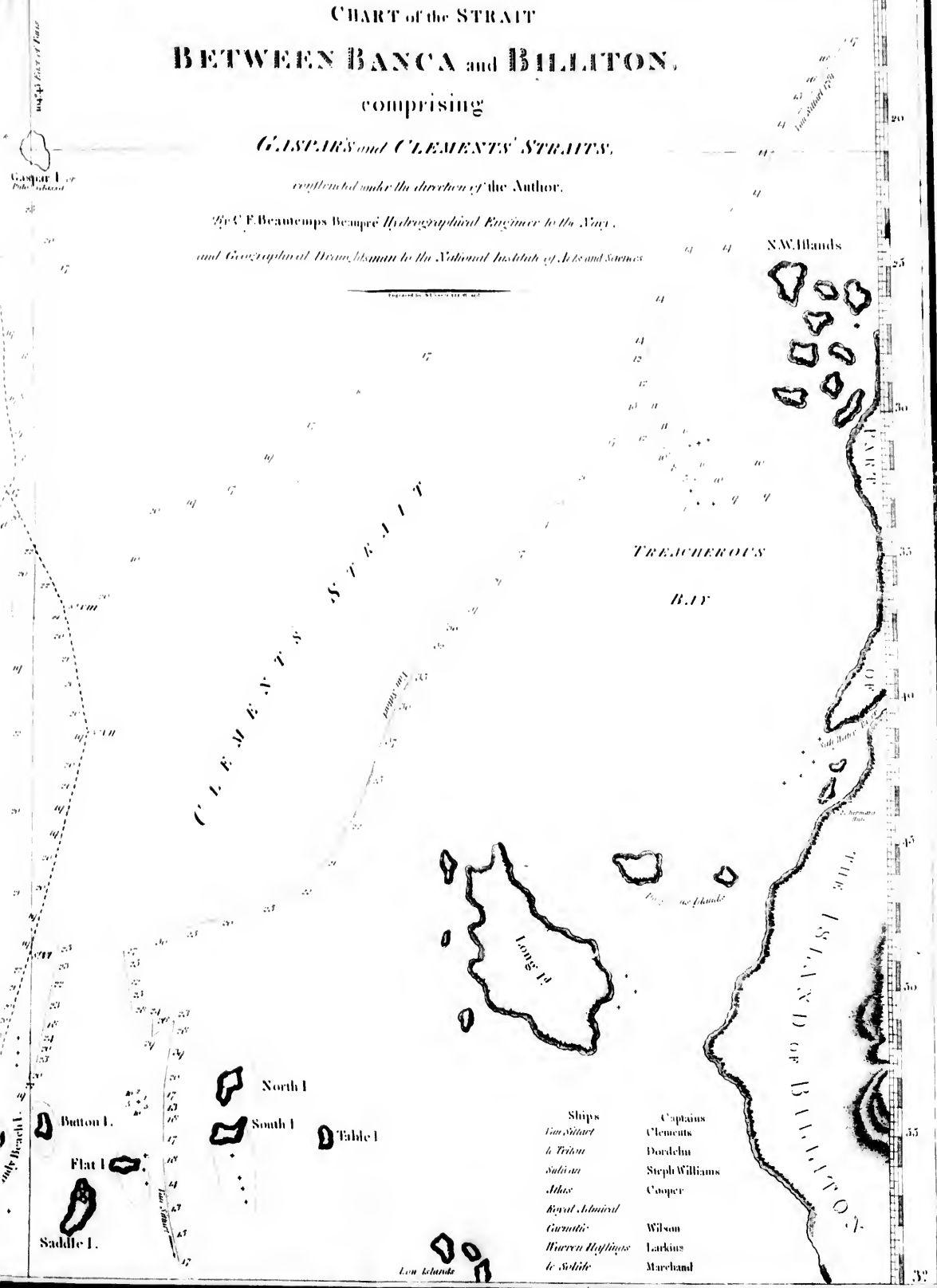
# CHART of the STRAIT BETWEEN BANCA and BILLITON, comprising

*GASPERS' and CLEMENTS' STRAITS,*

*compiled under the direction of the Author,*

*By C. F. Beantemps Beaupré Hydrographical Engineer to the Navy,*

*and Geographical Draughtsman to the National Institute of Arts and Sciences*



N.W. Islands

TREACHEROUS  
BAY

Long I.

North I.

South I.

Table I.

Button I.

Flat I.

Saddle I.

Low Islands

- |                      |                |
|----------------------|----------------|
| Ships                | Captains       |
| <i>Van Sittart</i>   | Clements       |
| <i>la Perle</i>      | Dordcht        |
| <i>Sullivan</i>      | Steph Williams |
| <i>Atlas</i>         | Cooper         |
| <i>Royal Admiral</i> |                |
| <i>Gardet</i>        | Wilson         |
| <i>Wuven Hoopius</i> | Larkous        |
| <i>le Solide</i>     | Marchand       |



JOURNAL  
OF  
THE ROUTE.

VOL. II.

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**JOURNAL**  
OF THE  
**ROUTE OF THE SHIP SOLIDE,**  
DURING HER  
*VOYAGE ROUND THE WORLD,*  
IN 1790, 1791, AND 1792.  
BY CAPTAIN PROSPER CHANAL.

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**T**HE titles of the Columns sufficiently indicate what each contains; but it is necessary to make known by what means Captain CHANAL obtained some of the results which are there inserted.

The columns of Latitude and Longitude, by *account* and by *observation*, shew the position of the ship, according to the dead reckoning, and according to the observations, *for the instant of noon* of each day, unless it be expressly specified that it is her position at another period of the day.

The latitude *by account* is that which was indicated each day by the dead reckoning, by deducing from the result of the last day of observation the progress in latitude by account in the interval of the two periods.

The longitude *by account* is the result of the dead reckoning from the last *Point of Departure*, deduced from the longitude of that point.

The longitude *by observation* is the mean result of the observations of the moon's distance from the sun or stars, reduced to the instant of noon of the day on which they were made; or the longitude deduced from the bearing of an island, a cape, &c. whose position is fixed by astronomical observations.

The situation of the sun, moon, or stars, in regard to each other, as seen in the column of *Remarks and Observations*, exhibits their situation in the heavens at the instant when their distance was observed: thus, Dist. ☉—☾, indicates that the moon was to the east of the sun; and ☽—☉, that it was to the west: it is the same with respect to the moon's distance from the stars.

The longitude is given in this last-mentioned column as it was found at the time of the observation: it was reduced to that of noon by the dead reckoning, in order that it might be inscribed, at that period, in the fifth column of the month. The letter *M* designates the result of Captain MARCHAND: *Cb*, that of Captain CHANAL. The letters *A. M.* (abbreviation of *ante meridiem*) indicates that the time is before noon. *P. M.* (abbreviation of *post meridiem*) that the time is after noon.

Each determination of the variation of the magnetic needle carries with it the indication of the method

method which was employed for ascertaining it by observation:

In all the points of the compass, in the column of *Remarks*, &c. allowance is made for the variation of the needle, and they are reduced to the *true North*.

In the interval from the 14th to the 29th of December 1790, and in that from the 5th to the 14th of August 1792, during which the ship sailed in the MEDITERRANEAN, no mention is made of the longitude, because Captain MARCHAND directed his course by a *plane Chart*; this deficiency has been supplied, by indicating each day the *distance run* from the one noon to the other, as well as the direction of the *course*, and by inserting in the Journal the *bearings* which were taken in sight of land: these *data*, combined with the latitude observed, will give the position of the ship for each day at noon.

TIME.	COURSE.	DISTANCE.	LATITUDE		VARIATION		DAYS.	DEGREES
			by observ.	NORTH.	of the Compaſs.	WEST.		
1790.		LEAGUES.	0	'	0	'	Dec.	Above freezing point
Dec. 14	Point of departure within ſight of Cape Sicily, bearing E. N. E. $\frac{1}{2}$ E. 11 leagues. . . . .						14	. .
15	S. by W. $20^{\circ}$ W.	35,87	41	17			15	. .
16	Monte Toro of the Iſland of Minorca bearing W. S. W. 7 leagues. . . . .		39	36			16	. .
17	S. by E. $30^{\circ}$ E.	16,33	39	08			17	. .
18	S. by E.	1,50					18	. .
19	S. W. $30^{\circ}$ S.	9,50	38	56			19	. .
20	S.	4,33					20	. .
21	W. S. W.	27,50					21	. .
22	W. by S. $30^{\circ}$ S.	31,33	37	33			22	. .
23	Cape Palos N. 6 leagues. . . . .		37	06			23	. .
24	Cape de Gata W. S. W. $\frac{1}{2}$ S. 6 leagues.		36	56			24	. .
25	Cape Torre Molinos W. by N. 9 leagues. . . . .		36	28	22	08 Amp. Weſtly.	25	. .
26	The Mountain of Velez-Malaga N. W.		36	20			26	. .
27	The ſame N. W. $60^{\circ}$ W. . . . .		36	09			27	. .
28	Ciſtel-de-Ferro N. by E. . . . .		36	34			28	. .

MARCHAND'S VOYAGE.

VARIATION  
of the Compass.  
WEST.

DAYS.	DEGREES	WINDS	REMARKS
	of the THERM.	AND WEATHER.	AND OBSERVATIONS.
	Above the freezing point.		
14	. . .	N. W. strong breeze; and clear weather.	On the 14th in the morning, the SOLIDE set sail from the harbour of <i>Marseille</i> .
15	. . .	From N. W. to N. mode- rate; fine weather.	
16	. . .	From N. W. to W. faint breeze; cloudy.	On the 16th, at 7 A. M. saw the Island of <i>Minorca</i> , bearing S. W. by W. distant 7 leagues.
17	. . .	From W. N. W. to W. S. W. faint; clear weather.	
18	. . .	From W. S. W. to N. W. accompanied by squalls; weather overcast.	From the 18th to the 20th, strong gales and a very heavy sea. Lay to.
19	. . .	From N. W. to E. N. E. variable and squally; weather overcast.	
20	. . .	From W. to N. W. vio- lent squalls; cloudy weather.	
21	. . .	From N. to N. E. faint; rain at intervals.	
22	. . .	N. N. E. faint; the wea- ther cloudy.	On the 22d, at 7 A. M. saw the Coast of <i>Spain</i> to the N. W. $\frac{1}{2}$ W.
23	. . .	From N. to N. W. var. light; clear weather.	
24	. . .	From E. to N. W. round by the S. faint; fine weather.	
25	. . .	From E. to N. fresh; fine weather.	
26	. . .	From S. W. to N. W. calm at intervals; fine weather.	On the 26th, the currents had car- ried the ship to the eastward about 6 leagues.
27	. . .	Calm, puffs from the S. to the W; fine wea- ther.	On the 27th and 28th, they set to the S. E. at the same rate.
28	. . .	W. N. W. light breeze and fine weather.	

08 Amp. Westly.

## MARCHAND'S VOYAGE.

TIME.	LATITUDE		LONGITUDE		VARIATION of the Compass. WEST.	DAYS.	DEGREES of the THER.
	by account. NORTH.	by observ. NORTH.	by account. WEST.	by observ. WEST.			
1791.	0	0	0	0	0	Dec.	Above freezing point
Dec. 29	The Mountain of d'Espejana [Sierra Bermeja] W. N. W. that of Marbella N. N. E. . . . . }					29	. .
29	Point of Departure within sight of Cape Spartel					29	. .
		35 52		8 14			
30	35 13	35 23	10 16			30	. .
31	34 45	. . .	11 49			31	. .
1791.						Jan.	. .
Jan. 1	33 47	33 50	13 55			1	. .
2	32 28	. . .	16 08	. . .	19 00 Amp. Eastly.	2	. .
3	31 14	31 08	17 51	. . .	19 10 by 2 Azim. 19 50 Amp. Westly.	3	. .
4	30 45	30 31	18 40			4	. .
5	30 09	30 08	19 46	In sight of the Peak of Teneriffe.	17 50 Azim.	5	. .
6	28 40	28 36	21 33	19 06		6	. .
7	26 54	26 50	22 18	. . .	14 30 Amp. Westly.	7	. .
8	24 26	24 19	23 03	. . .	14 16 Amp. Westly.	8	. .
9	21 21	21 24	23 20	21 46	13 10 Amp. Westly.	9	. .
10	18 52	18 45	23 06			10	. .
11	17 15	17 20	22 49			11	. .

MARCHAND'S VOYAGE.

9

VARIATION of the Compass. WEST.	DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
		Above the freezing point.		
0 /	Dec.			
	29	. . .	From S. E. to E. fresh, squalls and rain; lighting, thick, dark weather.	On the 29th at noon, saw the Rock of <i>Gibraltar</i> to the W. S. W. $\frac{1}{4}$ W: in the afternoon passed the Strait of that name; at 8 P.M. we were clear of it.
	29	. . .	From E. to E. N. E. fresh in squalls; weather overcast.	On the 29th, at 8 P. M. set Cape <i>Spartel</i> S. $1\frac{3}{4}$ leagues; shortly after, lost sight of the land.
	30	. . .	N. E. Fresh; cloudy.	
	31	. . .	From N. W. to S. S. W. variable; slight squalls.	
	Jan.			
	1	. . .	From S. E. to N. E. fresh breeze; cloudy weather.	
19 00 Amp. Eastly.	2	. . .	From N. N. E. to E. N. E. pleasant breeze and misty.	
19 10 by 2 Azim.	3	. . .	N. variable, cloudy weather and mist.	
19 50 Amp. Westly.	4	. . .	From N. W. to N. E. faint, and fine weather.	On the 4th, at 10 A. M. saw <i>Salvage</i> Island bearing N. by W. $3^{\circ}$ W. distant 4 or 5 leagues.
17 50 Azim.	5	. . .	N. variable, faint, and mist.	On the 5th, at 1 <sup>h</sup> 45' P. M. saw the Peak of <i>Teneriffe</i> bearing S. $6\frac{1}{2}^{\circ}$ , E. 35 leagues. This day saw <i>Flying-fishes</i> for the first time.
14 30 Amp. Westly.	7	. . .	From N. E. to S. E. fresh breeze and fine weather.	On the 6th, at 5 <sup>h</sup> $\frac{1}{2}$ , A. M. saw the Island of <i>Palma</i> bearing S. S. E. $\frac{1}{2}$ S. 8 or 10 leagues; at 3 P. M. Island of <i>Ferro</i> S. S. E.
14 16 Amp. Westly	8	. . .	E. S. E. fresh; clear weather.	
13 10 Amp. Westly.	9	. . .	E. fresh breeze; ditto weather.	On the 9th, at 3 <sup>h</sup> 45' P. M. } $0^{\circ}$ ' "
	10	. . .	E. moderate breeze, and fog.	Long. } $0^{\circ}$ 21' 45" 00
	11	. . .	From E. S. E. to E. N. E. var. faint; thick fog.	by 2 sets $\odot - \text{C} . . .$ } West.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION	DEGREES of the THERM.
	by account. NORTH.	by observ. NORTH.	by account. WEST.	by observ. WEST.	of the Compass. WEST.	
1791.	0 /	0 /	0 /	0 /	0 /	Above the freezing point.
Jan. 12	15 42	15 42	23 09			
13	15 08	. . .	25 08			
14	15 18	15 02	26 29			
	Point of Bearing of the Island of <i>Mayo</i> .					
	. . .	15 02	. . .	25 28½		
15						17,5
16	At anchor in <i>la Praya Bay</i> , Island of <i>St. Yago</i> .				14 12 Amp. Westly.	17,5
					14 12 by Azim.	
17						17,5
18	Point of Departure from the Island of <i>Sant Yago</i> .					17,5
	. . .	14 53	. . .	25 51		
19	12 02	12 02	24 40	. . .	18 10 Amp. W. dout.	18,0
20	9 57	9 57	23 47	. . .	12 31 by 4 Azim.	19,5
					12 48 Amp. Westly.	21,5
21	8 39	8 39	23 12	. . .	11 50 Azim.	21,5
22	7 34	7 30	22 30	. . .	12 20 Azim.	21,0
23	6 25	6 28	21 51	. . .	11 27 Amp. Eastly.	22,0
					11 54 by 4 Azim.	
24	6 09	6 13	21 37			
25	5 46	. . .	21 23			21,0
26	5 22	. . .	21 18			20,0
27	4 40	. . .	21 04			20,0



VARIATION  
of the Compass.  
WEST.

DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
Above the freezing point.		
	From N. E. to N. var. fr. cloudy and foggy wea- ther.	On the 11th, 12th, 13th, the sea covered with <i>Mollusca</i> . In the night, the water luminous. Saw some <i>Flying-</i> <i>fishes</i> , a <i>Shark</i> , and a shoal of <i>Porpoises</i> .
	From N. to N. E. fresh; cloudy and foggy.	
	From N. to N. E. var. faint, squalls and rain.	On the 14th, at 9 <sup>h</sup> $\frac{1}{2}$ A. M. saw the Island of <i>Mayo</i> N. N. W.—At noon the south point of the island N. distant 1 league.—At 3 P. M. the Island of
4 12 Amp. Westly.	17,5 N. N. E. fresh breeze and fine weather.	<i>St. Jago</i> S. W. by W.
4 12 by Azim.	17,5 N. E. moderate; fine wea- ther.	On the 15th A. M. anchored in <i>La</i> <i>Praya</i> Bay, in the Island of <i>St. Jago</i> .
	17,5 N. N. E. fresh; fine wea- ther.	
	17,5 N. E. fresh; fine weather, slight fog.	On the 18th, in the morning, got under way from <i>La Praya</i> Bay.
8 10 Amp. W. dout.	18,0 E. N. E. fresh breeze; fine weather.	On the 19th, saw a <i>Tropic-bird</i> .
	19,5 E. N. E. ditto, ditto.	
2 31 by 4 Azim.	21,5 From E. N. E. to E. mo- derate; fine weather.	On the 21st, saw some <i>Porpoises</i> , <i>De-</i> <i>radoes</i> , <i>Tunnies</i> , and <i>Flying-fishes</i> .
2 48 Amp. Westly.	21,5 From N. N. E. to E. N. E. moderate; cloudy wea- ther.	On the 22d, saw a <i>Booby</i> .
50 Azim.		
4 20 Azim.	21,0 From N. E. to E. faint, almost calm; fine wea- ther.	
1 27 Amp. Eastly.		
1 54 by 4 Azim.	22,0 N. E. variable, almost calm; dull weather, fog.	
	25,0 Variable, calm; with hea- vy rain.	On the 25th, saw the same fishes in great numbers; the sea luminous during the night.
	26,0 Var. calm, and squalls at intervals; storm and rain.	On the 26th, saw some <i>Sea-swallows</i> and the same fishes; the sea luminous at night.
	27,0 From N. E. to E. in squalls; stormy wea- ther, rain.	

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compas WEST.	DEGREES of the THERM.
	by account. NORTH.	by observ. NORTH.	by account. WEST.	by observ. WEST.		
1791.	0 1	0 1	0 1	0 1	0 1	Above the freezing point.
Jan. 28	3 35	3 36	20 35	. . .	14 09 Azim. 13 52 by 4 Azim.	21,5
29	2 57	. . .	20 37	. . .		21,5
30	2 29	. . .	21 08	. . .		
31	1 36	2 26	21 29	. . .	12 18 by 6 Azim. 12 36 Amp. East	20,5
Feb. 1	1 11	1 23	22 17	. . .	10 17 by 3 Azim. 10 57 Amp. West	21,0
2	0 05	0 12	23 21	. . .	11 09 Amp. West	22,0
	SOUTH.	SOUTH.				
3	1 05	0 53	24 19	. . .		22,0
4	2 33	2 29	25 28	. . .	7 00 Amp. East 8 53 by 2 Azim.	23,0
5	4 12	4 11	26 20	. . .	6 30 Amp. East 6 17 by 2 Azim.	22,0
6	5 29	5 38	26 55	27 58	5 18 Azim. 5 30 Amp. West	21,5
7	6 57	7 00	27 41	28 52	5 53 Amp. East	21,5
8	8 52	8 55	28 38	29 48	4 39 Amp. East	22,5
9	10 40	10 43	29 35	31 08	2 30 Amp. West 1 53 by 4 Azim.	22,0
10	12 35	12 35	30 24	. . .	1 58 by 6 Azim. 1 54 Amp. West	21,5
11	14 20	14 25	31 06	. . .	0 53 Amp. East	22,0
12	15 51	16 10	31 46	33 41	0 33 by 3 Azim. 0 24 Amp. West	22,0
13	17 12	17 17	32 29	. . .	0 07 Amp. East	23,0

VARIATION of the Compas WEST.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
	Above the freezing point.		
0 14 09 Azim.	21,5	From E. to S. E. light breeze with squalls; wet weather.	On the 29th, met with a ship. Saw a quantity of oceanic birds, among others some <i>Boobies</i> .
13 52 by 4 Azim	21,5	From E. to S. S. E. slight squalls, calm at intervals; rain.	Till the 2nd of February, the ship was constantly followed by numerous shoals of <i>Tunnies</i> and <i>Bonitoes</i> ; enough were caught for supplying all the ship's company at discretion: on the 2d saw a shoal of <i>Porpoises</i> , on the approach of which the <i>Tunnies</i> and <i>Bonitoes</i> disappeared.
12 18 by 6 Azim	20,5	From S. E. to S. faint, squalls; rain, and weather overcast.	
12 36 Amp. East	21,0	S. E. moderate; fine weather, cloudy at intervals.	
10 17 by 3 Azim	22,0	From S. to S. S. E. moderate; cloudy weather.	
10 57 Amp. West	22,0	S. E. by S. moderate; fine weather.	
11 09 Amp. West	23,0	S. E. steady fresh breeze; cloudy weather.	On the 3d, saw some <i>black Petrels</i> among other birds.
7 00 Amp. East	22,0	S. E. pleasant breeze; fine weather.	
8 53 by 2 Azim.	21,5	S. E. by S. moderate breeze; fine weather.	The 6, { at 4 <sup>h</sup> 47' P.M. } M. } 0 1 " { Long. } and } 28 04 22W. { by 4 sets ☉ - ☽ } Cb. }
6 30 Amp. East	21,5	E. S. E. moderate breeze; fine weather.	The 7, { at 4 <sup>h</sup> 14' P.M. } M. } { Long. } and } 29 08 00W. { by 2 sets ☉ - ☽ } Cb. }
6 17 by 2 Azim.	22,5	From S. E. to S. S. E. fresh; fine weather.	The 8, { at 4 <sup>h</sup> 10' P.M. } M. . 30 01 00 { Long. } Cb. . 29 55 00 { by 2 sets ☉ - ☽ } Mean 29 58 00W.
5 18 Azim.	22,0	From S. E. to E. S. E. moderate; fine weather.	The 9, { at 5 <sup>h</sup> 12' P.M. } M. . 31 32 00 { Long. } Cb. . 31 05 00 { by 2 sets ☉ - ☽ } Mean 31 17 30W.
5 30 Amp. West	22,0	E. S. E. moderate breeze; dull weather.	The 12, { at 4 <sup>h</sup> 19' P.M. } M. . 33 43 15 { Long. } Cb. . 33 56 12 { by 4 sets ☉ - ☽ } Mean 33 49 44 and a set ☾ — <i>β</i> Pollux. Cb. 33 50 14
5 53 Amp. East	23,0	From E. S. E. to E. N. E. faint; clear sky.	Mean of the 5 sets. . . 33 49 59W.
4 39 Amp. East			
2 30 Amp. West			
1 53 by 4 Azim.			
1 58 by 6 Azim.			
1 54 Amp. West			
0 53 Amp. East			
0 33 by 3 Azim.			
0 24 Amp. West			
0 07 Amp. East			

## MARCHAND'S VOYAGE.

TIME.	LATITUDE		LONGITUDE		VARIATION of the Comp EAST.	DAYS.	DEGREES of the THERM.
	by account. SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.			
1791.	0	0	0	0	0	Feb.	Above freezing point
Feb. 14	17 52	18 02	33 00			14	23,0
15	18 39	18 53	33 28	35 56	0 24 Amp. E 1 19 plus Azim.	15	22,5
16	19 51	20 01	34 12	37 06	2 19 Amp. E 1 42 Azim.	16	22,0
17	21 12	21 21	34 51	. . .	3 00 Amp. E 3 42 by 2 Azim.	17	23,0
18	23 02	23 22	36 13	. . .	4 00 Azim.	18	22,0
19	24 21	24 21	36 35	. . .		19	22,0
20	25 04	24 55	37 04	. . .	5 14 Azim.	20	21,0
21	26 06	26 10	38 10	. . .	5 56 Azim.	21	21,0
22	27 35	27 44	39 35	. . .	8 16 sev. Azim.	22	21,5
23	29 05	29 19	40 58	. . .		23	21,5
24	30 28	. . .	42 12	. . .	10 10 by 6 Azim. 10 44 Amp. W	24	20,5
25	31 25	31 45	43 17	47 56	10 45 Amp. E 11 15 by 6 Azim.	25	21,5
26	32 08	32 30	43 44	48 23½	11 12 Azim.	26	22,0

MARCHAND'S VOYAGE.

VARIATION of the Comp EAST.	DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
0	Feb.	Above the freezing point.		
	14	23,0	Variable, intervals of calm and rain; weather over-cast.	On the 15th, at 8 <sup>h</sup> 30' P. M. } Long. } by 2 sets ☾ - <i>Regulus</i> } <i>Cb.</i> . 36 10 15W. and <i>Aldebaran</i> - ☽ }
0 24 Amp. E. 1 19 plus Azim.	15	22,5	E. N. E. light breeze; cloudy weather.	
2 19 Amp. E. 1 42 Azim.	16	22,0	From N. N. E. to N. E. moderate; fine weather.	On the 16th, at 9 <sup>h</sup> 00' P. M. } Long. } <i>M.</i> } by 2 f. <i>Aldebaran</i> - ☾ } and } 36 54 06W. and 1 set ☽ - <i>Regulus</i> } <i>Cb.</i> }
3 00 Amp. E. 3 42 by 2 Azim.	17	23,0	N. E. by N. moderate; clear sky.	
	18	22,0	From N. N. E. to N. N. W. fresh; fine weather.	
4 00 Azim.	19	22,0	From N. W. to S. E. round by the S. faint, squally at intervals; hazy weather.	On the 18th, saw a <i>Sea-swallow</i> .
	20	21,0	From E. S. E. to E. light breeze; fine weather.	On the 20th, saw a <i>Bosby</i> .
5 14 Azim.	21	21,0	From E. to N. N. E. var. and squally; cloudy weather.	On the 21st and 22d, saw several <i>Sea-</i> <i>swallows</i> and a few <i>Boobies</i> .
5 56 Azim.	22	21,5	From E. N. E. to N. E. pleasant breeze; cloudy weather.	
8 16 sev. Azim.	23	21,5	From N. E. to N. N. E. moderate, dull wea- ther; small rain.	
	24	20,5	From N. N. E. to N. moder- ate, squally from the N. W. weather over- cast.	On the 24th, saw a number of <i>Petrels</i> .
10 10 by 6 Azim. 10 44 Amp. E.	25	21,5	From N. to N. E. faint, squally and calm at in- tervals; rain.	On the 25th, at 7 <sup>h</sup> 4' A. M. } <i>M.</i> . 0 47 46 35 Long. } <i>Cb.</i> . 47 41 52 by 6 sets ☽ - ☉ } Mean 47 44 13W.
10 45 Amp. E. 11 15 by 6 Azim.	26	22,0	Calm, clear sky; N. W. var. faint, cloudy wea- ther.	On the 26th, at 8 <sup>h</sup> 00' A. M. } <i>M.</i> . 48 37 55 Long. } <i>Cb.</i> . 48 09 05 by 6 sets ☽ - ☉ } Mean 48 23 30W.
11 12 Azim.				

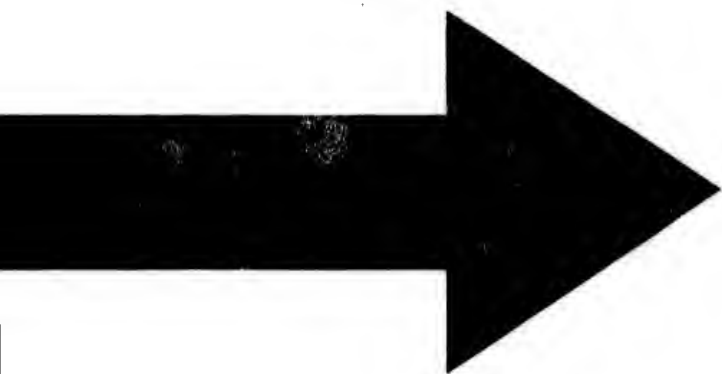
## MARCHAND'S VOYAGE.

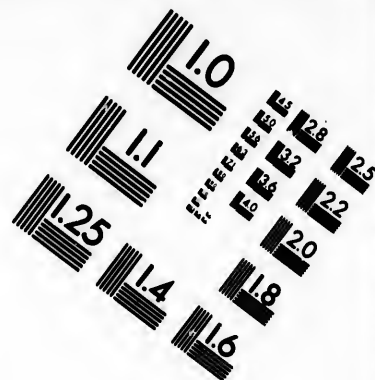
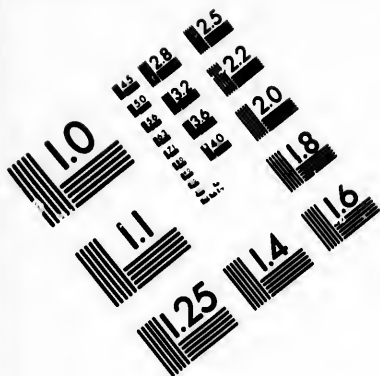
TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compas.	DAYS.	DROPS of THE
	by account. SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.			
1791.	0 /	0 /	0 /	0 /	0 /	<i>Feb.</i>	Above froz point 20,
<i>Feb.</i> 27	33 11	33 17	44 31	. . .	11 45 Amp. Eastly.	27	20,
28	33 47	33 37	44 52			28	18,0
<i>March</i> 1	33 53	33 48	44 06	. . .	11 17 by 6 Azim.	<i>March</i> 1	18,0
2	34 54	34 50	43 18	.. .	12 01 by 6 Azim.	2	18,0
3	35 10	35 06	43 29	. . .	11 57 Amp. Eastly. 11 29 by 3 Azim.	3	18,5
4	36 03	. . .	44 40	. . .	12 03 Amp. Eastly.	4	17,0
5	37 44	37 39	46 09			5	16,0
6	38 12	. . .	46 02			6	14,7
7	37 27	36 35	46 39	. . .	11 42 Azim.	7	16,5
8	36 54	36 48	47 13	48 06	12 45 by 4 Azim. 12 20 Amp. Eastly.	8	17,5
9	37 34	38 00	49 47	. . .	14 10 Azim.	9	17,0
10	38 41	38 44	52 09	53 16	15 50 Amp. Eastly.	10	16,0



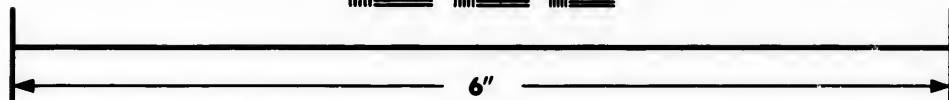
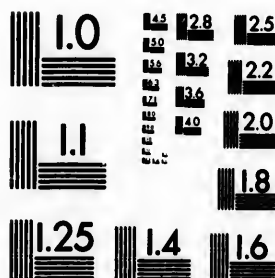








**IMAGE EVALUATION  
TEST TARGET (MT-3)**



**Photographic  
Sciences  
Corporation**

23 WEST MAIN STREET  
WEBSTER, N.Y. 14580  
(716) 872-4503

1.8  
2.0  
2.2  
2.5  
2.8  
3.2  
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17  
18  
19  
20

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION
	by account. SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.	of the Compass. EAST.
1791.	0 /	0 /	0 /	0 /	0 /
March 11	39 25	40 03	54 00	55 16	17 36 Azim.
12	40 52	40 48	55 01	56 28	} 16 32 Amp. Eastly. 17 00 Azim.
13	41 39	41 40	56 38		
14	41 30	41 15	56 14		
15	41 08	40 59	56 18	57 46	17 00 Amp. Westly.
16	41 14	41 01	56 24	. . .	19 00 Amp. Westly.
17	42 06	42 04	59 12		
18	43 07	43 04	59 38	. . .	18 50 Azim.
19	43 17	43 15	58 50		
20	42 43	42 24	59 12		
21	42 49	42 28	59 46	. . .	18 11 Amp. Westly.

DAYS.	of
March	Abol fre pe 14
11	14
12	15
13	11
14	11
15	11
16	12
17	13
18	10
19	10
20	11
21	10

VARIATION  
of the Compass.  
EAST.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
	Above the freezing point.		
March			
36 Azim.	11 14,5	From N. N. E. to N. W. fresh and faint by intervals, light fog; fine weather.	On the 11th, at 4 <sup>h</sup> 12' P. M. } Long. } by 4 sets ☉ - ☽, and } 1 set ☾ - β <i>Pollux</i> . } Mean 56 27 01W.
38 Amp. Eastly. 00 Azim.	12 15,0	From W. S. W. faint to N. W. light; clear weather.	On the 12th, at 4 <sup>h</sup> 44' P. M. } Long. } by 2 sets ☉ - ☽ and } 1 set ☾ - <i>Regulus</i> , } Mean 56 36 00W.
	13 11,5	From N. W. to S. S. W. stiff breeze, squally; fog and rain.	
	14 11,0	From S. W. to S. S. W. strong breeze, heavy squalls; clear weather.	
7 00 Amp. Westly.	15 11,0	From S. W. fresh to S. E. faint; clear weather, dew at night.	On the 15th, at 8 <sup>h</sup> 15' P. M. } Long. } by 2 f. ☾ - <i>Regulus</i> , } and <i>Aldebaran</i> - ☽. } <i>Petrels</i> , <i>Albatrosses</i> , and <i>Storm-birds</i> , were constantly seen: from the 12th to the 13th saw patches of <i>Sea-weed</i> , a <i>Duck</i> , a <i>white Antarctic Pigeon</i> , a <i>Pen-</i> <i>guin</i> , some <i>Mews</i> , and a few <i>Whales</i> .
9 00 Amp. Westly.	16 12,5	Calm, then N. N. W. pleasant breeze; fine weather.	
	17 13,7	From N. W. fresh, clear weather, to W. var. and faint; cloudy weather.	
	18 10,5	From W. N. W. to S. W. stiff breeze; weather heavy at the horizon.	On the 17th, at 3 <sup>h</sup> 30' P. M. 70 } fath. fine gray sand, with black and white specks.
	19 10,0	From S. W. to S. S. W. strong breeze, heavy squalls; clear weather.	at 8 <sup>h</sup> 00' P. M. 75 } On the 18th, saw a small <i>Land-bird</i> , a <i>Port Egmont Heh</i> , a <i>Quebranta-buesfo</i> , and the same birds as before.
	20 11,5	From S. W. to N. N. W. moderate, intervals of calm; fine weather, dew at night.	
8 11 Amp. Westly.	21 10,5	From W. to S. S. W. light fine weather, dew at night.	On the 21st, at 8 <sup>h</sup> 00' P. M. 85 fa- thoms, fine gray, greenish sand, with yellow, black and white specks.

TIME.	LATITUDE		LONGITUDE		VARIATION of the Compaſs.
	by account.	by obſerv.	by account.	by obſerv.	
	SOUTH.	SOUTH.	WEST.	WEST.	EAST.
1791.	0	0	0	0	0
March 22	42 17	42 05	60 54	...	18 05 Amp. Weſtly. 18 28 Azim.
23	43 14	43 26	62 01	62 15	19 15 Amp. Weſtly. 18 48 Azim.
24	44 05	44 00	63 02		
25	44 01	43 55	62 19	63 23	19 54 Amp. Weſtly.
26	45 33	45 37	63 45	...	19 54 by 3 Azim. 20 04 Amp. Weſtly.

DAYS.	of THE
March 22	13,
23	14,
24	10,0
25	11,0
26	13,0

Above  
tree  
point

VARIATION  
of the Compaſs.  
EAST.

MARCHAND'S VOYAGE.

5 Amp. Weſtly.  
8 Azim.

15 Amp. Weſtly.  
48 Azim.

54 Amp. Weſtly.

54 by 3 Azim.  
04 Amp. Weſtly.

DAYS.	DEGREES	WINDS	REMARKS
	of the THERM.	AND WEATHER.	AND OBSERVATIONS.
			Above the freezing point.
March 22	13,0	From S. to N. N. W. light; fine weather, dew at night.	On the 22d, at 2 <sup>h</sup> 00' P. M. 65 } fathoms, fine gray at 8 <sup>h</sup> 00' P. M. 55 } greeniſh ſand, at 8 <sup>h</sup> 00' P. M. 55 } with yellow, at midnight . . . 60 } black and white ſpecks. Saw ſome <i>Seals</i> and a <i>Whale</i> .
23	14,5	From N. W. pleaſant breeze to W. light and variable; fine weather.	On the 23d, at 7 <sup>h</sup> 28' A. M. } Long. } 0 1 " by 1 ſet D — a of } <i>Cb.</i> . 61 50 00W. <i>Aquila.</i> }
24	10,0	From S. S. E. to S. S. W. ſtrong breeze ſqually; rain and hail, weather overcaſt.	On the 24th, ſaw a great many marine plants and a <i>white Antarctic Pigeon</i> ; for ſome days paſt ſaw other birds.
25	11,0	From S. faint and calm, to N. N. W. freſh; fine weather, foggy horizon.	On the 25th, at 8 <sup>h</sup> A. M. 70 fathoms, gray, greeniſh ſand, with yellow and white ſpecks. On the 25th, at 8 <sup>h</sup> 34' A. M. } <i>M.</i> . 63 20 37 Long. } <i>Cb.</i> . 63 25 23 by 4 ſets D — O } Mean 63 23 00W.
26	13,0	From N. N. W. to S. S. W. freſh and faint; fine weather.	On the 26th, at noon, 65 fathoms, fine gray ſand. Saw <i>Seals</i> , <i>Whales</i> , <i>Porpoiſes</i> , heaps of marine plants, and the birds before denominated, in ſmall numbers.

MARCHAND'S VOYAGE.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass.
	by account. SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.	
1791.	0 /	0 /	0 /	0 /	0 /
March 27	47 05	47 05	64 30	64 48	21 00 Amp. Ea/W.
28	48 00	47 55	64 54	65 08	
29	49 50	. . .	66 46	. . .	21 38 Azim.

DAYS.	of TH
March 27	Abo free pc 10
28	12,0
29	11,0



VARIATION  
of the Compaſs.  
EAST.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
March	Above the freezing point.		
27	10,5	From N. W. to S. W. pleasant breeze; fine weather, var. calm and fog at night.	On the 27th, at 9 <sup>h</sup> 01' $\frac{3}{4}$ A. M. } <i>M.</i> } 0 1 " Long. } and } 63 43 45 W. by 2 ſets D — O. } <i>Cb.</i> } On the 27th, at 4 <sup>h</sup> P. M. 75 } fathoms, greeniſh sand, mixed with black and white. at 8 <sup>h</sup> P. M. 75 } fathoms, gray, black and white at 10 <sup>h</sup> P. M. 80 } sand, a little muddy.
28	12,0	From W. var. faint, to N. W. freſh and ſqual- ly; weather overcaſt.	On the 28th, at 8 <sup>h</sup> 27' A. M. } <i>M.</i> } 0 1 " Long. } <i>M.</i> } 65 05 30 by 4 ſets D — O, } <i>Cb.</i> } 65 07 00 and 1 ſ. <i>Antares</i> - D } Mean 65 06 15 W. On the 28th, at 4 <sup>h</sup> A. M. 80 } fathoms gray and yellow ſand. at 8 <sup>h</sup> P. M. 82 } fathoms, gray and yellow ſand with rocks and ſhells. At midnight. . . 80 } fath. gray greeniſh ſand, mixed with yellow and black gravel. <i>Petrels, Albatroſſes, Alcyons, Penguins,</i> and a few <i>white Antartic Pigeons</i> , together with <i>ſtals, Porpoiſes</i> , and a few <i>Whales</i> , were ſeen daily.
29	11,0	West, variable, freſh breeze, more mode- rate; weather overcaſt.	On the 29th, we obſerved the ſea to be covered with a ſpecies of <i>red</i> <i>Sbrimps</i> .

21 38 Azim.

## MARCHAND'S VOYAGE.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass.
	by account. SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.	
1791.	0 /	0 /	0 /	0 /	0 /
March 30	50 44	51 06	67 27	67 41	21 39 Amp. Eastlv.
31	53 26	53 25	67 20	. . .	23 20 Azim.
April 1	54 07	53 56	66 45		} Point of Departure within sight of Staten Land. }
	. . .	53 56	. . .	66 08	
2	55 52	. . .	66 21		
3	56 25	. . .	66 12		
4	57 37	57 24	66 36		
5	57 27	. . .	66 58		

DAYS.	of the THE
March 30	Above freez point 9.
31	9.
April 1	8.
2	5
3	5
4	4
5	5

VARIATION of the Compass.	DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
				Above the freezing point.
39 Amp. Eastly.	30	9,5	From W. to N. N. W. pleasant breeze; clear weather.	On the 30th, at 4 <sup>h</sup> P. M. 90 } fath. yellow, black and white sand. at 8 <sup>h</sup> P. M. 95 } fath. gray sand, and yellow gravel.
20 Azim.				On the 30th, at 7 <sup>h</sup> 47' A. M. } M. 67 22 15 Long. } Cb. 67 11 53 by 2 f. ☽ - ☉, and 1 set Antares — ☽. } Mean 67 17 04W.
	31	9,0	From N. N. W. to N. W. moderate breeze; fine weather, rainy.	On the 31st, at 8 <sup>h</sup> P. M. 90 fathoms, gravel, small pebbles and live shell-fish; at midnight and since, no bottom with 130 fathoms of line.
	1	8,5	Calm till noon, then from N. W. to N. N. E. fresh; hazy weather.	On the 1st of April at noon, perceived Staten Land bearing S. S. W. distant 17 or 18 leagues.
	2	5,5	From N. N. E. pleasant breeze; foggy weather, followed by a calm, and by a fresh breeze at S. W.	On the 30th and 31st of March, and 1st of April, saw a number of Petrels, Albatrosses, Penguins, Divers, and white Antarctic Pigeons, a great many Seals, <i>B. leu.</i> , and Porpoises; passed through a quantity of sea-weed in large patches.
	3	5,2	From S. S. W. to W. strong breeze and violent squalls; accompanied by hail and snow.	On the 2d and 3rd, saw few birds of any species.
	4	4,0	From W. to S. S. W. moderate, squally at times, followed by snow and hail; weather overcast.	On the 4th, saw some spotted Petrels for the 1st time, a <i>quebrantabueffos</i> and the same birds as before, but in small numbers.
	5	3,5	From N. N. W. to S. light breeze, followed by a calm; weather overcast, rain and snow at intervals.	On the 5th, saw a great many Petrels, and some spotted ones, several were caught with hook and line: we continued to see these birds with <i>Albatrosses</i> , <i>Quebrantabueffos</i> , <i>Penguins</i> , <i>Alecons</i> , and <i>Mews</i> , but in a small quantity.

MARCHAND'S VOYAGE.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass. EAST.
	by account SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.	
1791.	0 /	0 /	0 /	0 /	0 /
April 6	57 47	. . .	69 07		
7	58 15	. . .	71 08	. . .	26 04 Azim.
8	58 38	58 24	72 56		
9	59 13	59 14	75 47		
10	59 56	59 54	78 21		
11	59 44	59 44	79 09	77 03	
12	59 24	. . .	80 06		
13	59 54	. . .	82 34		
14	59 27	. . .	85 43		
15	58 02	58 38	86 28		

DAYS.	DEGREE of the THER.
April	Above freezing point
6	1,5
7	1,7
8	5,4
9	5,5
10	6,
11	3,
12	4
13	4
14	5
15	

MARCHAND'S VOYAGE.

VARIATION  
of the Compass,  
EAST.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
April	Above the freezing point.		
6	1,5	From S. S. E. to S. E. pleasant breeze; wea- ther, hail and hoary frost.	
7	1,7	From S. S. E. to N. N. E. light breeze; weather, dry.	
8	5,2	From N. N. E. to W. N. W. light breeze and fresh at intervals; weather overcast.	
9	5,0	From N. N. W. to W. N. W. moderate; cloudy and foggy, followed by squalls.	
10	6,0	From W. N. W. to N. W. fresh, accompanied by squalls; foggy weather.	
11	3,5	From S. S. W. to W. stiff breeze; squalls, small rain.	On the 11th, at 4 <sup>h</sup> 15' P. M. } M. } 0 " " Long. } and } 77 08 00 W. by 2 sets ☉ — ☾ } Ch. }
12	4,5	From W. to N. N. W. fresh in squalls; fog and small rain.	<i>Spotted Petrels, gray Petrels, Albatrosses,</i> were constantly seen, and from time to
13	4,5	From N. W. by W. to N. N. E. fresh breeze; weather overcast and rainy.	time <i>Quebrantabueffes, Penguins, Mews</i> and <i>Sheer-waters</i> ; <i>Spotted and gray Pe-</i> <i>trrels</i> were frequently caught with hook and line.
14	5,0	N. N. W. moderate; S. W. strong gale, accompanied by heavy squalls; foggy weather.	
15	2,5	From S. W. to E. fresh in squalls; followed by snow and hail.	

0 0 4 Azim.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compas.
	by account. SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.	
1791.	0 /	0 /	0 /	0 /	0 /
April 16	57 43	57 46	86 46	. . .	23 30 by 16 Azim.
17	56 27		88 08		
18	54 05	54 45	91 15		
19	52 32	52 33	93 16	93 19	16 34 plus Azim.
20	51 38	51 38	94 02	. . .	15 30 plus Azim.
21	50 19	. . .	95 57		
22	50 13	. . .	97 03		
23	50 22	50 39	96 55		
24	48 50	48 49	95 37	95 18	
25	46 07	46 08	95 42	{ 96 09 or 95 46 by a mean between the observations of the 24th and those of the 25th. }	11 14 Azim.

DAYS.	DEGREE of the THERM.
April	Above the freezing point.
16	5,0
17	2,7
18	3,0
19	2,0
20	5,0
21	6,0
22	7,5
23	7,0
24	7,0
25	7,5

MARCHAND'S VOYAGE.

VARIATION of the Compass. EAST.	DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
	April	Above the freezing point.		
23 30 by 16 Azim.	16	5,0	From S. W. to N. N. E. variable, light breeze; fine weather, foggy in the horizon.	
	17	2,7	From S. E. to S. strong gale in squalls, fol- lowed by snow and hail; weather overcast and rainy.	
	18	3,0	From S. S. E. to S. S. W. strong gale and squally; same weather.	
16 34 plus Azim.	19	2,0	From W. S. W. to S. S. W. fresh, and squalls fol- lowed by snow and hail; cloudy weather.	On the 19th, at 9 <sup>h</sup> 20' P. M. } Long. } by 1 set of <i>Spica</i> } <i>Virginis</i> — ( . . . )
15 30 plus Azim.	20	5,0	From S. S. E. light hazy weather; to N. E. by N. fresh; cloudy wea- ther.	• " " Cb. . 93 44 00W.
	21	6,0	From N. E. to N. N. E. violent and heavy squalls; weather foggy and rainy.	On the 21st, in the morning, forced to lie to by a boisterous wind and a very heavy sea, which occasioned the ship to labour extremely.
	22	7,5	From N. by E. to N. N. W. pleasant breeze; foggy weather.	
	23	7,0	From N. W. by N. to W. by N. strong breeze, squally; weather over- cast.	On the 24th, at 8 <sup>h</sup> 35' A. M. } <i>M.</i> } Long. } and } 0 " " by 2 sets D — ☉. } <i>Ch.</i> } 95 28 30W.
	24	7,0	From W. to W. S. W. fresh breeze, and clear weather.	On the 25th, at 9 <sup>h</sup> 23' A. M. } <i>M.</i> } Long. } and } 96 09 30W. by 2 sets D — ☉ } <i>Ch.</i> }
11 14 Azim.	25	7,5	From W. to S. W. fresh breeze in squalls, and clear weather.	

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass.	DAYS.	DEG. of THE
	by account. SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.			
1791.	0 /	0 /	0 /	0 /	0 /		
April 26	43 46	. . .	96 58			26	Above freez- point 8,
27	43 02	. . .	97 23			27	9,
28	42. 31	. . .	98 45			28	11,0
29	41 30	. . .	100 24	. . .	10 10 Amp. Eastly	29	11,0
30	40 24	40 20	100 45	. . .	7 41 by 15 Azim.	30	11,5
May 1	39 55	39 59	100 02	. . .	7 29 Azim.	May 1	12,0
2	38 21	38 29	100 53			2	11,5
3	36 34	36 33	100 44			3	14,0
4	35 04	. . .	99 30			4	14,5
5	33 57	33 56	100 10			5	16,0
6	33 14	. . .	100 41	. . .	7 56 by 12 Azim.	6	16,5



MARCHAND'S VOYAGE.

31

VARIATION of the Compass, EAST.	DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
		Above the freezing point.		
	April			
	26	8,0	From S. W. by S. to S. W. fresh breeze; cloudy weather.	On the 26th, saw a <i>Port Egmont</i> <i>ben</i> ; saw also the same sort of birds as before.
	27	9,5	Puffs from the W. N. W. hazy weather: then from N. N. E. to N. light breeze.	
	28	11,0	N. by E. pleasant breeze; weather overcast.	
10 10 Amp. East	29	11,0	From N. N. E. to E. N. E. light breeze; foggy weather, small rain.	On the 29th, saw a numerous flight of birds of the <i>Tern</i> species, going to- wards the S. W.
	30	11,5	From W. by N. to N. W. by N. light breeze; fine weather.	From the 30th to the 4th, saw only some <i>Spotted Petrels</i> and some <i>Albatrosses</i> : their number diminished every day.
7 41 by 15 Azim.	May			
	1	12,0	From N. N. W. to S. round by the E. var. fresh, squalls followed by rain and snow; stormy wea- ther.	
7 29 Azim.	2	11,5	From S. S. W. to W. fresh breeze in squalls; wea- ther overcast.	
	3	14,0	From W. to N. W. by W. stiff breeze squally; weather overcast.	
	4	14,5	From N. W. to S. S. E. round by the W. fresh and squally; foggy wea- ther and small rain.	On the 4th, saw a <i>Port Egmont</i> <i>ben</i> .
	5	16,0	From S. to N. E. var. light breeze; cloudy weather.	From the 5th, we no longer saw either <i>Spotted Petrels</i> , or others, nor <i>Albatrosses</i> .
	6	16,5	From N. N. E. to N. W. by W. fresh in squalls; weather overcast.	
7 56 by 12 Azim.				

## MARCHAND'S VOYAGE.

TIME.	LATITUDE		LONGITUDE		VARIATION of the Compaſs. EAST.	DAYS.	of THE
	by account SOUTH.	by obſerv. SOUTH.	by account. WEST.	by obſerv. WEST.			
1791.	0 /	0 /	0 /	0 /	0 /		Abol
May 7	31 54	31 40	99 33	. . .	8 07 plus Azim.	7	freſ po 19
8	30 28	30 25	98 45	96 44	9 00 Azim. 8 34 Amp. Weſtly	8	20
9	30 06	30 02	98 42	96 55 or 96 48 by a mean between the 8th and 9th	9 17 plus Azim.	9	21
10	29 21	29 33	100 00			10	20
11	29 09	29 09	100 34	. . .	6 33 by 8 Azim.	11	20
12	28 27	28 25	100 35	98 51	6 32 by 5 Azim.	12	18,
13	27 01	27 00	101 25			13	20
14	25 17	25 30	103 02	. . .	7 21 by 3 Azim.	14	20,
15	25 07	25 20	104 24			15	20,
16	25 16	25 29	105 27	. . .	6 47 by 4 Azim.	16	20,
17	25 32	25 36	106 25	. . .	6 39 by 4 Azim.	17	21,
18	25 39	25 44	107 15	. . .	6 26 plus Azim.	18	21,
19	25 27	. . .	107 24	. . .	5 50 Amp. Eaſtly	19	19,

MARCHAND'S VOYAGE.

33

VARIATION of the Compass, EAST.	DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
0	May	Above the freezing point.		
8 07 plus Azim.	7	19,0	N. W. by W. pleasant breeze; fine weather.	
9 00 Azim.	8	20,0	N. W. light breeze, fine weather.	On the 8th;
8 34 Amp. Westly.	9	21,0	From W. N. W. faint to N. by E. fresh breeze; fine weather.	at 2 <sup>h</sup> 48' P. M. } <i>M.</i> Long. } and } 0 17 by 2 sets ☉ — ☾ } <i>Ch.</i> } 96 33 00W.
9 17 plus Azim.	10	20,0	From N. E. by N. to N. N. W. in strong squalls; clear weather.	On the 9th, at 4 <sup>h</sup> 7' P. M. } <i>M.</i> Long. } and } 97 08 00W. by 2 sets ☉ — ☾ } <i>Ch.</i> }
6 33 by 8 Azim.	11	20,5	From W. N. W. to W. by S. faint and squally; cloudy weather.	On the 9th, saw a <i>Whale</i> , a <i>Sea-swallow</i> and a <i>Mew</i> .
6 32 by 5 Azim.	12	18,0	From W. to S. light breeze; fine weather.	On the 10th, saw some <i>Sea-swallows</i> . On the 12th, saw a <i>Man-of-war-bird</i> .
7 21 by 3 Azim.	13	20,0	S. E. pleasant breeze; fine weather.	On the 12th, at 3 <sup>h</sup> 20' P. M. } <i>M.</i> Long. } and } 98 54 00W. by 2 sets ☉ — ☾ } <i>Ch.</i> }
6 47 by 4 Azim.	14	20,0	From E. S. E. to N. by W. moderate, accompanied by squalls; weather overcast.	On the 13th, 14th and 15th, saw some <i>Sea-swallows</i> .
6 39 by 4 Azim.	15	20,0	From N. to N. N. W. light, squally; weather overcast.	
6 26 plus Azim.	16	20,5	From N. to N. by W. faint breeze; cloudy weather.	On the 16th, saw some <i>Bonitos</i> and two <i>gray Terns</i> .
5 50 Amp. Eastly.	17	21,0	From N. to N. N. W. faint; cloudy weather.	On the 17th, saw two <i>Tropic-birds</i> .
	18	21,0	From N. by W. to N. W. by N. faint breeze; fine weather.	From the 18th, saw constantly <i>Man-of-war-birds</i> , red-shafted <i>Tropic-birds</i> and others, also now and then some <i>Mews</i> and <i>Bonitos</i> .
	19	19,5	From W. to N. E. by E. round by the S. almost calm; cloudy weather.	

## MARCHAND'S VOYAGE.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION
	by account. SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.	of the Compass. EAST.
1791.	0 /	0 /	0 /	0 /	0 /
May 20.	24 49	24 47	108 09	. . .	5 48 by 3 Azim.
21	24 00	24 06	109 26	. . .	6 34 plus Azim.
22	24 00	23 59	109 53	. . .	6 07 Azim.
23	23 03	23 05	110 30	111 56	5 32 Azim. 5 26 Amp. Eastly.
24	21 44	21 54	111 37	113 41	4 05 by 6 Azim.
25	20 49	21 03	112 47	114 57	5 40 by 5 Azim.
26	20 24	20 22	113 02	115 38	5 25 by 3 Azim.
27	19 28	19 32	114 10	116 34	5 24 by 5 Azim.
28	19 20	19 20	114 22	. . .	5 56 Azim. 5 32 Amp. Westly.
29	18 46	18 46	115 26	. . .	5 32 Amp. Eastly.
30	19 05	19 09	116 23		
31	18 41	18 36	116 10		

DAYS.	of THE	DE
May	Above free point	
20	21,	
21	22,	
22	23,	
23	24,	
24	23,5	
25	24,0	
26	24,0	
27	23,0	
28	24,0	
29	22,0	
30	24,0	
31	23,0	

VARIATION  
of the Compass.  
EAST.

DAYS.	DEGREES	WINDS	REMARKS
	of the THERM.	AND WEATHER.	AND OBSERVATIONS.
	Above the freezing point.		
May 5 48 by 3 Azim.	20 21,5	From N. by E. to N. E. by N. light breeze ; cloudy weather.	
6 34 plus Azim.	21 22,5	From N. E. by N. to N. by W. light, followed by a calm ; fine wea- ther.	
6 07 Azim.	22 23,0	From N. W. by N. to N. E. by N. faint, calm at intervals ; fine wea- ther.	On the 23rd, saw a great many <i>Fly- ing-fishes.</i>
5 32 Azim. 5 26 Amp. Eastly.	23 24,0	From E. to E. S. E. fresh breeze ; fine wea- ther.	On the 23d, at 8 <sup>h</sup> 31' A. M. } <i>M.</i> } 0 1 " Long. } and } 111 45 30W. by 6 fets } — ⊙ } <i>Cb.</i>
4 05 by 6 Azim.	24 23,5	From N. E. by N. to E. N. E. moderate ; cloudy weather.	On the 24th, at 10 <sup>h</sup> 3' A. M. } <i>M.</i> } Long. } and } 113 34 00W. by 2 fets } — ⊙ } <i>Cb.</i>
5 40 by 5 Azim.	25 24,0	From E. S. E. to S. E. faint ; fine weather.	On the 25th, at 8 <sup>h</sup> 34' A. M. } <i>M.</i> } Long. } and } 114 49 00W. by 2 fets <i>Antares</i> - } } and 2 fets } — ⊙ } <i>Cb.</i>
5 25 by 3 Azim.	26 24,0	S. E. faint ; fine wea- ther.	
5 24 by 5 Azim.	27 23,0	From S. E. to N. E. light breeze, followed by calm ; fine weather.	On the 26th, at 8 <sup>h</sup> 12' 44" A. M. } <i>M.</i> } Long. } and } 115 32 15W. by 2 fets } — ⊙ } <i>Cb.</i>
5 56 Azim. 5 32 Amp. Westly.	28 24,0	Calm, then from N. E. to N. N. E. faint ; fine weather.	
5 38 Amp. Eastly.	29 22,0	From N. N. E. to N. W. pleasant breeze ; cloudy weather.	On the 27th, at 7 <sup>h</sup> 41' A. M. } <i>M.</i> } Long. } and } 116 23 30W. by 1 set <i>a of A.</i> } } <i>quila</i> — ⊙, and } <i>Cb.</i> } 2 fets } — ⊙ . .
	30 24,0	From N. to W. accom- panied by squalls ; wea- ther overcast.	
	31 23,0	From N. W. to S. W. squalls ; weather rainy, overcast.	

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass.
	by account. SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.	
1791.	0 /	0 /	0 /	0 /	0 /
June 1	18 06	. . .	116 16		
2	17 39	17 36	116 22	. . .	4 50 by 3 Azim.
3	15 51	15 47	117 49		
4	14 09	14 13	120 02	. . .	3 10 by 12 Azim.
5	13 08	13 11	122 21	. . .	2 43 by 6 Azim.
6	12 09	12 10	124 33	127 10	3 07 by 10 Azim.
7	11 09	11 12	126 47	129 35	4 03 by 6 Azim.

DAYS.	DR
June	Abol fre po
1	21
2 <sup>a</sup>	21
3	21,
4	23,
5	23,
6	24,
7	24,

VARIATION  
of the Compass.  
EAST.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
	Above the freezing point.		
June 1	21,0	From N. N. W. to S. S. W. faint, intervals of calm; stormy weather.	On the 1st and 3rd, saw some <i>Porpoises</i> .
2*	21,0	Calm, then from S. W. to S. pleasant breeze; hazy weather.	* It may be remarked, that between the tropics, the winds do not always blow from the <i>East</i> quarter; for it is seen that, from the 29th of May to the 3rd of June, between the parallels of 18° 45' and 15° 45' south, the <i>Solide</i> had, for five days, winds—from North to West—from North-West to South-West, in squalls;—from North-North-West to South-South-West—from South-West to South: this explains how the western islands may have had and may still have communication with the islands situated, in regard to them, to the <i>East</i> and to the <i>North</i> . This remark is confirmed by the <i>Journals of the Route</i> of all the navigators who have crossed the <i>Great Ocean</i> between the tropics.
3	21,5	From S. S. E. to S. E. by S. pleasant breeze; hazy weather.	<i>Red-bastard Tropic-birds</i> and others, and <i>Flying-fishes</i> were constantly seen, and from time to time <i>Boobies</i> , <i>Man-of-war-birds</i> , <i>Sbeer-waters</i> , <i>Sea-swallows</i> and <i>Bontoes</i> .
4	23,0	S. E. fresh breeze; fine weather.	On the 5th, saw a small <i>Tern</i> .
5	23,0	From E. S. E. to S. E. fresh breeze; fine wea- ther.	On the 6th, at 4 <sup>h</sup> 23' P. M. } Long. } <i>M.</i> } 0 1 11 by 4 sets ☉ — ☽, } and } 117 33 00 W. and 2 sets ☽ — ☉ } <i>Cb.</i> }
6	24,5	E. S. E. pleasant breeze; fine weather.	<i>Spica Virginis</i> .
7	24,0	E. S. E. moderate breeze; fine weather.	On the 7th, at 3 <sup>h</sup> 26' 33" P. M. } <i>M.</i> } Long. } and } 129 42 15 W. by 2 sets ☉ — ☾ } <i>Cb.</i> }

0 1

4 50 by 3 Azim.

3 10 by 12 Azim.

2 43 by 6 Azim.

3 07 by 10 Azim.

4 03 by 6 Azim.

MARCHAND'S VOYAGE.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION	
	by account. SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.	of the Compaſs. EAST.	
1791.	0 1	0 1	0 1	0 1	0 1	
June 8	10 17	10 18	128 39	131 08	4 37 by 8 Azim.	
9	9 45	9 46	130 34	. . .	4 52 by 6 Azim.	
10	9 48	9 45	132 30	135 52	5 38 by 10 Azim.	
11	9 49	9 59	133 20	. . .	4 18 Amp. Eaſtly.	
12	9 54	9 59	136 01	. . .	5 50 by 6 Azim.	
	Point arrived at within ſight of the <i>Marqueſas</i> . . . .   9 59   . . .   140 29					
13	Lying to off the Bay of <i>la Madre de Dios</i> in the Iſland of <i>Santa Chriſtiana</i> .					
14						
15						
16						
17	At anchor in the Bay of <i>la Madre de Dios</i> .					
18	. . . . .					<i>In the Bay.</i>
						3 18 30 by 8 Azim.
19	. . . . .					4 15 00 Amp. Eaſtly.
						3 09 45 by 8 Azim.
20	Point of Departure from the Bay of <i>la Madre de Dios</i> . . . .   9 55 1/2   . . .   141 29					2 49 00 Amp Eaſtly

DAYS.	of TH
June	Abol fre pu 25
8	25
9	25
10	23
11	25
12	25
13	25
14	26
15	27
16	25
17	24
18	25
19	24
20	24



VARIATION of the Compaſs. EAST.	DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
		Above the freezing point.		
0 0	June			
4 37 by 8 Azim.	8	25,0	From E. S. E. to S. E. moderate; fine weather.	On the 8th, at 3 <sup>h</sup> 2' 17" P. M. Long.
4 52 by 6 Azim.	9	25,0	From E. S. E. to S. E. moderate; cloudy weather.	by 2 ſets ☉ — ☾, and 2 ſets ☽ — ☾ to <i>Spica Virginis</i> . . . } <i>M.</i> . 0 0 " } 131 23 00 W. } <i>Cb.</i> }
5 38 by 10 Azim.	10	23,5	From E. S. E. to E. light; fine weather.	The ſame birds were ſtill ſeen, and <i>Terns</i> beſides.
4 18 Amp. Eaſtly.	11	25,0	From E. to E. S. E. light breeze; fine weather.	On the 10th, ſaw ſome <i>Flying-fiſhes</i> with <i>four red wings</i> , the firſt that were ſeen of this ſpecies.
5 50 by 6 Azim.	12	25,0	From E. N. E. to E. by S. moderate; fine weather.	On the 10th, at 4 <sup>h</sup> 45' 34" P. M. Long.
	13	25,5	Variable, calm; fine weather.	by 8 ſets ☉ — ☾, 2 ſets ☽ — <i>Antares</i> , 2 ſets <i>Regulus</i> — ☾. } <i>M.</i> . 136 10 55 } } <i>Cb.</i> . 136 14 55 } Mean 136 12 55 W.
	14	26,0	N. N. E. freſh breeze, followed by a calm; fine weather.	On the 11th and 12th, ſaw a number of birds of every ſpecies of thoſe before-mentioned.
	15	27,0	From N. E. to E. N. E. light breeze, followed by a calm; fine weather.	On the 12th at ½ paſt ten, A. M. perceived the Iſland of <i>La Madalena</i> , one of the <i>Marqueſas</i> , bearing S. W. by S.: at noon it bore S. W. and the Iſland of <i>San Pedro</i> Weſt, diſtant 14 leagues.
	16	25,0	E. N. E. freſh breeze; fine weather.	
	17	24,0	N. E. accompanied by ſqualls; calm, and rain at intervals.	On the 14th, at 8 A. M. anchored in the Bay of <i>La Madre de Dios</i> in the Iſland of <i>Santa Chriſtiana</i> .
<i>In the Bay.</i>	18	25,0	N. E. in puffs, and ſqualls of rain; fine weather.	
3 18 30 by 8 Azim.	19	24,0	From N. E. to N. N. W. accompanied with ſudden ſqualls; cloudy weather.	
4 15 00 Amp. Eaſtly.				
3 09 45 by 8 Azim.				
2 49 00 Amp Eaſtly	20	24,0	From N. N. W. to N. E. ditto.	On the 20th, at 11 P. M. took our departure from the Bay of <i>La Madre de Dios</i> .

## MARCHAND'S VOYAGE.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION
	by account. SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.	of the Compaſ. EAST.
1791.	0 /	0 /	0 /	0 /	0 /
June 21	In ſight of <i>Ile Marchand</i> , one of the <i>Iſlands</i> } discovered. . . . . }				<i>At ſea.</i>
	9 25	. . . .	142 25	. . . .	4 32 by Azim.
22	9 21	9 21	142 30	142 27	
23	In ſight of <i>Ile Baux</i> . }				
	8 54	8 50	142 46		

DAYS.	of TH
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June	Abor fre po
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21	24
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22	25
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23	26
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## MARCHAND'S VOYAGE.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass.	DAYS.	DEG. of THE
	by account. SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.			
1791.	0 1	0 1	0 1	0 1	0 1		Abov free poi 27
June 24	In sight of <i>Ile Maffe</i> and <i>Ile Chanal.</i>					24	27
	7 44	7 54	143 06	143 10			
25	5 54	5 42	143 27	143 49	5 32 by 8 Azim.	25	27
26	3 24	3 14	143 21	. . .	5 06 by 4 Azim.	26	24
27	1 17	1 02	143 12	. . .	5 07 Azim.	27	24
28	NORTH. 0 19	NORTH. 0 06	143 12	. . .	5 04 by 4 Azim.	28	25
29	1 06	1 16	143 51	. . .	5 20 Azim.	29	24
30	3 11	3 11	144 15	. . .	5 08 by 7 Azim.	30	25
July 1	4 54	. . .	144 15	. . .		July 1	23
2	6 08	6 18	144 30	. . .		2	23
3	7 05	7 10	144 38	. . .	4 54 by 6 Azim.	3	22
4	7 21	7 23	144 31	. . .	5 27 Amp. Eastly.	4	25

VARIATION  
of the Compass.  
EAST.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
	Above the freezing point.		
June			
24	27,0	From E. to E. N. E. plea- sant breeze; fine wea- ther.	On the 24th, at 10 <sup>h</sup> 40' A. M. } <i>M.</i> } Long. } and } 143° 08' 00" W. by 2 sets D — O } <i>Cb.</i> } Lat. 8° 1' S.
25	27,5	From E. to E. S. E. plea- sant breeze; fine wea- ther.	An island discovered the day before, which had been named <i>Ile Maffé</i> , then bore from E. by N. 1° N. to S. E. 1° E. 5 leagues; another island discovered in the morning, and which was named <i>Ile Chanal</i> , bore from E. N. E. 1° E. to E. by N.
5 32 by 8 Azim.	26	From E. S. E. to E. by N. with squalls and rain.	On the 22nd, 23rd, and 24th, saw a number of <i>Bobbies</i> , <i>Man-of-war-birds</i> , and some <i>large flying-fishes with two red</i> <i>wings</i> .
5 06 by 4 Azim.	27	From E. S. E. to N. E. moderate breeze; fine weather.	On the 25th, at 8 <sup>h</sup> 53' A. M. } <i>M.</i> } Long. } and } 143° 48' 00" W. by 2 sets D — O } <i>Cb.</i> }
5 07 Azim.	28	From E. S. E. to E. by N. light breeze; fine weather.	On the 25th, 26th, and 27th, saw few birds, only some <i>Tropic-birds</i> .
5 04 by 4 Azim.	29	From E. S. E. to N. E. moderate breeze; fine weather.	On the 28th, in the afternoon, saw a great number of every species, which directed their flight to the S. E.: this very day, at $\frac{1}{2}$ past 6 P. M. an appearance of land was seen to the W. by S. 5° W.; we steered to the westward till 1 A. M. and we spent the rest of the night lying to; but, at day-light, we saw nothing.
5 20 Azim.	30	From E. by N. to E. N. E. fresh breeze; fine wea- ther; intervals of squalls; followed by showers of rain.	Till the 30th, we continued to see a great number of <i>Tropic-birds</i> , <i>Sea-swal-</i> <i>lows</i> , <i>Terns</i> , and a few <i>Porpoises</i> .
5 08 by 7 Azim.	July		
	1	From E. N. E. to E. S. E. moderate; squally; weather overcast.	
	2	From N. E. to S. E. var. accompanied by squalls; weather overcast, stor- my.	
	3	From S. E. to S. faint; rainy, accompanied by calm; stormy weather.	
4 54 by 6 Azim.	4	Var. and calm, fine wea- ther, then S. S. E. light breeze; misty wea- ther.	
5 27 Amp. Eastly.			

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION
	by account.	by observ.	by account.	by observ.	of the Compass.
	NORTH.	NORTH.	WEST.	WEST.	EAST.
1791.	0 1	0 1	0 1	0 1	0 1
July 5	8 22	8 33	144 23	. . .	5 48 by 3 Azim.
6	10 15	10 21	144 10		
7	11 36	11 42	143 41	. . .	6 15 Amp. Westly.
8	12 36	12 32	144 50	. . .	6 33 by 8 Azim.
9	13 31	13 28	146 05		
10	14 23	14 29	146 44	. . .	6 58 by 4 Azim.
11	16 08	16 17	147 42		
12	18 05	18 11	148 17	. . .	8 18 by 2 Azim.
13	20 05	20 04	149 12	. . .	9 02 by 2 Azim.
14	21 58	22 01	150 13	. . .	9 45 by 4 Azim.
15	23 47	24 03	151 18	. . .	10 27 by 4 Azim.

DAYS.	D
July	f
5	
6	
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VARIATION  
of the Compass.  
EAST.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
	Above the freezing point.		
July			
5	26,0	From S. to W. N. W. light breeze; followed by squalls and rain.	On the 5th, in the afternoon, passed the trunk of a tree which appeared not to have been long in the water.
6	25,0	From W. to S. E. round by the S. pleasant breeze; accompanied by squalls at inter- vals.	
7	22,0	From E. to N. E. light breeze, followed by calm; weather over- cast and misty.	
8	23,5	From N. E. to N. N. E. pleasant breeze; fine weather.	
9	24,0	From N. N. E. to N. E. pleasant breeze; squalls and rain at in- tervals.	
10	23,5	From S. S. E. to N. E. moderate and fresh in squalls; misty wea- ther.	
11	23,0	From N. E. to E. N. E. fresh in squalls; misty weather.	Since the 10th, we have seen but a very small number of birds.
12	21,5	From E. N. E. to N. E. by N. fresh in squalls; cloudy weather.	
13	21,5	From N. E. by E. to N. E. fresh breeze; showers of rain at intervals.	On the 13th, saw a <i>Turtle</i> , some <i>De-</i> <i>radetes</i> , and a few <i>Tropic-birds</i> .
14	22,0	N. E. by E. pleasant breeze; fine weather.	
15	22,0	From N. E. by E. to N. E. by N. fresh breeze; fine weather.	On the 15th, saw a number of <i>Terns</i> , and <i>Flying-fishes with two red wings</i> .

0  
5 48 by 3 Azim.

6 15 Amp. Westly.

6 33 by 8 Azim.

6 58 by 4 Azim.

8 18 by 2 Azim.

9 02 by 2 Azim.

9 45 by 4 Azim.

10 27 by 4 Azim.

## MARCHAND'S VOYAGE.

TIME.	LATITUDE		LONGITUDE		VARIATION of the Compass. EAST.
	by account. NORTH.	by observ. NORTH.	by account. WEST.	by observ. WEST.	
1791.	0 /	0 /	0 /	0 /	0 /
July 16	25 53	25 58	152 38		
17	27 42	27 42	153 53		
18	28 36	28 36	154 41	. . .	11 48 Amp. Eastly, 11 39 by 5 Azim.
19	28 40	28 40	153 46	. . .	12 21 by 11 Azim.
20	28 53	28 42	153 54	156 02	13 07 by 6 Azim. 13 32 Amp. Westly.
21	29 36	29 36	153 29		
22	30 47	30 52	152 53	. . .	13 26 by 8 Azim.
23	32 04	32 10	152 14	154 25	
24	33 44	34 05	151 19	153 32	14 37 Amp. Westly. 14 53 Azim.
25	35 44	35 51	150 19	. . .	15 30 Azim.
26	37 41	37 49	149 47	152 17	16 24 Amp. Westly.
27	39 35	39 48	149 12	. . .	16 50 by 3 Azim.
28	41 26	41 35	148 34	. . .	16 54 Azim.

DAYS.	of THE
July	Abol fre p 20
16	20
17	20
18	20
19	20
20	19
21	20
22	20
23	20
24	20
25	19
26	19
27	19
28	19



MARCHAND'S VOYAGE.

47

VARIATION  
of the Compass.  
EAST.

DAYS.	DROEGES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
July	Above the freezing point.		
16	20,0	N. E. fresh breeze; weather overcast, squalls at intervals.	On the 20th, at 7 <sup>h</sup> 34' A. M. } <i>M.</i> } Long. } and } 0 1 "
17	20,0	From N. E. by E. to N. E. by N. pleasant breeze; cloudy weather.	by 4 sets D—⊙ } <i>Cb.</i> } 156 06 00W.
18	20,5	From N. N. E. to W. faint, intervals of calm; cloudy weather.	On the 20th, saw a <i>Tropic-bird</i> , a <i>Quebrantabueffos</i> or <i>Giant-Petrel</i> , a <i>Shark</i> , and some <i>Porpoises</i> .
19	20,0	N. N. E. var. faint; small rain at intervals.	From the 21st to the 23rd, saw some <i>Alecyons</i> , <i>Quebrantabueffos</i> , <i>Bonitoes</i> , and <i>Porpoises</i> , and passed some sea-weeds: we still saw a few <i>Tropic-birds</i> till the 24th.
20	19,5	Calm and puffs, variable; fine weather.	On the 23rd, at 7 <sup>h</sup> 34' A. M. } <i>M.</i> } Long. } and } 0 1 "
21	20,2	From S. E. to S. W. var. light breeze; squalls at intervals; cloudy weather.	by 4 sets D—⊙ } <i>Cb.</i> } 154 35 00W.
22	20,5	From S. S. E. to S. light breeze; cloudy weather.	On the 24th, at 8 <sup>h</sup> 4' A. M. } <i>M.</i> } Long. } and } 153 42 00W.
23	21,5	From S. S. E. to E. S. E. moderate breeze; cloudy weather.	We daily saw <i>Alecyons</i> , <i>Storm-birds</i> , <i>Sea-swallowers</i> , <i>Petrels</i> , and a few <i>Quebrantabueffos</i> .
24	20,5	From S. E. by E. to E. by S. moderate; fine weather.	On the 26th, at 8 <sup>h</sup> 21' 20" A. M. } <i>M.</i> } Long. } and } 152 19 00W.
25	19,0	From E. S. E. to E. by N. pleasant breeze; cloudy weather.	by 2 sets D—⊙ } <i>Cb.</i> }
26	17,5	From E. to S. E. moderate breeze; dull weather.	On the 26th and 27th, passed by a quantity of floating substances, of the form of rushins, and of a brown colour; saw some <i>Mollusca</i> .
27	16,5	From E. by N. to E. by S. moderate; dull weather.	On the 28th, in the morning, saw a number of <i>Gulls</i> , <i>Sea-swallowers</i> , and several flights of other birds, which appeared to be land-birds; we also saw some <i>Mollusca</i> .
28	15,5	From E. by N. to S. E. light breeze; cloudy weather.	

0 1  
11 48 Amp. Eastly.  
11 39 by 5 Azim.  
2 21 by 11 Azim.  
13 07 by 6 Azim.  
13 32 Amp. Westly.  
3 26 by 8 Azim.  
4 37 Amp. Westly.  
4 53 Azim.  
5 30 Azim.  
6 24 Amp. Westly.  
6 50 by 3 Azim.  
6 54 Azim.

MARCHAND'S VOYAGE.

TIME.	LATITUDE		LONGITUDE		VARIATION of the Compass.
	by account. NORTH.	by observ. NORTH.	by account. WEST.	by observ. WEST.	
1791.	0 /	0 /	0 /	0 /	0 /
July 29	42 22	42 37	148 14	. . .	17 24 by 4 Azim.
30	43 03	43 02	148 07	. . .	18 13 plus Azim.
31	43 53	44 01	147 30		
August 1	46 29	. . .	146 44		
2	48 42	48 44	145 51		
3	50 26	. . .	145 11		
4	53 06	. . .	144 34		
5	55 04	55 12	142 20	143 46	23 30 plus Azim.
6	56 38	. . .	139 14		
7	56 57	57 20	138 30		
	At 6 P. M. Time of taking the bearing of Cape del Engaño. . . . .				
	56 52	57 18	138 01½	139 26½	
8	56 57	57 12	Plying to windward or be- calmed in sight of the Coast.		24 63 by 12 Azim.
9	56 49	57 05			

DAYS.	DEG.
July	Abc
29	fre
	P
30	1
31	15
August	
1	12
2	10
3	9
4	9
5	12,
6	10,
7	12,0
8	10,5
9	10,0

VARIATION  
of the Compass,  
EAST.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
	Above the freezing point.		
July			
29	18,0	From E. to S. S. W. faint, followed by a calm; fine weather.	On the 29th, saw a <i>Sea-leek</i> ( <i>Fucus giganteus</i> ); we also saw the same spe- cies of birds.
30	15,0	From E. N. E. to W. N. W. round by the S. faint; fine weather.	On the 30th and 31st, saw some <i>Whales</i> and <i>Sea-leeks</i> .
31	15,0	W. Moderate and then fresh; weather overcast.	On the 1st of August passed a root of a tree.
August 1	12,0	From W. S. W. to W. N. W. stiff breeze; weather overcast and misty.	On the 3rd and 4th, passed several <i>Sea-leeks</i> ; and a few leaves of the species of sea-weed, called <i>Alga marina</i> . On the 4th, saw a large piece of wood float- ing, and a flight of small land-birds. We daily saw besides <i>Quebrantabueffos</i> , <i>Petrels</i> , <i>Sea-swallows</i> , <i>Gulls</i> ; and <i>Storm- birds</i> .
2	10,3	From W. to W. S. W. strong gale; weather overcast and foggy.	On the 5th, at 2 <sup>h</sup> 12' 12" P.M. } <i>M.</i> } 0 , " Long. } and } 143 29 41 W. by 4 sets ☉—☾ } <i>Cb.</i> }
3	9,7	From W.S.W. to S.S.W. fresh; weather overcast and foggy.	On the 6th, saw some <i>Auks</i> , and a quantity of <i>Sea-leeks</i> .
4	9,0	From S. by W. to S. E. fresh, accompanied by squalls; weather over- cast.	On the 7th, passed a piece of wood, a quantity of <i>Sea-leeks</i> , and other sea- plants. Saw a <i>Whale</i> , some <i>Auks</i> , and some <i>Merws</i> : the water has a greenish colour. This day at 5½ P.M. perceived the coast of <i>America</i> , and at 6 <sup>h</sup> set <i>Monte San Jacinto</i> E.S.E. 3° E. at the distance of 14 or 15 leagues.
5	12,0	From S. by W. to S. E. fine breeze; cloudy weather.	
6	10,5	From S. E. to N. E. fresh; followed by squalls; weather misty and rainy.	
7	12,0	From E. N. E. to S. faint; weather dull and misty.	
8	10,5	From S. W. to E. S. E. var. faint; weather dull and foggy.	On the 8th, at noon, the extremity of <i>Cape del Engañó</i> bore E.S.E. 2° S. The Mountain E. by S. 4° S.
9	10,0	From S. W. to S. E. by S. var. light; weather overcast and misty.	On the 9th, at noon, the point of <i>Cape del Engañó</i> bore E. by S. 4° S.; the mountain E. 4° S.

0 /  
17 24 by 4 Azim.

18 13 plus Azim.

23 30 plus Azim.

24 63 by 12 Azim

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass. EAST.	DAYS.
	by account. SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.		
1791.	0 /	0 /	0 /	0 /	0 /	
August 10	57 00	57 00	Plying to windward, or becalmed in sight of the coast.			August 10
11	57 00	57 00	At the mouth of the Bay of <i>Tebinkitánay</i> .		28 46 plus Azim.	11
12						12
13					13	
14	. . .	57 04	. . .	137 59	14	
15					15	
16	At anchor in the Bay of <i>Tebinkitánay</i> .					16
17					17	
18					18	
19					19	
20					20	
21	Point of Departure from the Bay of <i>Tebinkitánay</i> .				29 30 Amp. Westly	21
	. . .	57 04	. . .	137 59		
22	54 38	54 35	137 16	137 10	29 00 Amp. Eastly 28 02 Azim.	22
23	. . .	54 04	Longitude of the place whence the bearing was taken.			136 01

MARCHAND'S VOYAGE.

VARIATION  
of the Compass.  
EAST.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
	Above the freezing point.		
August 10	11,5	Calm, then from N. W. to N N.W. light; fine weather.	On the 10th, at noon, the point or pitch of Cape del Engaño bore E. 6° N. distant 2 ½ leagues.
11	15,5	From N. W. light to S. S. W. faint; clear weather.	
12	10,0	From S. S. W. to S. E. var. almost calm; rain.	On the 12th, at 10 <sup>h</sup> A. M. anchored in the Inlet of <i>Tchinkitánay</i> .
13	10,5	S. S. E. fresh, then faint; small rain.	While we were in sight of Cape del Engaño, we constantly saw <i>Divers, Auks, Whales, Seals, Porpoises</i> , and different sea-fowl.
14	10,5	E. S. E. ditto; weather foggy with small rain.	
15	11,5	From S. S. E. to S. S. W. faint; dull weather.	
16	12,5	Puffs from N. to S. faint; fine weather.	
17	10,5	From S. S. E. to S. light breeze; thick weather; continual rain.	On the 21st, got under way from <i>Tchinkitánay</i> Bay. At noon, Cape del Engaño bore N. W. 6° W.
18	11,5	N. W. light; fine weather, followed by calm and fog.	On the 22d,
19	10,0	S. S. E. moderate; weather foggy and rainy.	at 9 <sup>h</sup> 40' A. M. } <i>M.</i> } 0 " " } Long. } and } 137 31 30 W. } by 2 sets D — O. } <i>Ch.</i> }
20	11,5	From S. S. E. to W. S. W. var. light; fine weather.	On the 22d, at noon, the coast of <i>America</i> extended from E. N. E. to E. distant 18 leagues.
21	10,2	Var. light; then from S. W. to N. W. fresh breeze; fine weather.	At 7 P. M. <i>Queen Charlotte's</i> Islands S. E. 8 or 9 leagues.
22	11,5	N. W. fresh breeze and clear weather.	On the 23d, at noon, the north extremity of the most northern of <i>Queen Charlotte's</i> Islands bore N. E. 6° N; a small island on the coast of the large island of that name, S. 2 or 3° E.
23	11,2	W. N. W. light breeze; fine weather, followed by a calm.	

28 46 plus Azim.

29 30 Amp. West

29 00 Amp. East  
28 02 Azim.

## MARCHAND'S VOYAGE.

TIME.	LATITUDE		LONGITUDE		VARIATION of the Compass, EAST.
	by account. SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.	
1791.	0 /	0 /	0 /	0 /	0 /
August 24	. . .	54 18			
25	. . .	54 22			
26	. . .	54 29			
27	. . .	54 15			
28	. . .	53 55			
29	. . .	53 40			
30	. . .	53 28			
31	. . .	53 25			
Sept. 1	Point of departure from <i>Queen Charlotte's</i> Islands.				26 50 Azim.
2	50 59.	. . .	135 10.	. . .	25 16 Amp. Westly.
3	50 00	49 49	133 07		

Standing under easy sail,  
and frequently lying to,  
in sight of the west  
coast of *Queen Charlotte's*  
Islands, while the long-  
boat was visiting the  
coast.

DAYS.	Ab fre p 1
24	1
25	12
26	13
27	13
28	13
29	13
30	12
31	11
Sept. 1	11
2	12
3	14

VARIATION  
of the Compass,  
EAST.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
	Above the freezing point.		
Aug <sup>24</sup>	11,2	From W. N. W. to W. by S. gentle breeze; fine weather.	On the 24th, at noon, the most northern of <i>Queen Charlotte's</i> Islands bore from S. E. by S. to E. S. E.; the entrance of <i>Cloak Bay</i> S. E. by S. 2° ½ S.
25	12,5	From W. S. W. to W. N. W. faint breeze; fine weather.	On the 25th, at noon, the north point of the most northern of <i>Queen Char-</i> <i>lotte's</i> Islands bore S. E. 6° E. <i>Cloak Bay</i> , S. E. by E. 3° S.
26	13,0	From W. to N. N. W. faint and calm; fine weather.	On the 26th, at noon, the north point of the most northern of <i>Queen Charlotte's</i> Islands bore S. E. 6° E. <i>Cloak Bay</i> , S. E. by S.
27	13,0	From N. W. to N. E. faint and calm; fine wea- ther.	On the 27th, at noon, the same bay bore S. S. E. ½ E. the north point of the most northern of <i>Queen Charlotte's</i> Islands E. by S.
28	13,5	From W. N. W. to N. W. moderate breeze; fine weather.	On the 28th, at noon, <i>Queen Char-</i> <i>lotte's</i> Islands bore from N. E. by N. to S. E. by S. 4 leagues.
29	13,5	From W. N. W. to N. N. W. moderate breeze; fine weather.	On the 29th, at noon, an <i>Islet</i> on the coast of <i>Queen Charlotte's</i> Islands bore N. by E.; the most southerly land in sight S. E.
30	12,5	Ditto, fresh breeze, and fine weather.	On the 30th, at noon, <i>Hippab</i> Island bore N. E. 5° E. distant about 4 miles.
31	11,0	From N. W. to W. N. W. fresh breeze; fine wea- ther.	On the 31st, at noon, <i>Hippab</i> Island bore N. E. 6° N. distant 5 or 6 miles.
Sept. 1	11,5	From N. W. to W. N. W. moderate breeze; fine weather.	On the 1st of September, at noon, the extremity in sight of <i>Queen Char-</i> <i>lotte's</i> Islands bore from N. by E. to S. E. by E.
2	12,5	From N. N. W. to N. N. E. moderate breeze; dull weather.	
3	14,0	From N. W. to W. faint; weather overcast, and fog.	

26 50 Azim.

25 16 Amp. West.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass.	
	by account. SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.		
1791.	0 /	0 /	0 /	0 /	0 /	
Sept. 4	48 57	49 49	130 59	130 40	22 30 Azim.	
5	48 59	48 51	129 00		Point arrived at according to the bearing.	
	. . .	48 51	. . .	128 56		
6	. . .	48 59	Longitude of the place whence the bearing was taken.		128 50	22 00 Amp. Eastly.
7	At anchor.	48 58	Ditto.	128 54		
8	Point of Departure from the Coast of America.				22 24 Azim.	
	At 6 <sup>h</sup> $\frac{1}{2}$ S.	48 46	At 6 <sup>h</sup> $\frac{1}{2}$ S	128 48	21 15 Amp. Westly.	
9	48 01	47 45	129 26	. . .	20 04 Azim.	
10	46 33	46 16	130 30	. . .	18 22 Azim.	
11	45 10	45 08	131 28	. . .	18 29 plus Azim.	
12	44 14	44 00	132 10	. . .	17 20 Azim.	
13	43 05	42 56	132 48			
14	40 54	40 38	134 13	. . .	16 14 Azim.	
15	38 54	38 45	135 20	. . .	15 37 Azim. 15 27 Amp. Westly.	

DAYS.

TI

Sept.

4

5

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11

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15



VARIATION  
of the Compass.  
EAST.

DAYS.	DEGREES	WINDS	REMARKS
	of the THERM.	AND WEATHER.	AND OBSERVATIONS.
	Above the freezing point.		
Sept.			
22 30 Azim.	4 14,0	From W. to N. W. fresh breeze; fine weather.	On the 4th, at 4 <sup>h</sup> P. M. perceived the coast of <i>America</i> from N. N. E. to N. E. by E.
	5 14,5	From N. W. to S. S. W. var. faint; followed by calm, and thick fog.	On the 4th, at 4 <sup>h</sup> 25' P. M. } <i>M.</i> } 0 1 "
	6 14,0	From S. to E. S. E. faint, followed by calm; fine weather, dew in the night.	Long. } and } 129 58 30 W. } by 2 sets ○ — ( } <i>Cb.</i> }
22 00 Amp. Eastly.	7 13,0	From S. E. to N. W. round by the S. faint and calm; weather overcast.	On the 5th, at noon, the North point of <i>Berkley</i> Sound bore E. by N.; <i>Nootka</i> Sound N.
22 24 Azim.	8 14,0	W. N. W. light breeze; fog, followed by fine weather.	On the 6th, at noon, <i>Berkley</i> Sound bore E. by S. 4 or 5 leagues; at 5 P. M. anchored in 50 fathoms, over a bottom of black and oozy sand, at 2½ or 3 leagues from the coast; the N. point of <i>Berkley</i> Sound bearing E. by S.
21 15 Amp. Westly.	9 16,0	From E. N. E. to N. light breeze and fine weather.	On the 7th, at ½ past 1 P. M. got under way in order to increase our distance from the coast.
20 04 Azim.	10 15,0	From N. N. E. to S. E. by S. pleasant breeze; foggy weather.	On the 8th, at ½ past 6 P. M. the entrance of <i>Berkley</i> Sound bore N. E. ½ E. 6 leagues, whence we took our departure.
18 22 Azim.	11 13,0	From S. W. to W. N. W. pleasant breeze; fine weather.	
18 29 plus Azim.	12 18,0	From W. N. W. to W. S. W. faint and calm; cloudy weather.	On the 12th, saw some <i>Sea-larks</i> and a small land-bird.
17 20 Azim.	13 16,0	From W. N. W. to N. W. pleasant breeze; fine weather.	
	14 15,5	N. W. fresh breeze; dull weather.	
16 14 Azim.	15 17,0	From W. N. W. to W. by S. moderate; fine weather, then overcast.	On the 15th, was taken on board a small land-bird.
15 37 Azim.			
15 27 Amp. Westly.			

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass.	DAYS
	by account. NORTH.	by observ. NORTH.	by account. WEST.	by observ. WEST.		
1791.	0 /	0 /	0 /	0 /	0 /	
Sept. 16	37 06	36 58	136 07	. . .	14 43 Azim.	Sept. 16
17	35 19	35 03	137 39			17
18	32 58	32 43	139 27			18
19	31 02	30 58	140 51	139 03	11 58 Azim.	19
20	29 57	29 50	141 53	. . .	10 56 Azim. 10 30 Amp. Eastly.	20
21	28 47	29 46	143 08	141 33	10 12 Azim.	21
22	29 32	29 34	144 04	. . .	11 00 Amp. Eastly. 11 14 Azim.	22
23	28 32	28 30	145 16	143 47	10 15 Amp. Westly.	23
24	27 35	27 36	146 19	. . .	10 46 Azim. 9 30 Amp. Westly.	24
25	26 35	26 30	146 51	. . .	10 00 Amp. Eastly. and Westly.	25
26	26 02	26 07	147 14	. . .	9 32 Amp. Eastly. 9 13 Azim.	26

VARIATION  
of the Compass.  
EAST.

0  
14 43 Azim.  
  
11 58 Azim.  
  
10 56 Azim.  
10 30 Amp. Eastly.  
  
10 12 Azim.  
  
11 00 Amp. Eastly.  
11 14 Azim.  
  
10 15 Amp. Westly.  
  
10 46 Azim.  
9 30 Amp. Westly.  
  
10 00 Amp. Eastly.  
and Westly.  
  
9 32 Amp. Eastly.  
9 13 Azim.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
Sept.	Above the freezing point.		
16	16,5	From W. by N. to N. N. W. pleasant breeze; cloudy weather.	
17	18,0	From N. N. E. to N. E. fresh breeze; weather overcast and foggy.	
18	17,5	From N. N. E. to N. E. strong breeze, followed by squalls; weather overcast.	On the 18th, saw for the first time <i>Flying-fishes</i> , and a small land-bird of the species of the <i>Canary</i> .
19	20,0	From N. E. to S. E. light breeze; clear weather.	On the 19th, in the morning, and reduced to noon, } <i>M.</i> } 0 1 " and } 139 03 00W. } <i>Cb.</i>
20	20,0	From S. E. to S. by E. pleasant breeze, with squalls; cloudy weather.	Long. } by 2 sets D—C } <i>Cb.</i>
21	21,0	From S. S. W. to S. S. E. faint; same weather.	On the 20th and 21st, saw <i>Tropic-birds</i> and <i>Quebrantabueffos</i> .
22	21,5	From S. S. E. to S. E. by E. moderate breeze; weather overcast; followed by fine weather.	On the 21st, at 8 <sup>h</sup> 00' A. M. } <i>M.</i> } 0 1 " Long. } and } 142 24 30W. } <i>Cb.</i>
23	21,5	From S. E. to S. S. E. pleasant breeze; clear weather.	On the 23d, at 9 <sup>h</sup> 37' A. M. } <i>M.</i> } Long. } and } 143 38 00W. } <i>Cb.</i>
24	20,0	From S. E. by E. to E. faint breeze; weather overcast.	Since the 22d, we daily saw <i>Flying-fishes</i> , <i>Tropic-birds</i> , <i>Sea-larks</i> , and, from time to time, <i>Tunnies</i> and <i>Dolphins</i> .
25	21,0	From E. S. E. to S. E. by E. light breeze, followed by calm; fine weather.	
26	23,0	From S. E. by E. to S. S. E. faint and calm; clear weather.	

TIME.	LATITUDE		LONGITUDE		VARIATION of the Compass. EAST.
	by account. NORTH.	by observ. NORTH.	by account. WEST.	by observ. WEST.	
1791.	0 /	0 /	0 /	0 /	0 /
Sept. 27	25 53	25 56	147 29	. . .	9 54 Azim.
28	24 20	24 16	148 09	. . .	9 34 Azim.
29	22 38	22 37	149 44	. . .	8 49 Azim.
30	21 02	21 02	151 16	149 27	8 25 Azim.
October 1	19 46	19 41	152 49	150 59	8 04 Azim.
2	19 15	19 15	154 39	. . .	8 30 Azim.
3	19 17	19 14	156 49	156 54	
4	19 09	19 13	158 26	. . .	8 00 Azim.
	Point whence the bearing was taken off the Island of <i>O. Whybee.</i>			156 54	
5	18 57	18 54	Longitude of the place whence the bearing was taken.		158 13
	. . .	19 00	Ditto.		
	. . .	19 05	Ditto.		
7	At 6 P. M. point of departure in sight of <i>O. Whybee.</i>				
	. . .	19 04	. . .	158 29	

DAY'S.	of TH
Sept.	Abou fre po
27	21
28	21
29	23
30	22
Oct.	
1	24
2	24
3	24
4	24
5	24
6	24
7	24

VARIATION  
of the Compass.  
EAST.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
			Above the freezing point.
Sept.			
9 54 Azim.	22,5	From E. by S. faint to E. N. E. moderate; fine weather.	On the 30th, at 4 <sup>h</sup> 01' P. M. } <i>M.</i> . 149 47 30 Long. } <i>Cb.</i> . 149 41 30 by 4 fets ☉—☾ } Mean 149 44 30W.
9 34 Azim.	21,5	East, pleasant breeze; fine weather.	On the 1st of October, at 3 <sup>h</sup> 28' 30" P. M. } <i>M.</i> . 151 18 52 Long. } <i>Cb.</i> . 151 13 08 by 4 fets ☉—☾ } Mean 151 16 00W.
8 49 Azim.	23,0	East, fresh breeze; fine weather.	On the 2d, saw some sea-weed.
8 25 Azim.	22,5	From E. to N. E. pleasant breeze; fine weather.	On the 3rd, at 2 <sup>h</sup> 15' P. M. } <i>M.</i> } 0 , " Long. } and } 155 17 30W. by 2 fets ☉—☾ } <i>Cb.</i> }
8 04 Azim.	24,0	N. E. by E. pleasant breeze; fine weather.	Saw a great many <i>Tunnies</i> and <i>Bonitoes</i> , some sea-weed, and a few <i>Tropic-birds</i> .
	24,0	From N. to E. pleasant breeze; dull weather.	On the 4th, at 10 A. M. saw the Island of <i>O-Wybee</i> , bearing W. N. W. 3° W.; at noon, it extended from W. 2° 30' N. to N. W. 7° W. distant 8 or 10 leagues.
8 30 Azim.	24,0	From E. to E. S. E. moderate, followed by squalls; cloudy weather.	On the 5th, at noon, the fourth point of the Island of <i>O-Wybee</i> bore E. by N. 5° E.; and the western extremity in sight, N. W. 8° N.
8 00 Azim.	24,0	From E. to E. N. E. moderate breeze; fine weather.	On the 6th, at noon, the Island of <i>O-Wybee</i> extended from N. by W. 2° 30' N. to E. S. E. 2° 30' S.; distance off shore, 1 ½ leagues.
	24,0	From N. E. to E. S. E. fresh breeze; intervals of calm; fine weather	The same day, at 6 <sup>h</sup> P. M. the island bore from N. 5° E. to E. S. E. 2° 30' E. distance 2 leagues from the nearest shore.
	24,0	From E. S. E. to E. light breeze; intervals of calm; fine weather.	On the 7th, at noon, the Island of <i>O-Wybee</i> bore from N. 8° W. to E. S. E. 3° 30' E: distance 2 ½ leagues from the shore.

## MARCHAND'S VOYAGE.

TIME.	LATITUDE		LONGITUDE		VARIATION		DAYS.	of THI.
	by account	by observ.	by account.	by observ.	of the Compaſs.			
	NORTH.	NORTH.	WEST.	WEST.	EAST.			
1791.	0	0	0	0	0			Abol
Oct. 8	19 29	19 19	159 42	.	8 05 Azim.		8	fre pe 24
9	19 35	19 45	160 18	.	8 50 Azim.		9	25
10	19 57	20 26	160 47	.	9 00 Azim.		10	25
11	20 09	20 10	162 00	.	8 38 Azim. 8 03 Amp. Weſtly.		11	26
12	19 08	18 53	163 06	.	8 21 Azim.		12	25
13	17 26	17 22	165 10	.	8 41 Azim. 8 24 Amp. Weſtly.		13	26
14	15 52	15 48	167 21	.	8 56 Azim.		14	25
15	14 47	14 45	169 30	.	9 24 Azim. 9 52 Amp. Weſtly.		15	25
16	14 19	14 16	171 33	.	10 14 Azim. 10 59 Amp. Weſtly.		16	26
17	13 50	13 30	173 37	.	10 26 Azim.		17	26
18	13 37	13 34	175 48	.			18	25
19	13 33	.	177 23	178 48	10 56 Azim.		19	23
20	13 32	13 32	178 48	EAST. 179 41	10 58 Azim.		20	26

MARCHAND'S VOYAGE.

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VARIATION of the Compaſs. EAST.	DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
	07.	Above the freezing point.		
8 05 Azim.	8	24,0	From W. S. W. to E. S. E. round by the S. var. faint; clear weather.	On the 8th, at $\frac{1}{2}$ paſt 8, A. M. ſaw the Iſland of <i>Mowee</i> , bearing N. N. E. 8° E.
8 50 Azim.	9	25,0	Calm, then from S. to S. E. faint; cloudy weather.	On the 9th, at $\frac{1}{2}$ paſt 5 P. M. ſtill perceived the ſummit of <i>O. Whybee</i> bear- ing E. 2° 30' N. diſtant 46 leagues.
9 00 Azim.	10	25,0	From E. to N. E. faint; intervals of calm; clear weather.	On the 10th, at noon, the Iſland of <i>Atowi</i> ſhewed itſelf to the W. N. W. 3° N. at the diſtance of 34 leagues.
8 38 Azim. 8 03 Amp. Weſtly.	11	26,0	From N. E. to E. mode- rate breeze; fine wea- ther.	From the time of our leaving the <i>Sand- wich</i> Iſlands, we conſtantly ſaw <i>Boobies</i> , <i>Man-of-war-birds</i> , <i>Tropic-birds</i> , <i>Terns</i> , <i>Flying-fiſhes</i> , and now and then <i>Tunnies</i> and <i>Bonitos</i> .
8 21 Azim.	12	25,5	From N. E. to E. plea- ſant breeze; fine wea- ther.	
8 41 Azim. 8 24 Amp. Weſtly.	13	26,0	E. N. E. freſh breeze; clear weather.	
8 56 Azim.	14	25,5	Ditto; ditto.	
9 24 Azim. 9 52 Amp. Weſtly.	15	25,0	Ditto moderate; fine wea- ther.	
10 14 Azim. 10 59 Amp. Weſtly.	16	26,5	From E. N. E. to E. by N.; pleaſant breeze; cloudy weather.	
10 26 Azim.	17	26,0	From E. by N. to E. N. E. freſh breeze, followed by ſqualls; cloudy wea- ther.	
	18	25,0	From E. N. E. to E.; moderate weather, fol- lowed by ſlight ſqualls cloudy weather.	On the 19th, at 9 <sup>h</sup> 42' A. M. } <i>M.</i> Long. } and } 178 30 00 W. by 2 ſets } — ○ } <i>Cb.</i>
10 56 Azim.	19	23,5	East, ſqually with rain; weather overcaſt.	
10 58 Azim.	20	26,2	From E. to E. N. E. moderate; clear wea- ther.	On the 20th, at 8 <sup>h</sup> 26' 39" A. M. } <i>M.</i> Long. } and } 179 54 00 E. by 2 ſets } — ○ } <i>Cb.</i>

TIME.	LATITUDE		LONGITUDE		VARIATION of the Compaſs. EAST.	DAYS.
	by account.	by obſerv.	by account.	by obſerv.		
	NORTH.	NORTH.	EAST.	EAST.		
1791.	0 /	0 /	0 /	0 /	0 /	08.
Oct. 21	13 34	13 32	179 23	. . .	12 02 Azim. 11 08 Amp. Weſtly.	21
22	13 34	13 36	177 17	. . .	12 07 Azim. 12 33 Amp. Eaſtly.	22 23
23	13 40	13 40	175 18	172 33	12 49 Azim.	24
24	13 43	13 44	173 09	. . .	11 46 Azim.	25
25	13 48	13 45	170 33	. . .	13 05 Azim.	26
26	13 49	13 45	167 56	. . .	12 27 Azim.	27
27	13 48	13 51	165 08			27
28	13 36	13 42	163 08	. . .	11 05 Azim. 10 39 Amp. Weſtly.	28
29	13 43	. . .	160 46	. . .	10 10 Azim.	29
30	13 24	13 24	158 36	. . .	9 40 by 8 Azim.	30
31	13 29	. . .	156 29	. . .	8 04 Azim.	31
Nov. 1	13 44	13 42	154 42	. . .	8 08 by 5 Azim.	Nov. 1 2
2	14 24	14 26	152 38	145 14	7 27 Azim.	2
3	14 59	15 06	150 31			3



MARCHAND'S VOYAGE.

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VARIATION of the Compass. EAST.	DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
0	08.		Above the freezing point.	
12 02 Azim.	21	25,5	E. by N. pleasant breeze; fine weather.	On the 21st, saw a small land-bird, resembling a <i>Plover</i> , and a great number of oceanic birds.
11 08 Amp. Westly.	22	25,5	Ditto, ditto.	
12 07 Azim.	23	26,0	From E. by N. to E. N. E. pleasant breeze; cloudy weather.	On the 23th, at 8 <sup>h</sup> 43' A. M. } <i>M.</i> Long. } and } 172 51 30 E. by 4 sets ☉—☉ } <i>Ch.</i>
12 33 Amp. Eastly.	24	25,5	E. N. E. fresh; squalls at intervals; fine wea- ther.	On the 24th, saw a land-bird, and various oceanic birds, such as <i>Boobies</i> , <i>Man-of-war-birds</i> , <i>Tropic-birds</i> , <i>Mewes</i> , &c.
12 49 Azim.	25	25,0	E. N. E. fresh by squalls, with rain; cloudy wea- ther.	
11 46 Azim.	26	25,5	From E. by N. to E. N. E. fresh breeze; fine weather.	From time to time saw birds of the same species.
13 05 Azim.	27	25,0	From E. N. E. to E. by S. moderate breeze; fine weather.	
12 27 Azim.	28	26,0	From E. to E. N. E. mo- derate breeze; fine wea- ther.	
11 05 Azim.	29	25,0	From E. by N. to E. N. E. fresh breeze, followed by squalls and rain.	
10 39 Amp. Westly.	30	26,7	From E. S. E. to E. N. E. moderate; followed by squalls and rain.	
10 10 Azim.	31	25,0	Ditto; ditto.	
9 40 by 8 Azim.				
8 04 Azim.				
8 08 by 5 Azim.	Nov. 1	24,0	Ditto; rainy weather.	
7 27 Azim.	2	25,5	From E. to S. S. W. variable in squalls; weather overcast and rainy.	On the 2d, saw a small <i>white Mew</i> . On the 2d, at 2 <sup>h</sup> 27' P. M. } <i>M.</i> Long. } and } 148 02 00 E. by 4 sets ☉—☉ } <i>Ch.</i>
	3	24,0	S. S. E. stiff breeze, ac- companied by squalls; rainy weather.	

## MARCHAND'S VOYAGE.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass.
	by account. NORTH.	by observ. NORTH.	by account. EAST.	by observ. EAST.	
1791.	0 /	0 /	0 /	0 /	0 /
				144 34 or 144 13	
Nov. 4	14 53	14 50	148 15	by a mean corrected, between the observations of the 2d and those of the 4th.	6 12 Azim.
5	15 13	15 30	147 29		5 50 Azim.
6	15 58	16 02	146 29	. . .	5 16 Azim.
7	16 07	16 12	146 03	. . .	4 52 Azim.
8	16 47	17 03	144 17	. . .	4 36 Azim.
9	18 09	18 00	141 59		
10	18 53	18 48	140 00	. . .	2 58 Azim.
11	19 34	19 41	138 08	. . .	2 32 Azim.
12	20 24	20 26	136 27	. . .	2 12 Azim.
13	21 05	21 05	134 57	. . .	2 17 Azim.
14	21 27	21 19	132 57	. . .	1 29 Azim.
15	21 38	21 46	131 16		
16	21 50	21 34	128 21	122 06	0 00 Azim.

DAYS.	0	TH
Nov.	Abc	fre
4	25	25
5	26	26
6	26	26
7	26	26
8	25	25
9	25	25
10	25	25
11	24	24
12	25	25
13	24	24
14	24	24
15	22	22
16	22	22



TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compaſs. EAST.
	by account. NORTH.	by obſerv. NORTH.	by account. EAST.	by obſerv. EAST.	
1791.	0 /	0 /	0 /	0 /	0 /
Nov. 17	21 48	21 58	126 16	. . .	0 12 Azim.
18	21 41	. . .	124 47		
	Point whence the bearing was taken off the Iſland of <i>Formoſa.</i>				
	. . .	21 48	. . .	118 28	
19	22 17	. . .	116 47		
20	22 34	. . .	114 35		
21	22 24	. . .	113 33		
	Point whence the bearing was taken off <i>Pedra Branca.</i>				
	. . .	22 24	. . .	113 00	
22	<i>Ling-Ting</i> Iſland bearing half a mile North.				
23	At anchor under <i>Cbi-Cbow</i> Iſland.				
	. . .	22 03½			
24	. . .	22 03½			

DAYS.	DI
Nov. 17	Ab fr p 2
18	2
19	22
20	19
21	19
22	11,
23	10,
24	11,

VARIATION  
of the Compaſs.  
EAST.

0 12 Azim.

DEGREES	WINDS	REMARKS
of the	AND	AND
THERM.	WEATHER.	OBSERVATIONS.
Nov.		
	Above the freezing point.	
17	24,0 From N. E. to E. N. E. moderate; fine weather.	On the 17th, at 7 A. M. perceived the Iſlands of <i>Botel-Tabago-Xima</i> bearing W. $\frac{1}{2}$ ; at noon, the great <i>Botel</i> Iſland bore from W. by N. $1^{\circ}$ W. to N. N. W. $1^{\circ}$ W. about 7 leagues; the ſmall iſland of that name bore W. $3^{\circ}$ S. and the middle of the channel which ſeparates them W. $6^{\circ}$ N. The ſame day, at 5 P. M. ſaw the Iſland of <i>Formoſa</i> bearing W. by N.
18	23,5 From N. E. by E. to E. freſh breeze; fine weather.	On the 18th, at noon, the ſouth point of <i>Formoſa</i> bore E. N. E. $\frac{1}{2}$ N. diſtant about $4\frac{1}{2}$ leagues.
19	22,0 From S. S. E. to N. round by the E. accompanied by ſqualls; weather overcaſt and rainy.	On the 20th, at $\frac{1}{2}$ paſt 6 A. M. perceived the coaſt of <i>China</i> to the N. W: ſince midnight, the ſoundings are 22, 25, and 30 fathoms, over a bottom of gray ſand; ſeveral Chineſe fiſhing-veſſels in ſight.
20	19,0 N. E. freſh, followed by ſqualls; gloomy weather.	On the 21ſt, at $\frac{1}{2}$ paſt 7 A. M. perceived <i>Pedra Branca</i> to the W. by S. $3^{\circ}$ S.; the lead indicated from 35 to 30 fathoms, gray ſand, and there were ſtill a number of fiſhing-boats in ſight. At $\frac{1}{2}$ paſt 9, <i>Pedra Branca</i> bearing N. 2 miles, hove to till noon, waiting for a pilot. In the evening of the ſame day, came to an anchor in 18 fathoms over a bottom of ſoft mud, the <i>Grand Lema</i> bearing S. W. and the entrance of the <i>Deep Bay</i> N. W. by N. diſtant 2 leagues.
21	19,0 From E. N. E. to N. freſh breeze, accompanied by ſqualls and rain; foggy weather.	
22	11,0 From N. N. E. to N. N. W. freſh breeze, accompanied by ſqualls; weather overcaſt.	
23	10,0 From N. N. W. to N. N. E. ſtrong breeze, accompanied by ſqualls; weather overcaſt.	On the 22d, in the morning, got under way: at noon, ranged along the Iſland of <i>Ling-Ting</i> at a little diſtance to the ſouth; at $\frac{1}{2}$ paſt noon, anchored in 13 fathoms, muddy bottom, the Peak of <i>Cbi-Cbow</i> bearing N. N. E. $\frac{1}{2}$ E. 1 mile from the land.
24	11,0 From N. to N. E. moderate; fine weather.	

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compaſs.
	by account. NORTH.	by obſerv. NORTH.	by account. EAST.	by obſerv. EAST.	
1791.	0 /	0 /	0 /	0 /	0 /
Nov. 25	. . .	22 11			
26-27					
28					
29					
30					
Dec. 1	At anchor in <i>Macao</i> Road, near the <i>Tyga</i> .				
2					
3					
4					
5					
6					
7	Point of Departure at 0 <sup>h</sup> $\frac{3}{4}$ after midnight.				
	. . .	21 55	. . .	LII 22	
	20 47	20. 94	III 35		
8	18 12	17 54	III 04		
9	15 21	15 18	III 26		
10	13 22	13 22	109 25		

DAYS.

Nov.

25

26-27

28

29

30

Dec.

1

2

3

4

5

6

7

8

9

10

VARIATION  
of the Compass.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
			Above the freezing point.
Nov. 25	11,0	From N. N. E. to N. pleasant breeze; fine weather.	On the 25th, at 6 A. M. got under way; and the same day, at $\frac{1}{2}$ past 11 A. M. came to in the road of <i>Macao</i> in $5\frac{1}{2}$ fathoms, over a bottom of soft mud, the town of <i>Macao</i> bearing N. W. $\frac{1}{2}$ W. 2 leagues; Point <i>Peac</i> of <i>Montanha</i> Island N. N. E. $\frac{1}{4}$ E.; and the Peak of <i>Lan-Tao</i> E. N. E. $\frac{1}{2}$ N.
26-27	11,0	From N. to N. N. E. fresh breeze; fine weather.	On the 26th, as we had lost by sailing round the world by the west, we added one to the computation of time on board the ship, and we reckoned the 27th of November in lieu of the 26th.
28	11,0	From N. to N. N. E. strong gale and violent squalls; gloomy weather.	
29	12,0	Ditto; ditto.	
30	13,0	N. N. E. moderate; fine weather.	
Dec. 1	14,5	Ditto; ditto.	
2	15,0	North, moderate; fine weather.	
3	13,5	Ditto, fresh; clear weather.	On the 3rd, at 3 <sup>h</sup> P. M. we weighed anchor, and at $\frac{1}{2}$ past 5 brought up near the <i>Typa</i> , the town of <i>Macao</i> bearing W. N. W. $\frac{1}{2}$ N.; the Peak of <i>Montanha</i> S. W. $\frac{1}{2}$ W.
4	15,0	From N. to N. N. E. fresh breeze; weather overcast.	
5	16,5	Ditto, moderate; cloudy weather.	
6	16,0	Ditto, fresh; clear weather.	On the 6th, at 6 P. M. got under way from the road of <i>Macao</i> .
7	21,0	From N. by E. to N. E. by E. accompanied by squalls; weather overcast.	On the 7th, at $\frac{3}{4}$ past midnight, the South extremity of the <i>Grand Lema</i> bore E. $1\frac{1}{2}$ or 2 leagues, whence we took our departure.
8	23,0	N. E. strong breeze; clear weather.	On the 8th, at $\frac{1}{2}$ past 5 A. M. being on the <i>Macclesfield</i> bank, founded in 65 fathoms, bottom of small broken shells, mixed with fine black and white gravel.
9	23,0	Ditto; ditto.	
10	24,0	From N. E. to N. N. E. fresh breeze; clear weather.	On the 10th, saw a <i>Sea-snake</i> on the water.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass.	DAYS.
	by account.	by observ.	by account.	by observ.		
	NORTH.	NORTH.	EAST.	EAST.		
1791.	0 /	0 /	0 /	0 /	0 /	
Dec. 11	11 18	11 14	107 20			Dec. 11
	9 38	. . .	106 17			
12	Point of departure deduced from the bearing taken off <i>Pulo-Sapata</i> .					12
	. . .	9 12	. . .	106 16		
13	7 36	6 53	104 40			13
14	4 52	4 40	103 35			14
	3 23	. . .	103 12			
15	Point of departure deduced from the bearing taken off <i>Pulo-Aor</i> .					15
	. . .	3 02	. . .	102 19		
16	1 46	. . .	103 05			16



MARCHAND'S VOYAGE.

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VARIATION  
of the Compass.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
	Above the freezing point.		
11	22,0	From N. N. E. to N. E. fresh breeze; weather overcast.	On the 11th, saw a number of <i>Boobies</i> ; at $\frac{1}{2}$ past 4 P. M. perceived the <i>Three Brothers</i> bearing W. by S. about 5 leagues: at midnight following, saw <i>Pulo-Sapata</i> , to the S. W. by W; and three quarters of an hour after, it bore directly W. 4 or 5 miles, whence we took our departure.
12	22,0	From N. N. E. fresh to E. moderate; weather overcast.	
13	23,5	From E. to N. E. fresh in squalls; weather overcast.	On the 13th, saw some <i>Sea-swallows</i> and <i>Boobies</i> : at $\frac{3}{4}$ past 11 P. M. founded in 49 fathoms, bottom soft mud.
14	24,5	From S. E. by E. to N. E. moderate, in squalls; weather overcast.	On the 14th, the lead successively indicated 40, 50, and 45 fathoms, bottom of mud and oozy sand.
15	21,0	Var. from E. N. E. to N. W. found by the S. squalls with rain.	On the 15th, at 6 A. M. perceived <i>Pulo-Timoan</i> to the S. S. W. soundings from 36 to 38 fathoms, bottom of hard mud: at 8 A. M. the S. E. extremity of <i>Pulo-Piffang</i> S. $\frac{1}{2}$ W.: at $\frac{3}{4}$ past 2 P. M. <i>Pulo-Aor</i> bore S. S. W. 4 or 5 leagues, whence we took our departure.
16	22,0	From N. N. W. to N. by E. moderate; weather overcast and rainy.	On the 16th, saw some <i>Sea-snakes</i> on the water.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass.
	by account.	by observ.	by account.	by observ.	
	NORTH.	NORTH.	EAST.	EAST.	
1791.	0 1	0 1	0 1	0 1	0 1
Dec. 17	0 04	. . .	103 12		
	SOUTH.	SOUTH.			
18	0 20	1 15	102 57		
	Longitude, after taking the bearing, 6 leagues to the North of Banca. . .			103 18	
19	At anchor on the North Coast of Banca Island.				
	1 23	. . .	107 07		
20	At anchor on the coast of Banca Island.				
	1 16	. . .	103 16		

DAYS.

Dec.

17

18

19

20

VARIATION  
of the Compaſs.

DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
Above the freezing point.		
17 23,0	Variable, squalls and rain; weather overcaſt.	On the 17th, at $\frac{1}{2}$ paſt 9 A. M. ſaw an <i>Iſland</i> to the S. S. W.; at $\frac{1}{2}$ paſt 10 founded in 20 fath. bottom of ſand and mud; ſaw ſome <i>Sea-snakes</i> , and pieces of wood drifting before the ſea. At $\frac{1}{2}$ paſt 5 P. M. perceived the coaſt of the <i>Iſland of Banca</i> from S. to S. S. W.: anchored immediately in 19 fathoms, over a bottom of ſand and mud, the north point, or <i>Point Peſant</i> of <i>Banca</i> <i>Iſland</i> bearing S. a few degrees E.; the W. extremity in ſight of the coaſt of the ſame <i>iſland</i> S. S. W.
18 24,0	From N. W. to N. W. by N. moderate; fine wea- ther.	On the 18th, at $\frac{1}{2}$ paſt 7 A. M. weighed anchor. At noon, the N. coaſt of <i>Banca</i> extended from S. E. $\frac{1}{2}$ S. to S. W. $\frac{1}{2}$ S. diſtance 6 leagues: founded in 19 and 18 fathoms, bottom of ſand and mud. At $\frac{1}{2}$ paſt 3 P. M. anchored in 16 fathoms, bottom of ſand, gravel, and ſhells, the coaſt of <i>Banca</i> <i>Iſland</i> bearing from E. by S. to S. W. by W. diſtance off ſhore 3 leagues. The currents ſet to the E. S. E. the whole night, and in the morning of the 19th to the S. S. W.
19 24,5	From N. to N. W. freſh; fine weather.	On the 19th, at $\frac{1}{2}$ paſt 1, got under way. At 6 P. M. anchored in 18 fathoms, fine gray ſand, mixed with broken ſhells; <i>Banca</i> <i>Iſland</i> bearing from S. S. E. to S. W.; the currents ſet to the E. S. E. while we remained at anchor till the morning of the 21ſt.
20 24,0	From N. W. to N. N. W. freſh, accompanied by ſqualls; cloudy wea- ther.	

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compaſs.
	by account. SOUTH.	by obſerv. SOUTH.	by account. EAST.	by obſerv. EAST.	
1791.	0 /	0 /	0 /	0 /	0 /
Dec. 21	1 29	1 30	103 32	. . .	0 00 Amp. Weſly.
	} Long. from whence the bearing was taken off the North Point of Banca,			103 42	
22	2 10	2 21	104 12		

DAYS.

Dec.

21

22

VARIATION  
of the Compass.

DAYS.	DEGREES	WINDS	REMARKS
	of the THERM.	AND WEATHER.	AND OBSERVATIONS.
	Above the freezing point.		
Dec. 21	25,0	From N. W. by N, to N. pleasant breeze; fine weather.	On the 21st, at $\frac{1}{2}$ past 7 A. M. got under way. At noon, point <i>Pesant</i> of <i>Banca</i> Island bore from W. $\frac{1}{2}$ S. to S. W. by W. $4^{\circ}$ W. the part of its coast in sight to the eastward, S. E. by S.; the soundings were 19 fathoms, with a rocky and gravelly bottom. At $\frac{3}{4}$ past 6 P. M. anchored in 14 fathoms, over a bottom of sand, gravel and broken shells. Point <i>Brisée</i> of the Island of <i>Banca</i> bear- ing W. S. W. $5^{\circ}$ W. The currents set to the S. E. and E. S. E. but with no great strength.
22	25,0	From N. W. to N. N. W. moderate; fine wea- ther.	On the 22d, at 50 min. past 7 A. M. got under way. At noon, the extremi- ties of a lofty mountain on the Island of <i>Banca</i> bore from S. S. W. to S. W. $4^{\circ}$ W. the East point of <i>Banca</i> S. E. $2^{\circ}$ S. <i>Gaspard</i> Island East. The depth of wa- ter was 14 fathoms, over a bottom of sand and gravel, mixed with broken shells. At 40 min. past 6, anchored in <i>Gaspard's</i> Strait in 17 fath. bottom sand and gravel; a hummock on the East point of <i>Banca</i> bearing N. N. W. $\frac{1}{2}$ N. <i>Gaspard</i> Island N. by E. $2^{\circ}$ E. the Pen- insula of <i>Sel</i> from S. S. W. to W. $1^{\circ}$ S. The currents set to the S. E. and to S. $1 \frac{1}{2}$ miles per hour.

0 00 Amp. Westly.

## MARCHAND'S VOYAGE.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compas.
	by account. SOUTH.	by observ. SOUTH.	by account. EAST.	by observ. EAST.	
1791.	0 /	0 /	0 /	0 /	0 /
Dec. 23	3 05	3 30	104 28		
24	3 50	3 51	104 06		
25	4 08	4 25	103 46		
26	4 59	5 04	103 36		

DAYS.	DE
	o
	TH
	Abc
	frs
	P
	2
23	
24	2
25	2
26	2

VARIATION of the Compass.	DAYS.	DEGREES	WINDS	REMARKS
		of the THERM.	AND WEATHER.	AND OBSERVATIONS.
		Above the freezing point.		
0 /	23	24,5	From W. to N. W. moderate; fine weather.	On the 23d, at $\frac{1}{2}$ past 6, A. M. got under way; at $\frac{1}{4}$ past 9, we were clear of <i>Gaspard</i> Strait. At noon, the S. E. part of <i>Banca</i> Island bore from N. W. $\frac{1}{2}$ W. to N. N. W. $\frac{1}{2}$ N.; the lead indicated from 10 to 11 fathoms, with a bottom of sand and gravel. At $\frac{1}{2}$ past 9, P. M. anchored in $12\frac{1}{2}$ fathoms, bottom sand and mud, out of sight of land. The currents set S. E. by S. then to S. S. W. faint.
	24	24,0	Variable in squalls; weather overcast.	On the 24th, at 11 A. M. got under way, and at 5 P. M. anchored in 10 fathoms, oozy sand. The currents set E. S. E. then N. W. very faint.
	25	24,0	From W. N. W. to N. N. W. moderate; fine weather.	On the 25th, at 8 A. M. got under way. At $\frac{1}{2}$ past noon, perceived the coast of <i>Sumatra</i> , W. 6 or 7 leagues. At 8 P. M. anchored in $12\frac{1}{2}$ fathoms, over a bottom of sand and shells. The currents set E. sometimes inclined to the South, at others to the North.
	26	25,0	From N. W. to S. faint, squally; weather overcast.	On the 26th, at $\frac{1}{2}$ past 6 A. M. got under way. At 7 perceived the <i>Two Brothers</i> bearing S. W.; at noon, they bore from S. W. to S. W. $\frac{1}{2}$ W. distant one league. At $\frac{1}{2}$ past 4, P. M. anchored in 10 fathoms, sand, mud, and shells, the <i>Two Brothers</i> bearing from N. E. by N. to N. N. E. $\frac{1}{2}$ N. $1\frac{1}{2}$ leagues. The currents set S. S. W. till midnight, then N. E.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass.
	by account.	by observ.	by account.	by observ.	
	SOUTH.	SOUTH.	EAST.	EAST.	
1791.	0 /	0 /	0 /	0 /	0 /
Dec. 27	5 17	5 22	103 26		
28	5 32	5 34	103 19		
29	5 37	. . .	103 18		
30	At anchor near <i>Norib</i> Island.				
	5 42	5 45	103 16		

DAYS.
Dec.
27
28
29
30



VARIATION  
of the Compass.

DAYS.	DEGREES	WINDS	REMARKS
	of the THERM.	AND WEATHER.	AND OBSERVATIONS.
Dec. 27	Above the freezing point. 25,5	From W. S. W. to E. round by the N. light breeze, followed by calm; gloomy wea- ther.	On the 27th, at $\frac{1}{2}$ past 6 A. M. got under way. At noon, the South point of the <i>Two Brothers</i> bore N. N. E.; and a large mountain on the Island of <i>Suma- tra</i> S. W. At 4 P. M. anchored in 17 fathoms, muddy bottom, <i>North</i> Island bearing S. W. $\frac{1}{2}$ S.; Cape <i>St. Nicholas</i> of the Island of <i>Java</i> from S. S. E. to S. by E. The current set to the South at the rate of half a league per hour, till 8 P. M.; then N. E.
28	25,5	From W. S. W. to S. S. W. fresh; fine weather.	On the 28th, at $\frac{3}{4}$ past 6, got under way. At noon, Cape <i>St. Nicholas</i> of the Island of <i>Java</i> bore S. S. E. $30^{\circ}$ E. <i>North</i> Island S. W. by S. At $\frac{1}{2}$ past 4, anchored in 20 fathoms, bottom sand and gravel. <i>North</i> Island bearing W. S. W. $\frac{1}{2}$ W. 1 league; <i>Grande Toque</i> South. The currents set rapidly to the S. W. till $\frac{1}{2}$ past 6 P. M. then N. E. till the next day.
29	25,5	From S. S. W. to W. S. W. fresh breeze; fine wea- ther.	On the 29th, it was slack water at 10 A. M. got under way at noon. At 7 P. M. anchored in 22 fathoms, bottom sand and mud, <i>North</i> Island bearing N. W. by W. $\frac{3}{4}$ of a league. <i>Middle</i> Island S. by W. $20^{\circ}$ W. The currents set N. E. 1 mile an hour till the next day.
30	25,0	From S. W. to S. S. W. fresh breeze; fine wea- ther.	On the 30th, remained at anchor; the tide or current was slack the whole morning; after noon, the current set S. W. till 7 P. M. then N. E. till the next morning.

MARCHAND'S VOYAGE.

TIME.	LATITUDE		LONGITUDE		VARIATION of the Compaſs. EAST.
	by account.	by obſerv.	by account.	by obſerv.	
	SOUTH.	SOUTH.	EAST.	EAST.	
1791.	0 7	0 7	0 7	0 7	0 7
Dec. 31	5 48	. . .	103 15	. . .	0 49 Amp. Eaſtly.
1792.					
Jan. 1	5 51	5 53	103 01	. . .	
2	6 03	6 03	102 56	. . .	1 22 Amp. Weſtly.

DAY.

Dec.

31

Jan.

1

2

VARIATION  
of the Compass.  
PART.

0 49 Amp. Eally.

1 22 Amp. Westly.

DAYS.	DIRECTIONS of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
<i>Dec.</i>	Above the freezing point.		
31	25,5	From S. W. to S. S. W. fresh breeze; fine wea- ther.	On the 31st, at $\frac{3}{4}$ past 7 A. M. got under way. At noon, <i>Middle Island</i> bore S. S. W. $\frac{1}{2}$ W. ; <i>North Island</i> N. N. W. $\frac{1}{2}$ W. At $\frac{1}{4}$ past 6 P. M. anchored near <i>Remow Island</i> in 30 fathoms; bottom of gravel and broken shells; <i>Middle Island</i> bearing from S. E. to S. S. E. 4 <sup>o</sup> S. the Peak of <i>Cracatoa</i> S. W. $\frac{1}{2}$ W. At 8 P. M. the currents which had set to the S. W. changed their direction, and set N. E. the whole night.
<i>Jan.</i>			
1	24,5	From S. S. W. to W. S. W. light breeze; fine wea- ther.	On the 1st, at 6 A. M. the currents took a direction to the S. W. At $\frac{1}{2}$ past 7 got under way. At noon, the Peak of <i>Sambouricou</i> bore W. by S. ; the Peak of <i>Cracatoa</i> S. W. $\frac{1}{2}$ W. ; <i>Middle Island</i> E. $\frac{1}{2}$ S. At $\frac{1}{4}$ past 6, anchored in 30 fath. bottom oozy sand and broken shells; the Island of <i>Cracatoa</i> and the adjacent islands bearing from S. W. to W. S. W. ; the centre of <i>Sabaffe Island</i> N. W. The currents set N. E. till $\frac{1}{2}$ past 7 A. M. the next day.
2	25,0	From S. S. W. to W. by S. faint; fine weather.	On the 2d, at $\frac{1}{2}$ past 7 A. M. got under way with the current at S. W. At noon, <i>Middle Island</i> bore E. N. E. $\frac{1}{2}$ E. the Peak of <i>Sambouricou</i> Island bore N. W. $\frac{1}{4}$ W. At $\frac{1}{4}$ past 6, P. M. an- chored in 22 $\frac{1}{2}$ fathoms, muddy bottom; <i>Sambouricou</i> Island bearing from N. W. $\frac{1}{2}$ N. to N. ; <i>Cracatoa</i> Island and the ad- jacent islands from S. by W. $\frac{1}{4}$ W. From that moment, the currents set N. and shortly after N. E. till next day.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass.	DAYS.
	by account. SOUTH.	by observ. SOUTH.	by account. EAST.	by observ. EAST.		
1792.	0 /	0 /	0 /	0 /	0 /	
Jan. 3	5 58	. . .	102 52	. . .	0 22 Amp. Eastly.	Jan. 3
	6 04	. . .	102 45			4
4	Point of Departure according to the bearing taken at noon.					
	. . .	6 04	. . .	102 55		5
5	6 30	6 39	102 10			6
6	7 37	7 57	101 24			7
7	8 58	8 54	100 21	. . .	WEST. 0 29 Amp. Westly.	8
8	9 39	9 35	98 53	. . .	EAST. 0 19 Azim.	9
9	10 07	10 22	97 47	. . .	0 48 Azim.	10
10	10 49	10 53	96 42	. . .	1 00 Azim.	11
11	11 20	11 28	95 24	. . .	1 03 Amp. Westly.	12
12	11 57	11 53	94 32	. . .	WEST. 0 40 Azim.	13
13	12 15	12 20	93 14	. . .	0 49 Amp. Eastly.	14
14	13 30	13 30	91 08	. . .	0 51 Azim.	2

VARIATION  
of the Compass.  
EAST.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
	Above the freezing point.		
Jan.			
0 22 Amp. Eastly.	3 25,5	From S. W. to W. faint ; fine weather.	On the 3rd, at 6 A. M. the tide changed and set S. W. ; got under way immediately. At noon, the Island of <i>Sambourico</i> bore N. E. by N. 1 mile.
	4 25,5	Var. faint ; rain, followed by fine weather.	At $\frac{1}{2}$ past 6 P. M. anchored in 39 fath. bottom soft mud. The centre of <i>Sambou- ricou</i> bearing E. N. E. 2° N. the Peak of <i>Craatoa</i> S. E. by S. The currents contin- ued to run to the W. S. W. till
	5 26,0	From W. N. W. fresh in squalls, to S. E. faint ; fine weather.	8 P. M. ; they then set W. N. W. till midnight.
	6 26,5	From E. S. E. to S. S. E. pleasant breeze ; fine weather.	On the 4th, since midnight, the cur- rents set W. S. W. and S. W. At 10 A. M. got under way. At noon, the Island of <i>Craatoa</i> and the adjacent islands bore from E. to E. S. E. 2° S.
WEST.	7 26,2	S. E. by S. pleasant breeze ; fine weather.	<i>Prince's</i> Island, South, whence we took our departure.
0 29 Amp. Westly.	8 25,5	From S. S. E. to S. by E. moderate ; fine weather.	On the 5th, we were clear of the Strait of <i>Sunda</i> , and out of sight of land.
EAST.	9 27,5	From S. E. by S. to S. faint ; fine weather.	On the 6th and 7th, saw a number of <i>Boobies</i> and <i>Tropic Birds</i> .
0 19 Azim.	10 25,5	From S. by E. to S. E. by S. moderate ; fine wea- ther.	On the 10th, 11th, and 12th, saw a great many <i>Boobies</i> , <i>Man-of-war-birds</i> , and <i>Tropic-birds</i> , as well as a quantity of <i>Tunnies</i> and <i>Bonitoes</i> .
0 48 Azim.	11 25,5	From S. by E. to S. E. light breeze ; fine wea- ther.	On the 11th, at $\frac{1}{2}$ past 4 P. M. we perceived to the S. S. E. at 6 leagues' distance, a low island, which we judged to be the most northern of the Islands of <i>Cocos</i> .
1 00 Azim.	12 25,5	From S. S. E. to S. by W. moderate ; fine wea- ther.	On the 13th P. M. spoke a Dutch East-Indiaman bound to <i>Batavia</i> .
1 03 Amp. Westly.	13 25,5	From S. S. E. to E. S. E. pleasant breeze ; fine weather.	On the 13th and 14th, saw the same birds in a smaller number.
WEST.	14 26,5	From S. E. by S. to S. S. E. fresh breeze ; clear wea- ther.	
0 40 Azim.			
0 49 Amp. Eastly.			
0 51 Azim.			

## MARCHAND'S VOYAGE.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass. WEST.	DAYS.
	by account. SOUTH.	by observ. SOUTH.	by account. EAST.	by observ. EAST.		
1792.	0 /	0 /	0 /	0 /	0 /	
Jan. 15	14 42	14 48	88 52	. . .	1 02 Azim.	Jan. 15
16	15 42	15 53	86 30	85 00	1 14 Azim.	16
17	16 53	16 52	84 09	. . .	1 46 Amp. Eastly.	17
18	17 48	. . .	81 67	. . .	2 02 Azim.	18
19	18 40	18 50	79 21	77 33	2 34 Azim.	19
20	19 26	19 38	77 07	. . .	4 56 Amp. Westly.	20
21	19 59	20 10	75 16	. . .	6 12 Azim.	21
22	20 00	20 03	73 09	. . .	6 28 Amp. Westly.	22
23	19 48	19 48	71 13	. . .	7 11 Amp. Westly.	23
24	19 51	19 46	69 53	. . .	8 07 Azim.	24
25	19 45	19 52	68 14	. . .	9 00 Azim.	25
26	19 46	19 46	66 41	. . .	9 53 Amp. Westly.	26
27	19 38	19 37	65 04	62 24	10 18 Amp. Westly.	27
28	20 01	20 04	63 00	. . .	12 28 Azim.	28
	Longitude deduced from the bearing taken off <i>Rodrigue</i> Island in the morning.			59 54		

VARIATION of the Compass. WEST.	DEGREES		WINDS	REMARKS
	DAYS.	of the THERM.	AND WEATHER.	AND OBSERVATIONS.
		Above the freezing point.		
0	Jan.			
1 02 Azim.	15	25,5	From S. S. W. to S. E. fresh breeze; fine weather.	
1 14 Azim.	16	26,0	From S. E. to E. S. E. moderate; cloudy weather.	On the 16th, at 0 <sup>h</sup> 53' 48" A. M. } <i>M.</i> Long. } and } 35 15 00 E. by 4 sets (—○) } <i>Cb.</i>
1 46 Amp. Eastly.	17	25,0	S. E. fresh breeze; fine weather.	On the 17th, saw a red-footed Tropic-bird.
2 02 Azim.	18	25,0	From S. E. by S. to E. S. E. fresh in squalls; cloudy weather.	
2 34 Azim.	19	25,0	E. S. E. fresh breeze; fine weather.	On the 19th, at 8 <sup>h</sup> 01' 47" A. M. } <i>M.</i> Long. } and } 77 59 00 E. by 4 sets D—○ } <i>Cb.</i>
4 56 Amp. Westly.	20	24,0	Ditto, moderate; fine weather.	
6 12 Azim.	21	25,0	From E. S. E. to E. by S. moderate; clear weather.	We saw constantly red-footed Tropic-birds.
6 28 Amp. Westly.	22	25,0	From E. by S. to E. moderate; clear weather.	
7 11 Amp. Westly.	23	24,0	East, variable, moderate; fine weather.	On the 26th, saw some small gray Terns.
8 07 Azim.	24	25,0	East, light; clear weather.	On the 27th, at 11 <sup>h</sup> 21' 15" A. M. } <i>M.</i> Long. } and } 0 1 11 by 4 sets (—○) } <i>Cb.</i>
9 00 Azim.	25	25,2	From E. S. E. to E. light; fine weather.	Ditto, at 3 <sup>h</sup> 34' 44" P. M. } <i>M.</i> Long. } and } 62 00 00 E. by 2 sets ○—D } <i>Cb.</i>
9 53 Amp. Westly.	26	24,6	From E. S. E. to S. E. moderate; fine weather.	
10 18 Amp. Westly.	27	25,0	From E. S. E. to S. E. pleasant breeze; fine weather.	The same day, at 6 P. M. perceived Rodriguez Island bearing W. by S. distant about 14 leagues.
12 28 Azim.	28	25,5	From E. by S. to E. S. E. moderate; clear weather.	On the 28th, at 1/2 past 5, A. M. Rodriguez Island bore N. E. 10° N. which gave for the point of departure 60° 28' East longitude.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass.	DAYS.
	by account. SOUTH.	by observ. SOUTH.	by account. EAST.	by observ. EAST.		
1792.	0 /	0 /	0 /	0 /	0 /	Jan.
Jan. 29	19 57	19 47	57 47			29
30	20 09	. . . .	55 45			30
	Longitude arrived at according to the bearing. . . . .			55 25		
31						
Feb. —	At anchor off Port Nord-Ouest of the Isle of France.					April
March —						19
April 18						20
Ditto	Point of departure in sight of the Isle of France.					21
	. . . .	20 04	. . . .	55 04		
	20 45	20 59	54 00			22
19	Longitude arrived at in sight of the Isle of Bourbon. . . . .			53 23		23
20						
21	At anchor in the Road of St. Denis of the Isle of Bourbon.					24
Ditto	Point of Departure in sight of the Isle of Bourbon.					
	. . . .	20 48	. . . .	53 08		
22	21 31	21 33	52 07			25.
23	23 00	23 06	51 15	. . . .	18 20 Amp. Eastly.	
24	24 21	24 23	50 13			26
25	25 04	25 38	49 20			
26	25 56	25 56	48 49	. . . .	23 00 Azim.	27
27	26 48	26 39	47 26			



VARIATION  
of the Compass.  
WEST.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
	Above the freezing point.		
<i>Jan.</i>			
29	25,0	From S. E. to E. S. E. pleasant breeze; fine weather.	On the 30th, at $\frac{1}{2}$ past 6 A. M. saw <i>Round Island</i> to the W. by N. a few de- grees W. At 8 perceived the <i>Ile</i> of <i>France</i> . At 11 <i>Round Island</i> bore North.
30	25,0	S. E. pleasant breeze; fine weather.	At 4 P. M. anchored at the entrance of <i>Port Nord-Ouest</i> in the <i>Ile</i> of <i>France</i> . On the 31st of January, A. M. an- chored in <i>Port Nord-Ouest</i> , where we remained till the 18th of April following.
<i>April</i>			
19	23,0	S. S. E. light breeze; fine weather.	On the 18th of April, P. M. set sail from <i>Port Nord-Ouest</i> in the <i>Ile</i> of <i>France</i> ; and at 6 P. M. set <i>Gunner's</i> <i>Point</i> N. E. by N. 2° E. and <i>Pitrebos</i> S. E. 7° E. whence we took a point of departure.
20	23,0	From S. E. to S. S. E. moderate; fine wea- ther.	On the 19th, at $\frac{1}{2}$ past 6, A. M. per- ceived the <i>Ile</i> of <i>Bourbon</i> (at this day called the <i>Ile</i> of <i>Réunion</i> ) to the S. W. by W.; at noon, it bore from S. S. W. $\frac{1}{2}$ W. to W. by S. 2° W.
21	22,0	From S. E. to E. S. E. fresh breeze; fine wea- ther.	On the 20th, at $\frac{1}{2}$ past 9 A. M. an- chored in the road of <i>St. Denis</i> in the <i>Ile</i> of <i>Bourbon</i> , in 10 fathoms, over a bottom of sand and gravel, mixed with broken shells.
22	22,0	From E. N. E. to S. E. moderate; cloudy wea- ther.	On the 21st, at 7 P. M. got under way; and at $\frac{1}{2}$ past 7, <i>St. Denis</i> bore S. E. 4° S. the western extremity in sight of the <i>Ile</i> of <i>Bourbon</i> , W. S. W. 3° S. whence we took our departure.
23	22,0	From S. E. by E. to N. E. moderate; gloomy wea- ther.	We constantly saw <i>Tropic-birds</i> since we left the <i>Ile</i> of <i>France</i> .
24	21,5	From E. N. E. to N. E. moderate; clear wea- ther, followed by a storm.	
25	21,0	From N. E. to S. E. var- faint; gloomy weather accompanied by light- ning and rain.	
26	21,0	From S. E. to N. E. var- faint, followed by squalls and rain.	
27	20,0	From E. N. E. to E. fresh with squalls and rain; cloudy weather.	On the 26th and 27th, we still saw <i>Tropic-birds</i> , an <i>Albatross</i> , and some <i>Shear-waters</i> .

18 20 Amp. Eastly.

23 00 Azim.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION	DAYS.
	by account. SOUTH.	by observ. SOUTH.	by account. EAST.	by observ. EAST.	of the Compass. WEST.	
1792.	0 /	0 /	0 /	0 /	0 /	
April 28	27 23	27 11	44 51	42 44	23 11 Amp. Eastly.	April 28
29	27 57	27 50	41 53	39 22		29
30	28 31	28 18	39 23			30
May 1	29 03	29 00	37 26	. . .	26 17 Azim.	May 1
2	29 36	29 25	36 04	. . .	27 13 Azim.	2
3	29 55	30 28	34 55			3
4	31 04	31 08	33 47			4
5	31 55	32 11	32 41			5
6	31 50	31 53	32 13	. . .	24 34 Azim.	6
7	32 47	32 51	30 00			7
8	32 57	. . .	29 42			8
9	32 53	33 33	29 28			9
	Point of Departure in sight of the Coast of Africa.					
	. . .	33 33	. . .	25 57		10
10	33 46	. . .	25 52			

VARIATION  
of the Compass.  
WEST.

	DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
0				
	April	Above the freezing point.		
23 11 Amp. Eastly.	28	20,5	E. S. E. fresh breeze; fine weather.	On the 28th, at 2 <sup>h</sup> 45' P. M. } <i>M.</i> Long. } and } 0 1 "
	29	19,5	From S. E. to E. S. E. fresh breeze; clear wea- ther.	by 4 sets ○ — D } <i>Ch.</i> } 42 27 52 E.
	30	19,5	E. S. E. fresh breeze; weather overcast.	On the 29th, at 3 <sup>h</sup> 16' P. M. } <i>M.</i> Long. } and } 39 02 30 E.
	May			
26 17 Azim.	1	20,0	From E. S. E. to E. mo- derate; fine weather.	by 3 sets ○ — D } <i>Ch.</i>
	2	21,5	Ditto, faint; fine wea- ther.	
27 13 Azim.	3	21,0	From E. N. E. to N. moderate; fine wea- ther.	We constantly saw <i>Albatrosses</i> , <i>brown</i> <i>Petrels</i> , and <i>Alycons</i> .
	4	21,0	Variable, faint; cloudy weather.	
	5	17,0	From N. N. E. to S. W. strong gale and squally; cloudy weather.	On the 5th and 6th, saw a greater number of birds of the same species, and a few <i>spotted Petrels</i> .
	6	20,0	From S. W. to E. by N. faint, followed by a stiff gale; clear wea- ther.	On the 8th, P. M. perceived the coast of <i>Africa</i> in the vicinity of <i>Point Natal</i> , bearing from N. 2° W. to N. W. by N. 2° W.
24 34 Azim.	7	19,0	From E. by N. to N. W. by N. strong gale, fol- lowed by calm, clear weather.	On the 9th, at noon, the coast of <i>Africa</i> bore from N. W. by W. 2° W. to N. 2° W. whence we took our departure. The same day, at 2 P. M. sounded in 75 fath. bottom gravel and broken shells; at this moment, the coast of <i>Africa</i> bore from W. 4° N. to N. E. by N. 2° N.
	8	16,0	From N. W. to W. S. W. strong gale in squalls; clear weather.	
	9	18,0	From N. to W. var. fresh breeze; clear weather.	
	10	14,0	From N. W. by N. to W. S. W. strong gale and squally, clear wea- ther.	On the 10th, lay in a boisterous wind and heavy sea. We did not cease to see <i>Albatrosses</i> , <i>Pintades</i> , <i>Petrels</i> , and <i>Alycons</i> . 5

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compaſs. WEST.
	by account. SOUTH.	by obſerv. SOUTH.	by account. EAST.	by obſerv. EAST.	
1792.	0 /	0 /	0 /	0 /	0 /
May 11	33 31	34 42	26 20		
12	34 28	35 00	24 48	21 49	25 30 Azim. 24 53 Amp. Weſtly.
13	34 55	34 38	24 03	21 01	
14	35 13	. . .	24 00		
15	35 22	35 19	22 41	19 57	23 38 Azim.
16	35 35	35 44	20 29	17 47	
17	34 58	34 46	18 28		

DAYS.

May.

11

12

13

14

15

16

17

VARIATION  
of the Compa.  
WEST.

25 30 Azim.  
24 53 Amp. Westly.

23 38 Azim.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
May.	Above the freezing point.		
11	14,0	S. W. faint, followed by calm; fine weather.	On the 11th, at sun-rise, Cape of the <i>Mountains</i> bore N. N. W. 3° W. On the 11th, at 9 <sup>h</sup> 18' 14" A.M. } <i>M.</i> } 0 1 " Long. } and } 22 01 30 E. by 2 sets ☽ — ☉ } <i>Cb.</i> }
12	18,0	From E. N. E. to N. E. pleasant breeze; fine weather.	At noon, the environs of the Cape of the <i>Mountains</i> bore from N. by E. 3° N. to N. W. 3° N. 10 or 12 leagues from the coast; no bottom with a line of 100 fath.
13	17,0	From N. E. to W. S. W. round by the N. and W. var. fresh breeze; wea- ther overcast.	On the 13th, at 10 <sup>h</sup> 50' A.M. } <i>M.</i> } 0 1 " Long. } and } 21 01 40 E. by 2 sets ☽ — ☉ } <i>Cb.</i> }
14	15,0	From W. to S. E. by S. moderate, followed by squalls; weather over- cast.	On the 15th, at 8 <sup>h</sup> 43' A.M. } <i>M.</i> } 20 12 00 E. Long. } and } by 2 sets ☽ — ☉ } <i>Cb.</i> }
15	15,0	From S. E. to E. S. E. moderate; fine wea- ther.	On the 15th, at 5 P. M. perceived the land (the environs of <i>Cow Bay</i> ) to the N. as far as it could be seen. On the 16th, at 8 <sup>h</sup> 51' A.M. } <i>M.</i> } 0 1 " Long. } and } 18 04 22 E. by 2 sets ☽ — ☉ } <i>Cb.</i> }
16	15,0	From E. S. E. to S. E. moderate; fine wea- ther.	The same day, at noon, sounded in 95 fathoms, fine oozy sand.
17	15,0	From S. S. E. to E. S. E. moderate; fine wea- ther.	On the 17th, at 1 A. M. sounded, but could not strike ground with a line of 150 fathoms: we were then to the westward of the <i>Aiguillas</i> Bank. In the forenoon, we doubled the Cape of <i>Good Hope</i> , which must have borne at noon N. E. by N. 12 or 13 leagues: the fog which covered the land prevented it from being seen.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	- VARIATION of the Comps. WEST.	DAYS.
	by account. SOUTH.	by observ. SOUTH.	by account. EAST.	by observ. EAST.		
1792.	0 /	0 /	0 /	0 /	0 /	May
May 18	33 44	33 45	16 49	. . .	23 28 Amp. Eastly.	18
19	33 29	33 29	15 49			19
20	34 14	31 59	14 37			20
21	30 16	30 06	12 39	. . .	21 34 Azim. 21 49 Amp. Westly.	21
22	28 31	28 29	10 53	. . .	20 24 Amp. Westly.	22
23	27 04	27 13	9 34			23
24	26 22	26 11	8 41			24
25	25 28	25 28	8 30	4 42	20 06 Amp. Eastly.	25
26	24 00	23 48	7 15	. . .	20 14 Azim.	26
27	22 54	22 49	6 22			27
28	22 24	22 06	5 55	0 58	20 08 Amp. Eastly. 19 54 Amp. Westly.	28
29	20 52	20 52	4 50	0 15	WEST.	29
30	19 19	19 13	3 21	1 43	19 17 Azim.	30

VARIATION  
of the Compaſs.  
WEST.

0  
23 28 Amp. Eaſtly.  
  
21 34 Azim.  
21 49 Amp. Weſtly.  
  
20 24 Amp. Weſtly.  
  
20 06 Amp. Eaſtly.  
  
20 14 Azim.  
  
20 08 Amp. Eaſtly.  
19 54 Amp. Weſtly.  
  
19 17 Azim.

DAYS.	DEGREES		WINDS	REMARKS
	of the	TIHERM.	AND WEATHER.	AND OBSERVATIONS.
	Above the freezing point.			
May				
18	15,5		From E. N. E. to N. N. E. moderate breeze; fine weather.	Saw conſtantly <i>Albatroſſes</i> , <i>Pintadoes</i> , <i>Petrels</i> , <i>Alycons</i> , &c.
19	15,0		From N. E. to W. by N. light breeze, followed by ſqualls; weather overcaſt.	
20	12,0		From S. W. to S. S. W. ſtrong gale and ſqually; weather overcaſt.	On the 22d, ſaw ſome <i>Porpoſes</i> . On the 23d, ſaw ſome <i>Whales</i> . The <i>Albatroſſes</i> and <i>Pintadoes</i> begin to diminish; ſaw no more <i>Petrels</i> .
21	13,0		From S. to S. S. E. freſh breeze; fine weather.	
22	14,0		S. S. E. moderate breeze; fine weather.	On the 25th, at 3 <sup>h</sup> 07' 12" P. M. } Long. } <i>Cb.</i> . . . 0 4 38 " 00 E. by 1 fet ☉ — ☾
23	15,0		Ditto, variable, light breeze; cloudy weather.	
24	16,0		From E. S. E. to S. S. W. light, followed by calm; weather overcaſt.	The ſame day, at 11 P. M. ſaw a very luminous meteor. In the night from the 25th to the 26th, paſſed a quantity of <i>Molluſca</i> : the ſea was luminous; ſaw no more <i>Pintadoes</i> or <i>Albatroſſes</i> .
25	17,0		From N. to S. W. round by the W. light breeze; fine weather.	On the 27th, paſſed a piece of wood.
26	16,0		From S. S. W. to S. E. moderate; gloomy weather.	On the 28th, at 2 <sup>h</sup> 27' 23" P. M. } <i>M.</i> . . . 0 52 15 Long. } <i>Cb.</i> . . . 0 56 45 by 2 fet ☉ — ☾ } Mean . . . 0 55 00 E.
27	17,0		From S. E. to S. S. E. light, calm at intervals; gloomy weather.	Saw ſome <i>Molluſca</i> , <i>Dorades</i> and large <i>Whales</i> .
28	17,5		From W. S. W. to S. S. W. light breeze; cloudy weather.	On the 29th, at 2 <sup>h</sup> 44' 10" P. M. } <i>M.</i> . . . 0 22 00 W. Long. } <i>Cb.</i> . . . 0 25 00 by 2 fet ☉ — ☾ } Mean . . . 0 23 30 W.
29	18,0		From S. to E. S. E. moderate; fine weather.	
30	18,0		From E. S. E. to S. E. freſh breeze; miſty weather, followed by fine weather.	On the 30th, at 3 <sup>h</sup> 46' 49" P. M. } <i>M.</i> } Long. } and } 1 57 00 W. by 2 fet ☉ — ☾ } <i>Cb.</i> }

TIME.	LATITUDE		LONGITUDE		VARIATION of the Compass. WEST.	DAYS.
	by account SOUTH.	by observ. SOUTH.	by account. EAST.	by observ. WEST.		
1792.	0 /	0 /	0 /	0 /	0 /	
May 31	17 39	17 26	1 54			31
June 1	16 19	16 13	0 24	. . .	17 46 Azim.	1
2	15 58	15 47	WEST. 1 13	. . .	15 15 Amp. Westly.	2
3	15 52	15 49	2 24	. . .	15 19 Amp. Eastly. 15 06 Azim.	3
	15 57	. . .	3 00			4
4	Point arrived at in sight of the Island of <i>St. Helena</i> , at 9 o'clock in the morning.					4
	. . .	15 53	. . .	8 03 30"		5
5	At anchor in the Road of the Island of <i>St. Helena</i> .					5
6	Point of departure in sight of the Island of <i>St. Helena</i> .					6
	. . .	15 48	. . .	8 14 00		7
7	15 01	14 53	8 08	. . .	15 04 Azim.	8
8	14 01	13 55	8 47			9
9	13 24	13 20	9 26	. . .	15 06 Azim.	10
10	12 25	12 21	10 29	. . .	14 13 Amp. Westly.	11
11	11 09	11 10	11 51			12
12	9 50	9 56	13 19			13
13	8 27	8 29	14 40			



VARIATION  
of the Compaſs.  
WEſT.

DAYS.	DEGREES		WINDS		REMARKS	
	of the THERM.		AND WEATHER.		AND OBSERVATIONS.	
		Above the freezing point.				
0	May					
	31	19,0	S. E. moderate breeze; fine weather.		In the afternoon of the 31ſt, ſaw a <i>Booby</i> , and we were ſurprized to ſee a <i>Pintado</i> in theſe latitudes.	
17 46 Azim.	June					
	1	19,0	From E. S. E. to S. E. by S. light breeze; fine weather.			
15 15 Amp. Weſtly.	2	19,6	From S. to E. S. E. va- riable light; fine wea- ther.			
15 19 Amp. Eaſtly. 15 06 Azim.	3	19,5	From S. S. E. to E. S. E. faint; fine weather.		On the 3rd, at 11 A. M. ſaw the Iſland of <i>St. Helena</i> . At noon, it bore W. by S. at the diſtance of about 12 leagues.	
	4	19,5	S. E. light breeze; fine weather.			
	5	19,0	S. E. light; variable and calm; fine weather.		On the 4th, at 9 A. M. the eaſt ex- tremity of the Iſland of <i>St. Helena</i> bore S. and <i>Sugar-loaf</i> Point W. S. W. 2° W.	
	6	19,5	From N. to W. N. W. light breeze; fine wea- ther.		At ½ paſt 10 anchored in the Road of <i>St. Helena</i> in 13 fathoms, over a bottom of fine gray ſand; <i>Sugar-loaf</i> Point bear- ing N. E. by E. 2° E. <i>Munden</i> Point S. S. E. 2° S. and the flag-ſtaff of the Go- vernor's houſe S. by E. 2° S.	
15 04 Azim.	7	19,5	From W. N. W. to W. faint; cloudy weather.		On the 5th, at 10 P. M. got under way.	
	8	20,0	From S. S. W. to S. E. light breeze; fine wea- ther.			
	9	19,5	S. E. light; almoſt calm; fine weather.		On the 6th, at noon, the Iſland of <i>St. Helena</i> bore from S. S. E. 4° E. to S. E. by E. 2° S. whence we took our departure.	
15 06 Azim.	10	21,0	From E. S. E. to S. E. light; fine weather.			
	11	19,0	From S. E. by S. to E. S. E. freſh in ſqualls; weather overcaſt.		On the 7th, at noon, we ſtill ſaw the Iſland of <i>St. Helena</i> , bearing S. diſtant about 21 leagues.	
14 13 Amp. Weſtly.	12	20,0	S. E. var. moderate, ac- companied by ſqualls; weather cloudy.		On the 8th, 9th and 10th, ſaw ſome <i>Boobies</i> and <i>Bonitos</i> .	
	13	19,0	From S. E. to E. freſh in ſqualls; weather cloudy.			

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass, WEST.
	by account. SOUTH.	by observ. SOUTH.	by account. WEST.	by observ. WEST.	
1792.	0 1	0 1	0 1	0 1	0 1
June 14	6 55	6 55	16 03	. . .	13 36 Azim.
15	5 48	5 39	17 49		
16	4 27	4 20	19 37	. . .	11 24 Azim.
17	3 11	3 08	21 19	. . .	11 14 Azim.
18	1 41	1 57	22 46	. . .	10 58 Amp. East,
19	0 41	0 57	24 02	. . .	10 46 Azim.
20	NORTH. 0 22	NORTH. 0 38	25 19	. . .	9 17 Azim.
21	2 06	2 34	26 30	. . .	8 47 Azim.
22	4 19	4 34	27 25	. . .	8 02 Azim.
23	6 20	. . .	28 03	. . .	8 14 Azim.
24	7 18	. . .	28 24		
25	7 32	8 15	28 49	. . .	8 54 Azim.
26	9 21	9 21	30 21	. . .	7 08 Azim.
27	10 43	11 05	31 51		
28	12 14	12 20	33 44		

DAYS.

June

14

15

16

17

18

19

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24

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27

28

VOL.

VARIATION  
of the Compass.  
WEST.

DAYs.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
	Above the freezing point.		
June 13 36 Azim.	14 21,0	S. E. moderate breeze ; fine weather.	On the 14th, saw a number of <i>Boobies</i> , <i>Tropic Birds</i> and <i>Terns</i> .
	15 21,5	S. E. pleasant breeze ; fine weather.	
11 24 Azim.	16 22,0	From E. S. E. to E. moderate breeze ; fine weather.	
11 14 Azim.	17 22,5	E. pleasant breeze ; fine weather.	On the 17th, saw some <i>Man-of-war</i> <i>birds</i> and <i>Boobies</i> .
10 58 Amp. Eastly.	18 22,0	S. E. by E. moderate ; fine weather.	On the 18th, saw a number of <i>Flying-</i> <i>fishes</i> , a few <i>Tunnies</i> , and some <i>Boobies</i> .
10 46 Azim.	19 22,0	S. E. by S. pleasant breeze ; fine weather.	
9 17 Azim.	20 21,5	Ditto, moderate ; fine weather.	
8 47 Azim.	21 22,5	S. E. by E. moderate ; fine weather.	On the 21st, saw a number of <i>Flying-</i> <i>fishes</i> and <i>Bonitos</i> .
8 02 Azim.	22 23,5	From S. E. fresh breeze to S. S. E. moderate and squally ; weather over- cast.	
8 14 Azim.	23 22,6	From S. S. W. to S. S. E. fresh ; weather over- cast and rain.	
	24 23,5	From S. S. E. to N. N. E. round by the W. faint ; calm and rain.	
8 54 Azim.	25 23,5	From N. E. by N. to N. E. moderate ; cloudy wea- ther.	
7 08 Azim.	26 23,0	From N. E. to E. N. E. pleasant breeze ; cloudy weather.	
	27 23,0	From N. E. by E. to N. E. by N. fresh ; cloudy weather.	
	28 23,0	Ditto, ditto.	

## MARCHAND'S VOYAGE.

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compass.
	by account. NORTH.	by observ. NORTH.	by account. WEST.	by observ. WEST.	
1792.	0 1	0 1	0 1	0 1	0 1
June 29	13 24	13 33	35 19		
30	14 51	14 58	36 21	. . .	5 27 Azim.
July 1	16 32	16 37	37 25	. . .	6 00 Azim.
2	18 10	. . .	38 52		
3	19 45	19 49	40 08	. . .	5 50 Azim.
4	21 24	21 25	40 58		
5	23 06	23 03	41 40	. . .	5 36 Azim.
6	24 30	. . .	42 08	. . .	6 56 Amp. Westly.
7	25 51	26 00	42 19	. . .	7 35 Azim.
8	27 29	27 50	42 37	. . .	8 00 Azim.
9	30 03	30 05	43 01	. . .	9 54 Azim.
10	32 10	32 23	43 30	46 27	9 42 Azim.
11	34 05	34 15	44 35	. . .	12 26 Azim.
12	35 51	35 59	44 58	. . .	13 59 Azim.

DAY

June

29

30

July

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12

VARIATION  
of the Compass.  
WEST.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
	Above the freezing point.		
June 29	22,0	From N.N.E. to E.N.E. squally and misty, wea- ther overcast.	
3 27 Azim.	22,0	From N. E. by E. to E. by N. moderate; fine weather.	
July 1	22,5	From E. by N. to N. E. by N. fresh breeze and squally; fine weather.	
2	22,0	From E. N. E. to N. E. fresh in squalls; wea- ther overcast.	From the 2nd to the 12th, we were constantly meeting with the species of sea-weed called <i>Rafines du Tropique</i> .
3	22,5	From E. to N. E. by E. fresh; fine weather.	
4	20,0	From E. N. E. to N. E. moderate; fine wea- ther.	
5 36 Azim.	22,0	From E. to E. N. E. moderate and squally, with rain after the squalls.	
6 56 Amp. Westly.	21,0	East, var. squally with rain; cloudy weather.	
7 35 Azim.	22,0	Ditto, ditto.	
8 00 Azim.	22,0	Ditto, ditto.	
9 54 Azim.	22,5	From E. to E. N. E. fresh; fine weather.	
10	21,5	Ditto, ditto.	On the 10th, at 8 <sup>h</sup> 22' A. M. } Long. } and } 0 1 11 by 4 sets } — } } 46 22 30 W. Cb. }
9 42 Azim.	21,5	From E. N. E. to E. fresh breeze; fine wea- ther.	
12 26 Azim.	21,0	From E. to E.S.E. faint; fine weather.	On the 12th, saw some <i>Mellusca</i> .
13 59 Azim.			

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION
	by account.	by observ.	by account.	by observ.	of the Compaſs.
	NORTH.	NORTH.	WEST.	WEST.	WEST.
1792.	0 /	0 /	0 /	0 /	0 /
July 13	36 24	. . .	44 45		
14	36 19	36 07	44 15	. . .	14 30 Azim.
15	35 58	36 03	43 33	. . .	15 28 Azim.
16	36 06	36 16	43 21	. . .	15 31 Amp. Eaſtly.
17	36 43	36 52	43 15	. . .	15 04 Amp. Eaſtly.
18	38 13	38 18	41 33	. . .	16 40 Azim.
19	39 18	39 20	39 56	. . .	19 08 Azim.
20	40 25	40 25	37 53	. . .	21 30 Amp. Weſtly.
21	40 57	41 03	36 03		
22	41 32	41 24	33 57		
23	41 42	41 22	32 03	34 32	
24	41 50	41 42	29 55	32 18	
25	41 44	41 46	27 52	. . .	24 08 Azim.
26	41 48	41 43	25 16	. . .	22 17 Amp. Weſtly.
27	41 19	41 13	22 35	25 32	

VARIATION  
of the Compass.  
west.

DAYS.	DEGREES	WINDS	REMARKS
	of the THERM.	AND WEATHER.	AND OBSERVATIONS.
	Above the freezing point.		
July			
13	20,5	From N. to N. E. faint; fine weather.	
14 30 Azim.	21,0	From N. N. E. to N. E. faint; fine weather.	
15 28 Azim.	21,0	Variable and faint; fine weather.	On the 15th saw a <i>Turtle</i> .
16	21,5	Calm; fine weather.	
15 31 Amp. Eastly.	21,0	From S. S. W. to N. W. by N. light breeze, fine weather.	On the 17th, saw some <i>Bonitoes</i> ; passed a piece of wood.
15 04 Amp. Eastly.	21,0	From W. to N. W. fresh breeze; fine weather.	
16 40 Azim.	19,5	N. W. moderate; fine weather.	On the 19th, met with two large pieces of wood.
19 08 Azim.	21,0	From N. W. to W. moder- ate; slight fog; fine weather.	
21 30 Amp. Westly.	19,0	W. by S. moderate; fine weather.	On the 21st, saw some <i>Flying-fishes</i> and <i>Mollusca</i> .
	18,0	W. by N. moderate; misty weather.	On the 22d, saw a <i>Turtle</i> .
	19,0	From W. by S. to N. W. moderate; misty wea- ther.	On the 23d, at 2h 15' 43" P. M. } <i>M.</i> } Long. } and } 0 1 "
	18,0	From N. W. to W. light breeze; misty weather.	by 2 sets ☉ — ☾ } <i>Ch.</i> } 34 13 00W. We saw constantly some <i>Mollusca</i> .
	18,0	From W. N. W. to N. N. E. moderate; fine weather.	On the 24th, at 2h 55' P. M. } <i>M.</i> } Long. } and } 32 05 00W.
24 08 Azim.	17,5	From N. to W. N. W. moderate; fine wea- ther.	by 2 sets ☉ — ☾ } <i>Ch.</i> } On the 25th, saw a <i>white Tern</i> and two <i>Turtles</i> .
22 17 Amp. Westly.	17,0	From N. to W. N. W. moderate; fine wea- ther.	On the 27th, at 4h 26' 33" P. M. } <i>M.</i> } Long. } and } 25 14 00W. by 2 sets ☉ — ☾ } <i>Ch.</i> }

TIME.	LATITUDE	LATITUDE	LONGITUDE	LONGITUDE	VARIATION of the Compaſt. WEST.
	by account. NORTH.	by obſerv. NORTH.	by account. WEST.	by obſerv. WEST.	
1792.	0 1	0 1	0 1	0 1	0 0
July 28	40 54	40 54	20 35		
29	40 16	40 16	18 23		
30	39 37	. . .	16 37		
31	38 48	38 28	14 09		
Aug. 1	38 09	38 09	11 39		
2	37 14	. . .	10 00		
	Point of departure in ſight of Cape <i>St. Vincent</i> .				
	. . .	37 02	. . .	11 31	
3	36 17	36 08	10 14	. . .	21 12 Azim.
4	35 49	. . .	8 53	. . .	
	Point arrived at in ſight of Cape <i>Spartel</i> at 5 o'clock in the morning.				
	. . .	35 49	. . .	8 16	22 06 Azim.
	At noon,	36 05	. . .	. . .	
The Point of <i>Gibraltar</i> bearing W. $\frac{1}{2}$ N. 7 leagues diſtant, and the <i>Mont aux Singes</i> S. W. $\frac{1}{2}$ S.					
			REDUCED courſe CORRECTED.	REDUCED diſtance CORRECTED.	
5	36 31	36 31	E. by N. E. 4° N.	34,0	
6	37 11	37 21	N. E. by E. $\frac{1}{2}$ E.	36,0	
7	38 34	38 40	N. N. E. $\frac{1}{2}$ E.	29,5	19 23 Amp. Eaſtly.
8	39 20	39 32	N. $\frac{1}{2}$ E.	17,5	
9	40 05	40 17	N. E. by N. 1° N.	18,0	21 00 Azim.
10	40 35	40 45	N. E. 2° N.	13,0	

DAY

July

28

29

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31

Aug.

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VARIATION  
of the Compass.  
WEST.

DAYS.	DEGREES of the THERM.	WINDS AND WEATHER.	REMARKS AND OBSERVATIONS.
	Above the freezing point.		
July 28	18,0	From W. to W. N. W. moderate; cloudy wea- ther; slight mist.	
29	18,0	From W. N. W. to N. E. moderate; weather overcast and misty.	On the 1st of August, passed several patches of sea-weed interwoven, called <i>Lacets</i> .
30	17,0	N. E. by E. fresh breeze; weather overcast.	On the 2d of August, at $\frac{1}{2}$ past 3 A.M. Saw the land to the northward of Cape <i>St. Vincent</i> . At 5 A.M. the part of the coast in sight bore from N. by E. to S. by W. In the forenoon, passed through some boars of currents which set to the S. E. At noon, Cape <i>St. Vincent</i> bore E $\frac{1}{2}$ S. 2 $\frac{1}{2}$ leagues, whence we took our departure.
31	17,0	N. E. by N. fresh; fine weather.	On the 4th of August, at $\frac{1}{2}$ past; A.M. saw the land. At 5, distinguished Cape <i>Spartel</i> , which bore S. E. 2 or 2 $\frac{1}{2}$ miles. The currents set rapidly to the eastward, towards the Strait of Gibraltar. At 6, entered the Strait, and before noon we were standing up the Mediterranean with all sail set.
Aug. 1	17,5	From N. E. by N. to N. by E. pleasant breeze; fine weather.	On the 5th, at noon, the point of <i>las Roquetas</i> bore N. N. E. $\frac{1}{2}$ E. 3 or 4 leagues.
2	17,0	From N. E. to N. N. W. pleasant breeze; fine weather.	On the 6th, at noon, Cape <i>Jalos</i> bore North.
3	19,0	From E. to W. round by the N. faint; fine wea- ther.	On the 7th, at noon, Cape <i>Sant Anto- nio</i> bore N. 4 <sup>c</sup> W. Mount <i>Binjorme</i> W. S. W. 7 <sup>o</sup> W.
4	19,0	From W. to N. W. mo- derate; fine weather.	On the 8th, at noon, the Mountain of <i>Oropesa</i> bore N.W. by N. or 2 <sup>c</sup> N. Cape <i>Cullica</i> , W. 4 <sup>o</sup> S.
5	20,0	From W. to N. W. mo- derate; fine weather.	On the 10th, the coast of <i>Spain</i> ex- tended from N. N. E. to W. S. W. at the distance of 9 leagues.
6	22,0	W. N. W. faint; showery weather.	
7	22,5	From S. S. E. var. faint to S. W. fresh; fine weather.	
8	23,0	From N. W. to N. E. moderate breeze; fine weather.	
9	24,0	From E. S. E. to S. W. variable, faint; fine weather.	
10	23,5	From N. E. to N. var. faint; fine weather.	

21 12 Azim.

22 06 Azim.

19 23 Amp. Eastly.

21 00 Azim.

TIME.	LATITUDE	LATITUDE	REDUCED	REDUCED distance CORRECTED.	VARIATION
	by account.	by observ.	courfe		of the Compaſs.
	NORTH.	NORTH.	CORRECTED.		WEST.
1792.	0 1	0 1			
Aug 11	41 04	41 11	N. E. by E. 2° E.	14,7	
12	41 38	41 41	E. N. E. 2° N.	24,0	
13	42 04	42 09	N. E. 4° E.	14,5	
14	In ſight of Cape Sſep, Towſon Road.				

DAYS.

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VOL.

VARIATION  
of the Compaſs.

WEST.

DAYS.	DEGREES	WINDS	REMARKS
	of the THERM.	AND WEATHER.	AND OBSERVATIONS.
	Above the freezing point.		
Aug. 11	24,0	Variable and faint, with intervals of calm; fine weather.	On the 11th, Mount <i>Jui</i> bore N. 1 or 2° E. 3 leagues.
12	24,5	From W. S. W. to S. faint, almost calm; fine weather.	On the 12th and 13th, crossed the Gulf of <i>Lyon</i> out of sight of land.
13	23,5	From W. S. W. to W. faint; fine weather.	On the 14th, in the morning, ſaw Cape <i>Sépet</i> . In the afternoon of the ſame day, anchored in the inner Road
14	23,0	West, moderate breeze; fine weather.	of <i>Toulon</i> , in 3½ fathoms, muddy bot- tom.

THE END.

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July 20, 1801.

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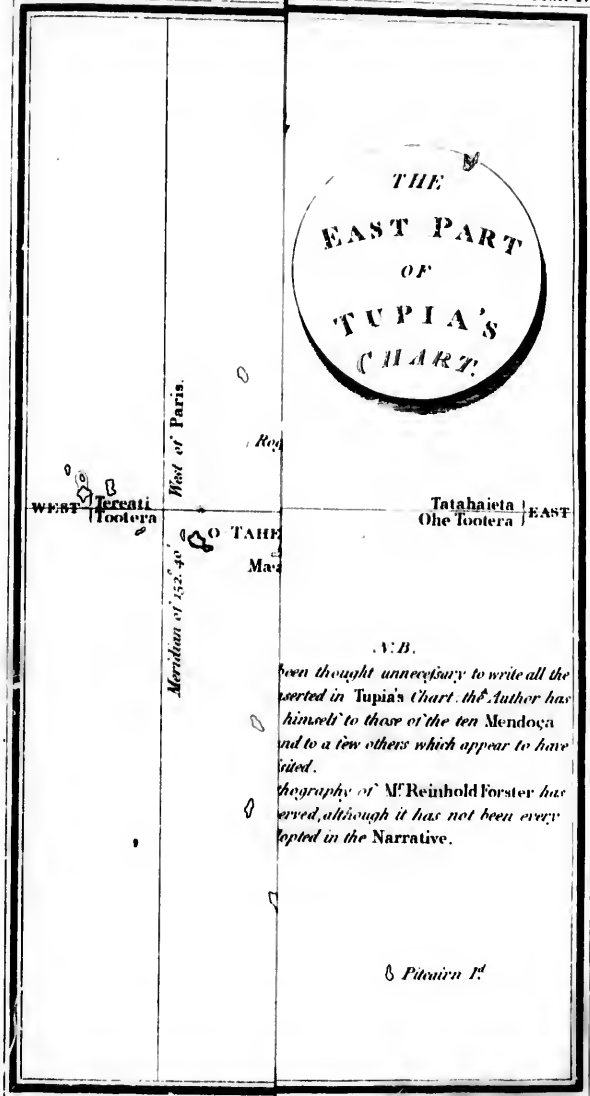
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Martindale's Voyage.

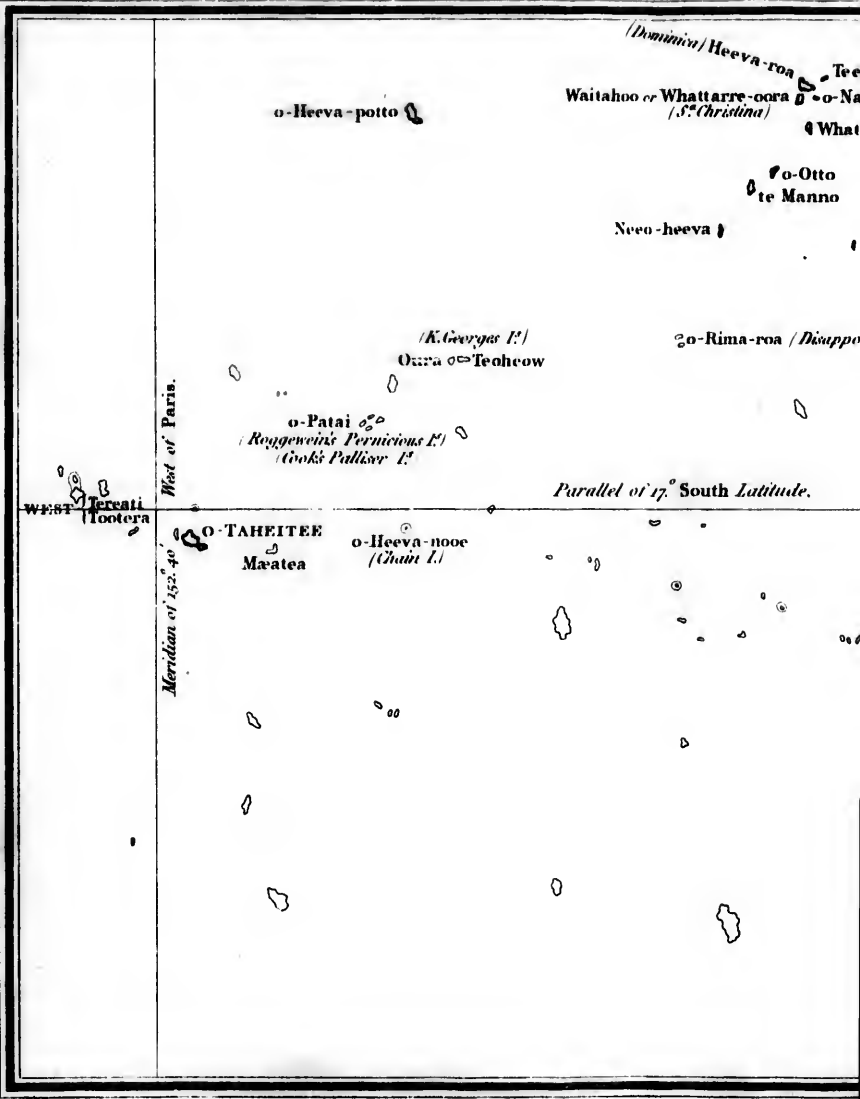
Plate IV.



N.B.  
 been thought unnecessary to write all the  
 inserted in Tupia's Chart. the Author has  
 himself to those of the ten Mendocia  
 and to a few others which appear to have  
 originated.  
 the geography of M<sup>r</sup> Reinhold Forster has  
 served, although it has not been every  
 adopted in the Narrative.

W. Pitcairn del.

J. Russell sculp.



o-Heeva-potto

(Dominica) Heeva-roa  
Waitahoo or Whattarre-ooa  
(Christina)

o-Otto  
te Manno

Neco-heeva

(K. Georges I.)  
Oara or Tehecow

o-Rima-roa (Disappo)

o-Patai  
(Roggewein's Pernicious I.)  
(Cook's Pulliser I.)

Parallel of 17° South Latitude.

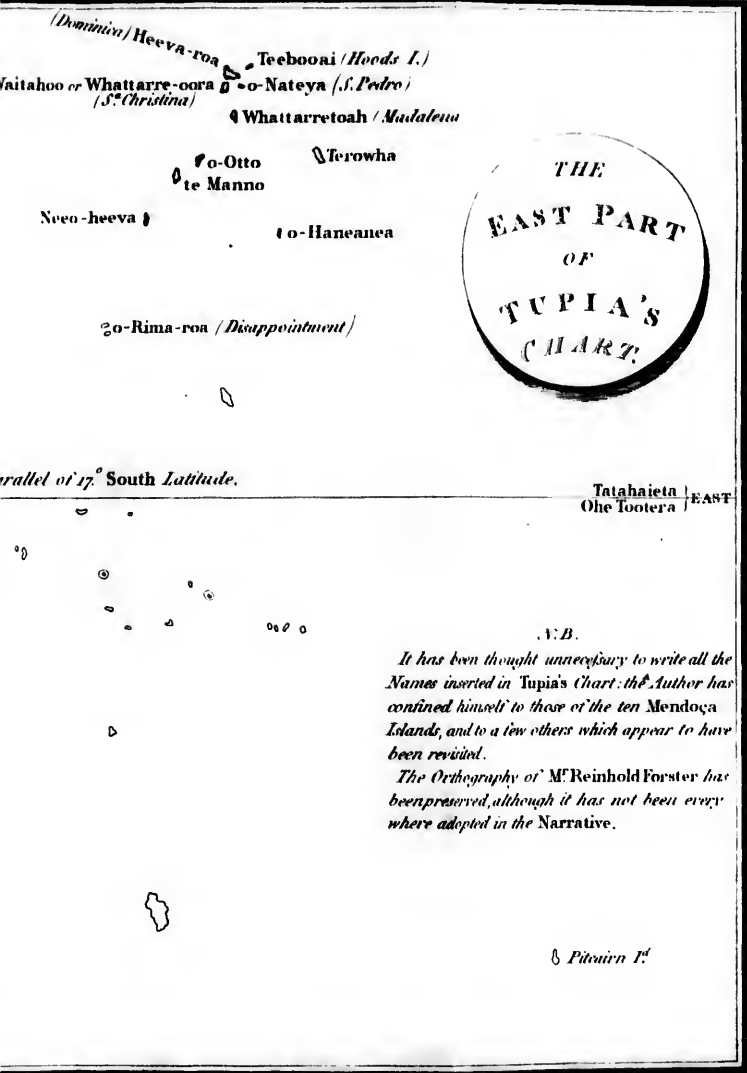
WEST Tereati  
Tootera

West of Paris.

Meridian of 152° 40'

O-TAHEITEE  
Maatea

o-Heeva-nooe  
(Chain I.)



J. Russell sculp.

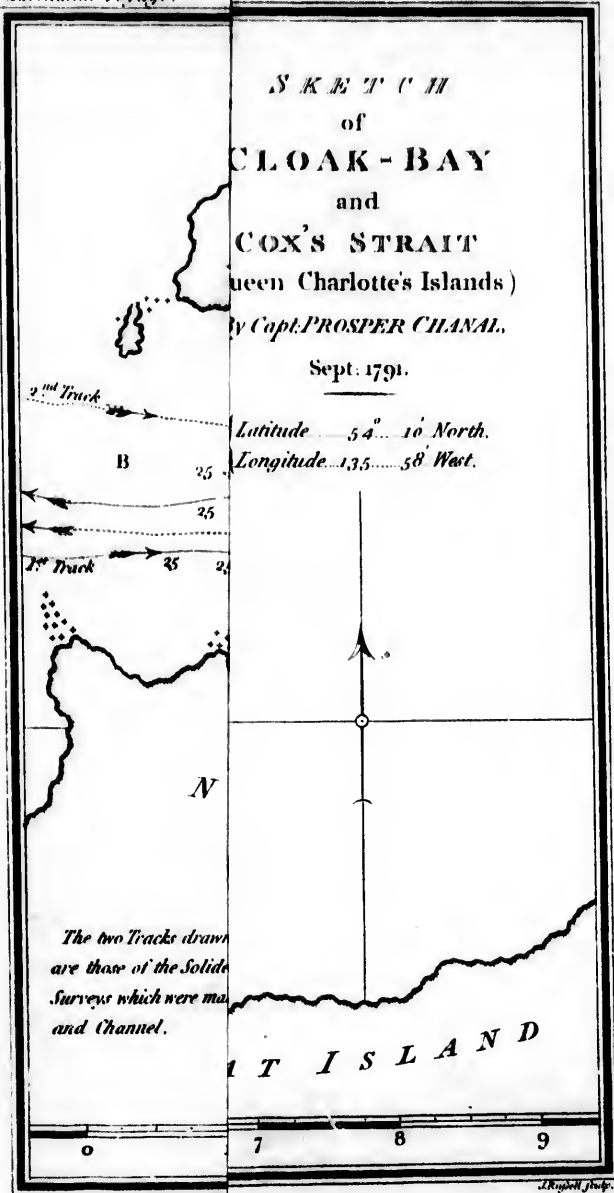
March





S K E T C H  
 of  
 CLOAK - BAY  
 and  
 COX'S STRAIT  
 (Queen Charlotte's Islands)  
 by Capt. PROSPER CHANAL.

Sept. 1791.

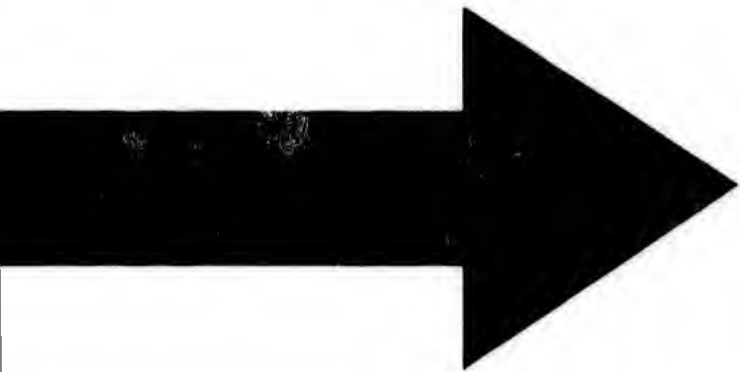


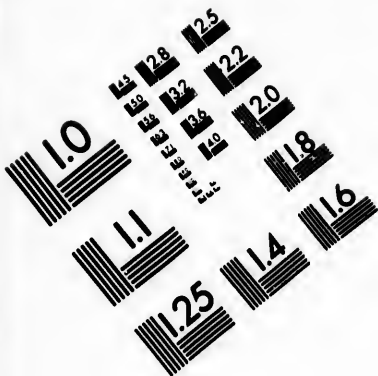
Latitude  $54^{\circ} 10'$  North.  
 Longitude  $135^{\circ} 58'$  West.

The two Tracks drawn  
 are those of the Solide  
 Surveys which were made  
 and Channel.

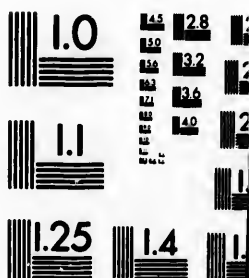
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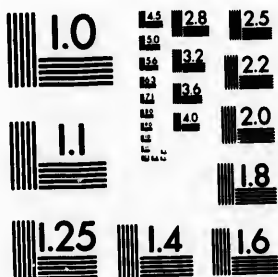
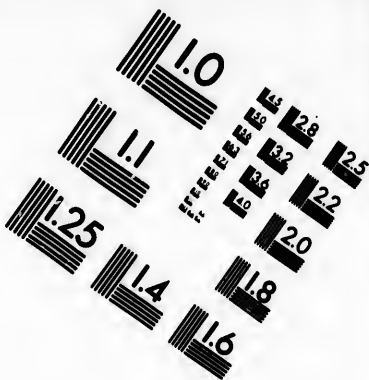


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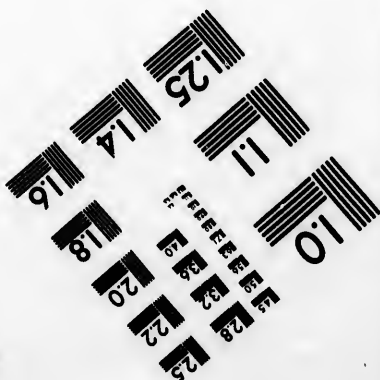


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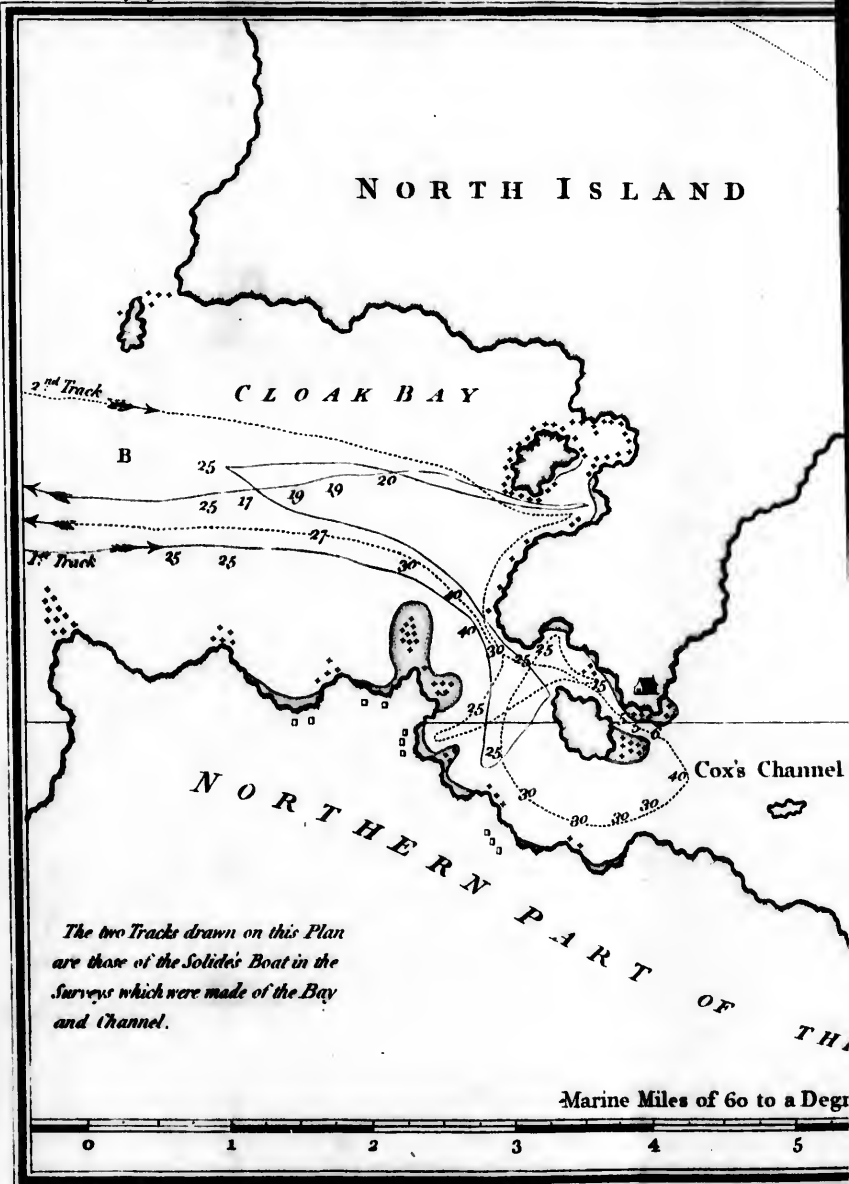
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25







*The two Tracks drawn on this Plan are those of the Solide's Boat in the Surveys which were made of the Bay and Channel.*

Marine Miles of 60 to a Degree



*SKETCH*  
of  
**CLOAK - BAY**  
and  
**COX'S STRAIT**  
(Queen Charlotte's Islands)

*By Capt PROSPER CHANAL.*

Sept: 1791.

B { Latitude ..... 54° 10' North.  
Longitude ..... 135° 58' West.

ISLAND



Cox's Channel or Strait

PART OF THE GREAT ISLAND

Marine Miles of 60 to a Degree.



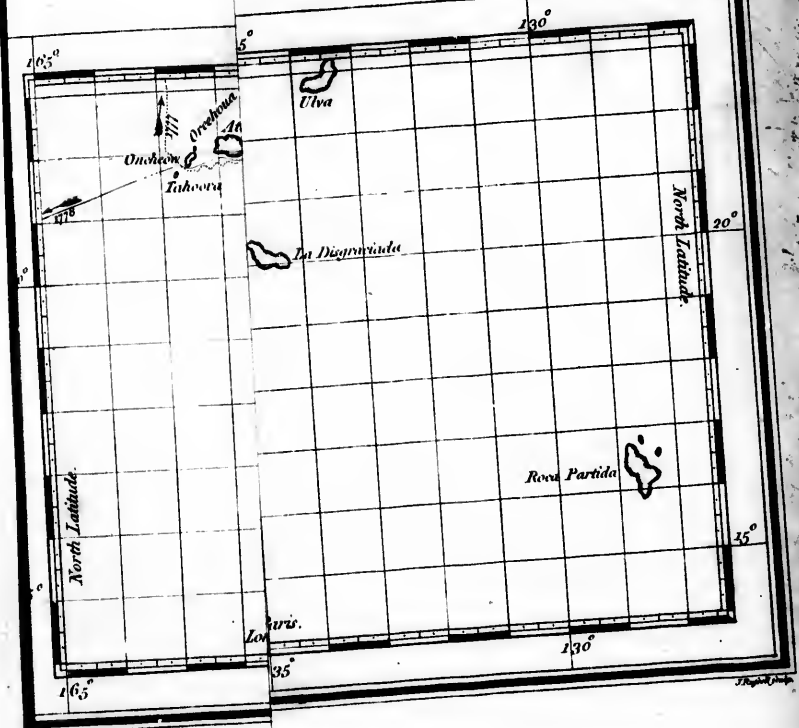
*Journal de Voyage.*



hand's Voyage.

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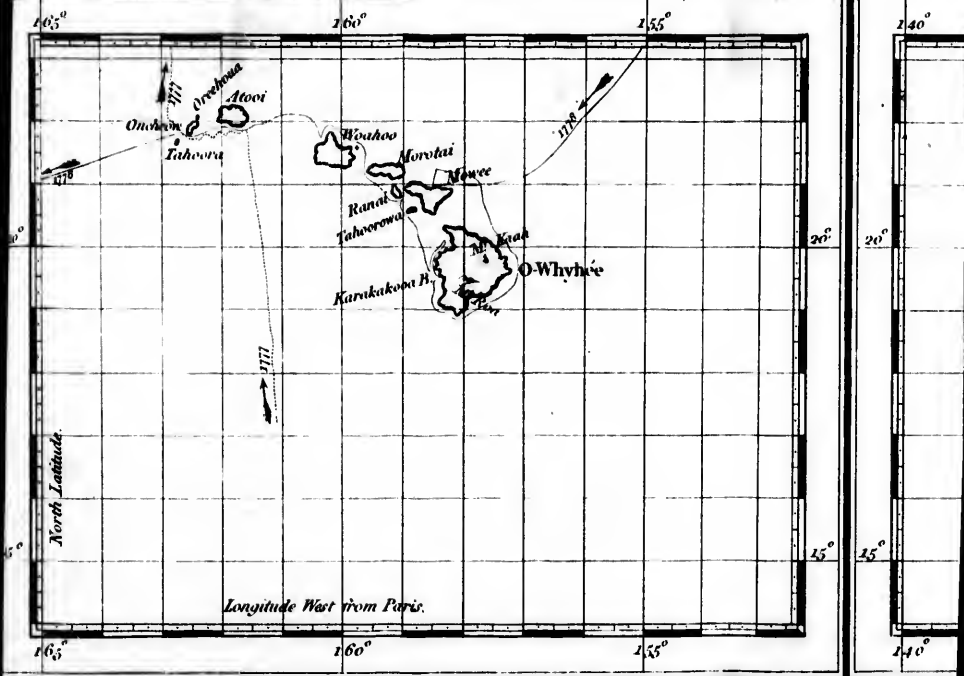
*the Chart of the Galleon.*



Hand's Voyage.

# SANDWICH ISLANDS.

according to Cook.



# GROUP OF LA MESA.

*Taken from the Chart of the Galleon.*

