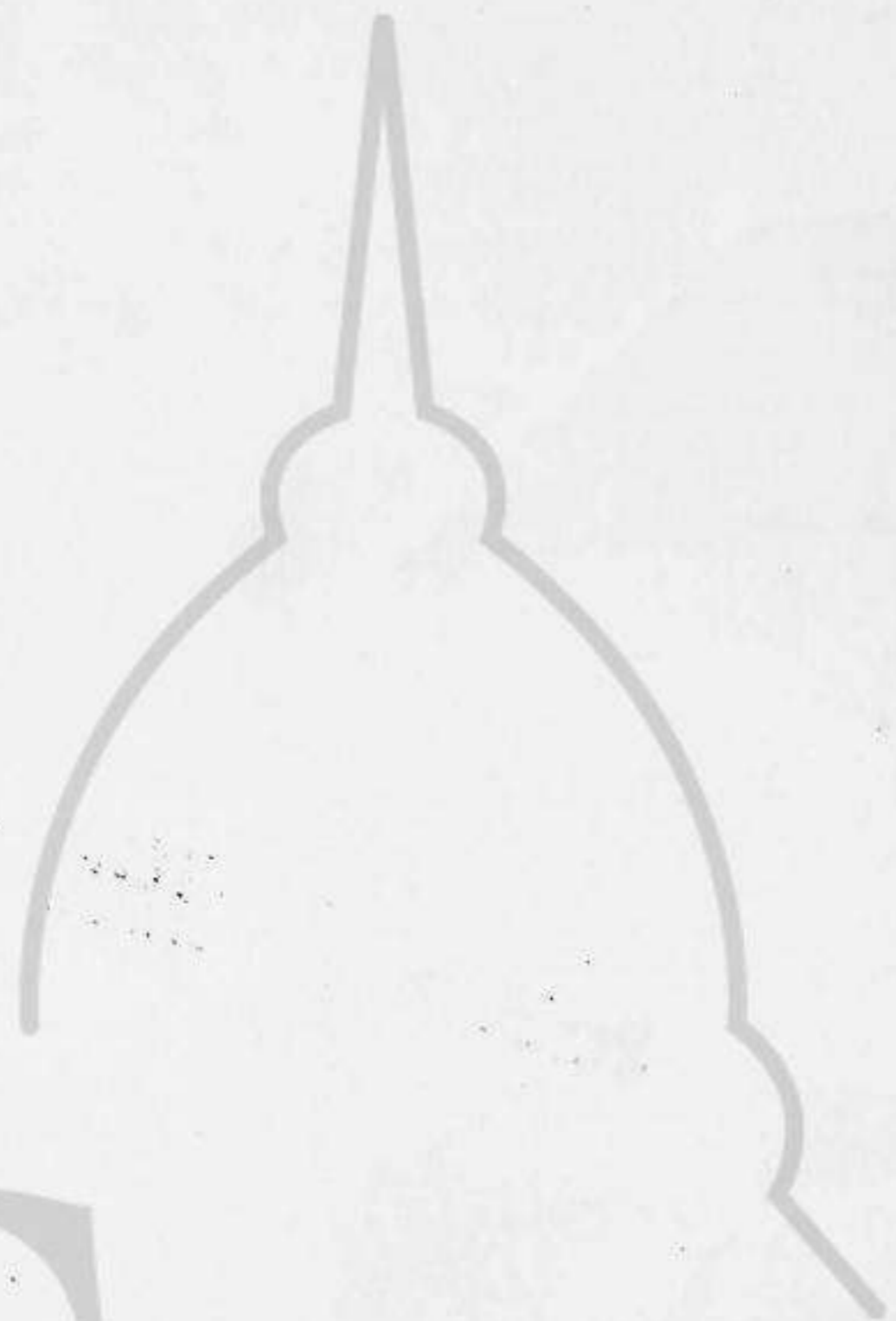




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SAILING DIRECTIONS

FOR THE

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RIO DE LA PLATA.

*Referencia*

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NORJE & WILSON,

PUBLISHERS OF CHARTS AND NAUTICAL WORKS, &c.,

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In this edition of Directions for the RIO DE LA PLATA, the publisher has considered it expedient to reprint a portion of the directions in Part I. of the "South America Pilot," which relates to the navigation of this great river, and published by the Admiralty. To this has been added corrections and information contained in notices issued by the English, American and French Governments, &c., to the present time.

*N.B.—Alterations and additional information will be given in supplementary pages of ADDENDA, as occasion may require; these corrections are transferred at once to the Chart, which this book is intended to accompany; so that generally the Chart has the latest information.*

ANY REMARKS OR COMMUNICATIONS FROM OUR NAUTICAL FRIENDS FOR THE FUTURE IMPROVEMENT OF THIS, OR OTHER OF OUR WORKS, ARE RESPECTFULLY SOLICITED.

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## SAILING DIRECTIONS

FOR THE

## RIVER PLATE.

NOTE.—In this Work the Courses and Bearings are Magnetic, or by Compass, except where otherwise expressed. The Distances are in Nautical Miles of 60 to a Degree of Latitude. A Cable Length is the tenth part of a nautical mile, or about 100 fms.

## MAGNETIC VARIATION IN 1890.

*Decreasing Annually about 4'.*

Cape Sta. Maria	-	6° 0' E.	Colonia	-	8° 25' E.
Maldonado	-	7° 0' E.	Barragan	-	8° 30' E.
Monte Video	-	7° 15' E.	Buenos Ayres	-	8° 40' E.

THE RIVER PLATE, or RIO DE LA PLATA, is a great estuary of South America, formed by the junction of the rivers Parana and Uruguay. It was discovered in 1512 by the Spanish navigator, Juan Diaz Solisio, or Solis, who, on a subsequent voyage three years after, with several companions, was attacked by the natives and killed.

The entrance of the estuary is situate between 35° and 36° south latitude, and extends in a N.W. by W. and S.E. by E. direction, about 170 miles; its breadth greatly diminishes from the entrance up to the confluence of the rivers Parana and Uruguay. At East Point Maldonado, on the north, to Cape Antonio on the south, the river is 120 miles in width; between Monte Video and Piedras Point, 50 miles, and between Colonia and Buenos Ayres, 26 miles. \*

Above a point between the river St. Lucia on the north, and St. Piedras on the south, the water is always fresh, while to seaward of this line it is brackish. Vessels of large draught may navigate as far as Monte Video, and those of 17 ft. to Buenos Ayres and the islets of Hornos, north-west of Colonia. Small vessels enter the inner road of Buenos Ayres to within about half-a-mile of the town.

Banks of sand and shoal water greatly obstruct the navigation of the river; the outermost of these are the English, Archimedes, and Rouen banks, and farther up the Cuirassier, Ortiz, and Chico banks, &c.

The depths of the river increase from its confluence towards its entrance, the bottom between the banks is generally mud and tuf (a soft sandy stone), as far as the meridian of Monte Video; eastward of this it is muddy sand, sand, sand and

\* See the chart of River Plate, on a large scale, from Cape Sta. Maria to Buenos Ayres and Colonia, and the Rivers Parana and Uruguay, published by Norie & Wilson, 156, Minorities, London.

shells, and sand and gravel as far as Cape San Antonio, except near the north shore and near San Boronbon Bay, where it is soft mud. The average depth at its entrance is about 10 fms., and between Monte Video and Buenos Ayres it may be  $3\frac{1}{2}$  fms.

The north shore is comparatively high and rocky. The whole southern shore is low, uniform in appearance, and bordered by a bank. The 3-fms. line of soundings extending northwards of Cape San Antonio to a distance of 10 miles, then curving round the bay of San Boronbon, passing 12 miles south-east of and 25 miles N.E. of Piedras point, joining the tail of Ortiz bank, and forms a bar of that depth, about 9 miles wide, inside of which the water deepens; thence the 3-fathom line continues to the westward, at the distance of from 5 to 10 miles off the southern shore. The English and Archimedes banks, occupying a large space in the fairway of the entrance, and the Ortiz bank, stretching southward from the north shore, with that of the Chico bank on its south-west side, are the great impediments to the navigation.

On account of the large body of waters brought down by the rivers, which drain an area of about 1,200,000 English square miles, and the general movements of the waters being greatly influenced by the wind, the currents are variable. In light winds and fine weather, the tides are generally regular, but the mouth of the estuary being wide and shallow, the water flows easily in when the wind is from seaward, and is forced rapidly out when the wind is off the land.

#### REMARKS ON THE CURRENTS, TIDES, WINDS, BAROMETER, THERMOMETER, RAIN, &c.

**Currents and Tides.**—The general movements of the waters in the Rio de La Plata are greatly influenced by the direction and force of the wind. With fine weather and light breezes there is some degree of regularity in the tides, but in stormy weather the movements of the waters are entirely dependent on the force and direction of the wind. The strength of the alternate streams produced by the tides does not much exceed 1 to  $1\frac{1}{2}$  miles an hour; but the current caused by the wind reaches 3 to 4 miles an hour.

The variations of the winds have such an influence on the movements of the waters, that there is nearly always a possibility of foreseeing the alterations in the weather, from a daily observation of the current and height of the water. Before the winds from seaward are felt on the coast, the currents set into the river, and the water rises to a height in proportion to the strength and duration of the wind. At times the difference between high and low river is as much as 12 feet. For several hours, and sometimes for a whole day before a pampero, or S.W. wind, the water is seen rising in the port of Monte Video, which rising continues until three or four hours after the pampero has commenced; it is then quickly followed by a strong ebb.

The winds between N.N.E. and W.N.W. cause the river to fall the lowest; the down current is then stronger along the south coast, but it seldom exceeds 3 miles an hour; on the north bank it is inconsiderable.

When the wind has been from the N.E. for some time, and occasionally before the N.E. wind arrives, the waters flow to the westward along the north coast, whilst they are falling and running to the eastward along the south coast; and during the time the wind remains between S.E. and N.E. the current flows generally to the westward beyond Monte Video, without much increasing the depth to that point, while it fills up the river above the banks.

In fine weather a portion of the waters from the Parana and Uruguay run to the eastward along the northern shore, east of Colonia.

When gales from the north, or winds from the N.W. to east prevail, the river falls considerably, and the current runs to the S.E. and south; and when pamperos prevail, the river rises and the current flows to the N.W., west or S.W., according to the direction of the channels. During the months of March, April, and May, the Rio de la Plata is higher than in the other months of the year, on account of the rising of its tributary rivers, which carry whole trees, brambles, and weeds, which form into masses like islets, sometimes large enough to support four or five men standing, and known by the natives under the name of camalotes. During fine weather, without wind or other apparent cause, the river may fall or rise considerably.

If the water rises for a longer time than the duration of a tide, in a calm or light breeze from N.W. to S.W., it may be inferred that the wind will blow from N.E. to S.E., and that it already blows from that quarter at sea.

At the mouth of La Plata, in the vicinity of English and Rouen banks, in the months of August and September, the currents were found to set in all directions, but generally more toward east and west, than to the north and south. The greatest rate observed did not exceed  $1\frac{1}{2}$  knots an hour. Northward of English bank the currents are stronger, but variable in direction; easterly prevail, with a strength of  $2\frac{1}{2}$  knots. A current has, however, been found running to the eastward at the rate of 5 miles an hour, at 5 miles W.S.W. of Lobos isle; and a vessel has been set in one night from Lobos isle to the northward of Cape Castillos; also a vessel in sight of Piedras point found the current setting S.E. 4 miles an hour. These cases are probably exceptional.

It is likely these strong currents do not extend beyond the limits of the soundings, where they must lose their strength.

Off the entrance of the La Plata the current generally sets to the N.N.W. before and with southerly winds, and to the S.S.E. before and with northerly winds, at rates varying from 1 to 3 miles an hour. An east and E.N.E. current of 1 mile an hour, a supposed outfall from the La Plata, has been experienced, extending to long.  $40^{\circ}$  W.

Between Santa Catharina island and La Plata, the current generally sets to the southward with N.E. winds; a rate of 40 miles has been experienced in 24 hours. S.E. winds force the current to the shore, with a heavy sea.

**Ground Log.**—From what has been said of the irregularity of the currents in the La Plata, and the importance of knowing a vessel's position, it will be easily seen how useful the ground log may be made, which alone in the absence of land, &c., can indicate the strength and direction of the current; but notwithstanding its simplicity we fear it is seldom in use. We cannot call too strongly the attention of the mariner to this subject when the depth of water will admit of its use. The very smallest line that will haul in a lead of 5 or 6 pounds weight is the best. The lead should be rounded, long and tapered at each end, in order that it should sink fast and be hauled in easily.

The lead may be also made fast to the logship, without the peg being fixed in it, and thrown overboard; the lead taking it to the bottom will prevent it coming easily home to the ship. In this manner it is clear that the log-line will show the distance run by the ship, both from the effect of the wind and current. Having noted the number of knots, make the line fast, so that it may be upon a strain. Set the bearing of it by compass, and the opposite point will be the ship's course. There can be no doubt of the course and distance obtained in this manner being as correct as if there were no current. If the log be hove in the usual way, and the distance shown by it, and the ship's course by compass, be compared with the course and distance shown by the first mode, sufficient data will be obtained to find the force and velocity of the currents.

**Winds.**—One of the distinctive features of the climate of La Plata is the frequency and rapidity in the changes of the weather; but these changes depend on certain laws which facilitate the means of foreseeing them. The general law regulating these changes here, as well as in the other parts of the southern hemisphere, is that the ordinary change in the wind takes place from right to left, or contrary to the movement of the hands of a watch. Therefore the wind generally backs from north to N.W., to S.W., to S.E., &c. &c., whilst in the northern hemisphere it veers from left to right.

The prevailing winds differ according to seasons. During the summer months, from September to March, the winds prevail from the eastward. The atmosphere is then pretty clear, but thick near the horizon, and the land is difficult to be seen. In the offing the winds blow from the N.E., hauling gradually to the east in approaching the river. Within the river during this season the winds generally veer round the compass in 24 hours. A fine steady breeze blows from the S.E. during the afternoon, in the evening it is from N.E., and during the night from north. At Monte Video this afternoon breeze is called *brizas*. Often fresh gales prevail during the night. On the following morning it backs to N.W. and west, or else calms prevail until the wind springs up from the southward or sets in from seaward about 11 o'clock. This wind is called *virazon*. When it fails, or the wind from north or N.W. continues to blow, squalls more or less heavy may be expected from the S.W. A few days of tolerably fine weather are often followed by clouds, rain and strong breezes, but it is difficult to foretell from what quarter they may come. Should it be from the northward, a continuance of bad weather may be depended upon; as unless the wind is from the southward, there is no duration in the fine weather, although it may appear likely to last. The more clouds, rain, and wind from the northward, the more it will blow hard from the southward.

During the hot summer months, when it does not rain sufficiently to cool the atmosphere, the winds from the northward are nearly suffocating, and produce a dry, oppressive, debilitating atmosphere, which affects both man and beast in a way that would scarcely be credited by those who have not felt them. These winds last about three days, and are always accompanied by a depression of the barometer, which falls in proportion to its strength; whilst blowing, the atmosphere is loaded with electricity, a storm invariably follows, during which the wind veers to the S.W.

When it blows from the southward the weather is cool and agreeable; there is however, a marked difference between S.E. and S.W. winds; the former, although cool, are damp, as are all winds from the eastward; but the S.W. winds bring the most clear, elastic, refreshing atmosphere that can be imagined, and the climate of the Rio de la Plata, whilst the wind is from this quarter, can hardly be surpassed. A little time before the new and full moon, there are often strong breezes from the S.E., with rain; but sometimes it blows from the northward, not so hard as from the S.E., and the temperature is higher. The pamperos, or S.W. winds, seldom prevail at this season.

During winter, from March to September, the most prevailing winds at the entrance of the La Plata are from west to S.W.; and in the river they are oftener from north than south or west. At that season, when the weather is really fine, the wind backs round the compass as in the summer; but in ordinary weather it happens only once a fortnight, taking place, as already mentioned, from south to east, north and west. The winds from north blow with rain, lightning, and thunder; it hails at the first with south winds. With the wind from the east there is an abundance of rain. When the wind backs as above, fine steady weather may be expected; but if in the contrary way it is nearly a certain sign of bad weather.

During the months of June to October the squalls from S.W. or pamperos prevail the most; at that time the winds are variable, with squalls, calms and rain. When the wind is from the east, with squalls, it is generally followed by those from the

west, with squalls, and *vice versa*, and the weather sets in fine again only when the wind veers either to the north or south according to its rotation. Thus the wind begins at west, backs to the south and S.E., blows rather strong at east and N.E., changes to the N.W. in a squall, and the weather becomes fine again only if the wind settles in the north.

**Pamperos.**—The bad weather in the La Plata sets in with the wind from S.W. or S.E. The winds from the S.W., whether strong or light are called pamperos, from their blowing over the pampas before reaching the coast. They may be divided into two classes; the general and the local pampero. The local pampero is of short duration, and should it blow hard the weather is clear. The general pampero, on the contrary, is accompanied with rain and storms. It descends from the Cordilleras, passes over the pampas, generally lasts for three days, and is known in the La Plata by the name of *pampero sucio*, or dirty pampero.

They set in generally with a strong squall from the westward, which darkens the horizon, and is followed by other heavy squalls of wind, rain, hail, and thunder; soon after the sky becomes clear, the wind remains, becomes cool, and backs to the S.W. and S.S.W. By attention to the barometer and the state of the atmosphere, the coming of a pampero can generally be foretold, but sometimes the signs of bad weather end in a short squall with thunder and lightning, which soon passes away. A vessel from the northward on reaching the parallel of 31° or 32° S. will be in the vicinity of the pamperos; they are felt as far as 48° W., and between the parallels of 31° and 40° S. These squalls are dangerous, as they are sudden, but their violence has been exaggerated, and they are no more to be dreaded than the heavy squalls which are met with in other parts of the world.\* Let not the sailor, however, by these remarks, be thrown off his guard.

The different circumstances which generally precede a pampero are:—Interruption of the regular daily and nightly breezes. A series of north winds, with great heat and suffocating atmosphere. Fresh breezes from N.W., followed by unsettled weather, then by a north wind, freshening and backing to N.W., with haze or a little rain; if in this case it should be hazy with lightning in the S.W. a pampero is certain. A great depression of the barometer, for several hours and sometimes entire days. The rising of the water of the river. The presence of myriads of insects in the air, and a kind of white filament (*virgin's thread*).† And lastly, the extreme clearness of the atmosphere, which admits the cerros of San Juan to be seen from Buenos Ayres, and other objects at a great distance.

As soon as the pampero blows, the temperature becomes cold; its duration in winter is generally from two to three days, it may last five or six, but very seldom. In summer it is less frequent than in winter; it does not last so long, but blows with more violence. It is known then by the name of *turbonada*, as after a few hours it veers to south and S.E., losing all its force. In the winter it often backs to south and S.E. when it blows in squalls for several days; it being then foggy with rain, and consequently the coast is not easily seen. When it comes on with a clear sky it lasts longer than in cloudy weather. Should it continue raining whilst the wind backs to south and S.E., it is a sign the pampero will last, and that fine weather will be preceded by squalls from the S.W.

If on the rising or setting of the sun it should lull occasionally, it is a sign of an early change or less wind, and if it freshens again it will only be for a short

\* The pamperos have now and then assumed the violence of heavy gales, but the occurrence is more and more rare; all frequenters of the La Plata agree that the violence of the pamperos has been continually on the decrease since the present century.

† Lieut. James P. Thurburn, commanding H.M. brigantine "Griffin," 1850, says, I have several times observed this singular phenomenon in the Rio de la Plata. It generally takes place in very fine weather, perfectly clear atmosphere, and light northerly winds. The whole of our clothes, hair, and the vessel's rigging were covered with long white slender webs, not unlike that of a spider's.

time. When the pampero is about to abate, the atmosphere becomes clear, and the wind veers to west. The weather is generally bad at the end of August, and there is the same regularity here in the change of weather as there is about the time of equinoctial gales in the English Channel.

**South-East Winds.**—These winds blow with much force, cause a heavy sea, and a strong current to the N.N.W.; they are known in the country by the name of *suestadas*, and are more dangerous as they prevail on a coast without shelter, accompanied with rain and fog, which prevents the land from been seen. They are anticipated by a great rise in the barometer, cloudy threatening weather with lightning, and a red sky on the rising of the sun; the water in the La Plata and the coast becomes high, and a strong current flows into the river.

**Barometer.**—The rise and fall of the barometer will generally indicate the changes of the weather, though it may frequently happen that the oscillations may be the same with opposite winds; it must therefore be consulted with great regularity. The general rule is, that it rises with easterly winds, and fall with westerly winds; but with bad squally weather it invariably falls, from whatever point the wind may be blowing. The greatest mean height of the barometer takes place in August and September; the lowest in the months of January, February and June. The highest range may be about 30.6 inches, and the lowest 29.3 inches.

In fine weather the mercury falls a little for east and S.E. winds, and rises again when they are settled, falling again for westerly winds. If with westerly winds the barometer continues to fall, it may be inferred that it will blow again from the east. With the wind from S.E. to N.E., immediately after a storm, or as soon as the weather is clearing up, it is not long without rising and remaining sometimes very high as long as strong winds from S.E. prevail; if, on the contrary, the barometer continues falling, and especially if it should become cloudy in the S.W., a pampero may be expected.

The fall which precedes bad weather is generally a great deal slower than the rising which takes place when the weather is clearing up.

**Thermometer.**—The mean temperature in the La Plata is about 65°, but the changes of the temperature are as sudden as the changes of the wind. The extreme thermometrical limits are from 32° to 88°. The highest temperature is in the first fortnight of February; the lowest in the first fortnight of July. The thermometer rises with north winds and falls with south winds. It seldom snows, but in fine winter nights the ground becomes covered with hoar frost, and the stagnant water with a slight coating of ice, melting with the first rays of the rising sun.

**Rain.**—The rain is very irregular in the La Plata; it falls more frequently during the spring and autumn than in the other two seasons. May and October are the two months when it rains the most; it is more frequent during the night than by day.

As the difference of temperature between day and night is always considerable, the vapour dissolved in the atmosphere begins to condense as soon as the sun has set, when the dew falls by its own weight; and it often happens in clear weather that it looks like thin rain.

**Fog or Haze.**—During the winter months of July, August and September, there are thick fogs, especially from the entrance of the river to Ortiz bank; they are not so intense further up. At Buenos Ayres they seldom last more than a few hours.

**Lightning** is extremely frequent during the summer, and indeed all the year round it is more frequent in the La Plata than in most other parts of the world. Vessels' masts, churches and houses are often injured. These accidents, however, do not so often take place as from the frequency and vividness of the lightning might be imagined.

**Mirage or Refraction.**—In the Rio de la Plata there is a great deal of refraction, and more so in the tributary rivers. It often happens that objects above the visible horizon disappear; others under the horizon rise and are clearly seen at great distances. At Buenos Ayres the cerros de San Juan, below the horizon, on the Oriental coast, a distance of 36 miles, are sometimes seen. When this is the case the atmosphere is extremely clear, and it is a most certain sign of bad weather. In 1862, Nav. Lieut. R. Cook, H.M.S. "Stromboli," observed that Colonia light-house, and vessels at anchor there, were plainly seen by the naked eye, at a distance of 30 miles.

This extraordinary refraction not only takes place near the horizon, but also many degrees above it. Captain E. Mouchez, of the French Imperial navy, gives an instance of a fog rising during the time he was taking observations, which hid the sun but slightly, leaving the limbs clearly visible. In calculating the hour angles and comparing the different series, it was found that the refraction had regularly increased with the fog, and that at the last observation, when the altitude was 31°, it was higher by 1' 25" than that given by the tables.

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## NORTH EAST SHORE,

FROM

### CAPE CASTILLO TO EAST POINT MALDONADO.

**CAPE CASTILLO** is the most northerly point that a ship should sight, if from the state of the weather or the position of the vessel it should be thought prudent to make the land before running up to Lobos islet. This cape is easily distinguished by a white rounded sandhill, 184 feet high, and named Buena Vista, at its back, with its summit towards the N.W. ending in a sandy peak. There are patches of black bushes on its white sides, and its isolation and peculiar form render it a good mark for this part of the coast. It may be seen in clear weather at about 15 miles off, and the vessel will then be in from 15 to 20 fathoms water. Polonia light, 3 miles southward of Cape Castillo, should also be seen. In case of need, fair shelter may be found against S.W. winds in Castello Bay, northward of the cape.

Pilots cruise between Cape Castillo and Maldonado Bay.

**CASTILLO GRANDE OR MARCOS**, an islet at about 1½ miles to the eastward, derives its name from a steep black rock like a castle, which stands up on its S.E. side, 102 ft. above the sea. From a few miles in the offing this rock looks like a vessel under sail, or if seen against the coast it is well defined on the white sand-hill of Buena Vista behind it. The islet is nearly circular, and about 320 yards in diameter.

**CASTILLO CHICO OR ISLA DE TIERRA** is a smaller islet lying ¾ of a mile to the westward of the former; it is not so steep, and is separated from the coast by a passage 160 yards wide and 20 ft. deep. The islet is about 40 ft. high, and its top covered with bushes. In fine weather a boat can land on the S.W. side, where is a small creek. In the channel between the two Castillo islets there is a depth of from 8 to 9 fms., sand and mud; vessels of any size may pass through without difficulty.

**CASTILLO BAY.**—From Cape Castillo the coast to the N.W. forms a small sandy bay, where boats may land. The shore continues low to the northward for a distance of 1½ miles, where the Castillo lagoon has its outlet.



**Anchorage.**—In the Ensenda, or Bay of Castillo, vessels may find shelter from all winds from S.S.E. round by the south to N.W. The best anchorage is with the summit of Buena Vista bearing about S.S.W.  $\frac{1}{2}$  W., at 3 or 4 cables from the point, in a depth of 4 fms. hard sand. Before dropping the anchor it is necessary to be sure of the nature of the bottom, as patches of rock are scattered about. There is tolerably good anchorage also in 3 fms. water, fine sand, in the centre of the bay formed by Cape Castillo to the west, and the islet Castillo Chico to the S.E.; here a vessel would lie at 2 cables from the nearest land; and in case of its coming on to blow from the N.E. a vessel could get out between the islet and Coronilla point, where there is a depth of 3 fms. in the channel,  $\frac{3}{4}$  of a cable wide.

These anchorages were formerly much frequented, many a vessel disabled by a pampero at the embouchure of the La Plata has been obliged to bear up for Santa Catherina or Rio de Janeiro to repair damages; others have been driven off a long way to sea, whereas had they known of these anchorages close at hand they might have run for them. Vessels, however, should be on the watch for the wind shifting to the N.E., when they should put to sea immediately, as that wind raises a heavy sea on this coast.

In the angle of the bay, at the very foot of Buena Vista, there is a small stream where boats can get fresh water easily. There is no fuel but the brushwood on the hill.

**Cape Polonio** lies 2 miles southward of Coronilla point, the intervening coast being sandy downs from 12 to 18 ft. high. The cape is a steep rocky promontory forming three points; that to the S.E. being named Polonio; above it is a greenish cone-shaped hill, rising about 120 ft. above the sea, which seen from the S.W. or N.E. assumes the appearance of an island. In the bay between capes Castillo and Polonio there is anchorage with off-shore winds in a depth of 5 fms. at  $\frac{1}{2}$  a mile, and in 7 or 8 fms. at one mile from the shore, sand and mud.

**Light.**—On Cape Polonio a light-house is erected showing a fixed white light, 137 ft. above the sea, and visible from a distance of from 20 to 22 miles. The light-house is of grey masonry, with three broad white horizontal bands equidistant, and built on a circular platform, is situated near the beach.

**ISLAS DE TORRES** are a group of three islets which extend one mile to the eastward of Cape Polonio; they are arid rocks from 100 to 160 yards in diameter, and from 12 to 18 ft. high. The two inner are named Raza and Encantada, and are surrounded by a reef; the third, named Isote, lies  $1\frac{1}{2}$  miles east from the cape, and at a cable to the N.E. of it is a detached rock generally above water. A dangerous reef, barely awash, named the Bisson, lies midway between Isote and the other islets. Torres rock, as well as the Castillos, are much frequented by seals.

There is fair anchorage with tolerably even bottom in the bay north of Polonio in  $5\frac{1}{2}$  fathoms, with Isote bearing S.E. by E. and the light-house S.W. by S.

**POLOONIO ROCK** is a dangerous rocky shoal lying  $2\frac{1}{2}$  miles S.W. by S. from the cape. The reef extends  $\frac{1}{2}$  a mile in an E.S.E. and W.N.W. direction, and the least water over it is 11 ft., while close alongside it there are 11 fms. The shoalest spot is  $\frac{1}{2}$  its length from its western end; the sea breaks on it in rough weather. Between the shore and the reef there is a passage 2 miles wide with 10 and 11 fms., sand and mud, but the mariner is cautioned to make well sure of his bearings before he trusts his vessel in the vicinity of this dangerous shoal.

**POLOONIO BAY** lies to the westward of the cape, and offers fair anchorage with off-shore winds, and as far out as N.E. A vessel may anchor in 7 fms., fine sand, with the cape bearing N.E. by E., but she must be ready to start if the wind comes more to the eastward. A vessel, if detained in this neighbourhood, may change her anchorage to the northward or southward of the cape according to the wind; there is, however, at times a heavy swell in these small bays.

**Tides.**—It is high water full and change, at Cape Castillo at 8h. 30m. The rise is much influenced by the wind; southerly and S.E. winds often raising the water 6 ft., and occasionally 9 ft., as shown by the marks left by the sea on the rocks. In fine weather the tides are tolerably regular, and the rise at springs is about 2 ft.

**PUNTA RUBIA (Red point).**—The coast from Cape Polonio extends in a low range of sandy downs, S.W. for 20 miles, to a red cliff, about 50 ft. high, named Rubia, which is remarkable as the only cliff of that color in the whole extent of the embouchure of the La Plata, whence it takes its name.

With the exception of the Polonio reef the coast is all along clear of danger.

**CAPE SANTA MARIA**, is only a low point, lies 4 miles southward of Punta Rubia, the coast between forming a small bay, in which is the anchorage of Arecife, well sheltered against westerly and S.W. winds. Cape Santa Maria is called by the natives Punta de Rocha, on account of the town and lagoon of that name a few miles inland to the N.W. A reef of rocks extends a cable's length to the southward of the cape.

There is anchorage west of the cape, with off-shore winds, in 6 or 7 fms. water, about  $\frac{3}{4}$  of a mile from the beach.

**Light.**—On Cape Santa Maria there is a lighthouse, which exhibits a revolving white light of the first order, attaining its greatest brilliancy every minute; it is 132 ft. above high water, and visible 18 miles. The light-house is round, and 125 ft. high.

**Rock.**—In 1865, the steamship "Herschel" struck on a rock off Cape Santa Maria. In May, 1871, H.M.S. "Speedwell" in searching for the rock, which is believed to be small, found a depth of  $6\frac{1}{2}$  fms. at 2 miles E. by N.  $\frac{1}{4}$  N. from Cape Santa Maria; until the position of the danger is correctly ascertained, vessels should give the cape a good berth.

**BANK.**—Mr. Slack, master of the "La Place" in 1872, reported a dangerous sand bank off Cape Santa Maria. The bank lies parallel to the shore about 2 miles distant; its S.W. end, which is perfectly distinct, bearing about south from the flagstaff at Port Paloma. There appeared to be a deep channel inside the sand bank. The existence of the above bank is considered doubtful.

**ARECIFE ANCHORAGE**, as already mentioned, is in the small bay to the north of Paloma isle, and affords anchorage in 5 fathoms, well sheltered from N.W. and S.W. winds, about  $\frac{3}{4}$  of a mile off shore. The bottom is very uneven, in approaching from the northward.

A bank with  $2\frac{1}{2}$  fathoms on its extremity, which occasionally breaks, extends  $1\frac{1}{2}$  miles N.N.E. of Paloma island, and is 1 mile distant from the shore; it must be avoided in making the anchorage.

**PALOMA HARBOUR.**—A short distance to the northward are two small islands, which together form the small harbour of Paloma. The northern islet is the larger, and is named Paloma; it is about 4 cables long, its southern part 26 ft. high, and it is green; a reef extends off it 4 cables to the N.E., on which there are heavy breakers: the other islet, Tuna or Espinosa (so called from the cactus which grows on its summit), is low, sandy, and covered with brushwood.

Paloma Harbour, formed by a bight in the coast and the islets Paloma and Espinosa, is a circular basin about 4 cables in diameter, having a general depth of 8 or 9 ft., hard sand; it is well adapted for a few small coasters. The entrance, which is between the two islets, is narrowed by the reefs which extend from either

islet towards the centre, and form a channel about 50 yards broad. Nearly in the centre of the channel there is a rock having a depth of 7 ft.; the deepest water is on the Paloma side. By keeping as close as possible to the edge of the surf on that side will lead in about 11 ft. water, and clear of the rock, which it will be prudent to buoy before the vessel enters. The channel on the other side of the rock has a depth of only 8 or 9 ft., uneven bottom. Just inside the entrance there is the deepest water, about 15 ft.; moor N.E. and S.W., as the space is very confined.

H.M.S. "Pert," drawing 9 ft., entered Paloma harbour in November, 1872, and rode out a heavy pampero there. The marks on the rocks indicate a rise and fall of about 3 ft., but the tides are much influenced by the winds. There is a small stream of fresh water at the northern end of the harbour; abundance of geese, ducks, swans, and partridges may be shot near Rocha lagoon about 5 miles inland.

**CAUTION.**—Although Cape Castillo could be recognized at a distance by the round white sand hill of Buena Vista (184 ft.) and, rising up in advance of it, the steep black islet Castillo Grande (102 ft.) with Cape Polonio about 3 miles to the southward, it was often mistaken for Cape Santa Maria, which has the appearance of undulating sand hills, varying from 50 to 80 ft. in height. Since the erection of lighthouses on Capes Polonio and Santa Maria, this mistake should not occur. In heavy weather, if the land cannot be made out, come no nearer than 15 fathoms water, as there are depths of 12 fathoms close to Polonio rock.

The COAST from Cape Santa Maria extends westward for 6 miles to the Laguna de Rocha, and then S.W. by W. for 21 miles to San José Ignacio or Piedras point. It is a sand beach similar to that to the eastward; not a rock nor a single remarkable object exists on this uniform coast. A few estancias or farm-houses, surrounded by a few trees, are dotted on the summits of the sandy downs which rise from 60 to 130 ft. above the sea, and gaps in these sandhills indicate the presence of divers lagoons which exist in the interior, and here fall into the sea, as the lagoons Rocha, Cardal, Garcia, Blanca, &c. This coast is clear of danger, and at the distance of  $\frac{2}{3}$  of a mile from the shore there are from 6 to 11 fms. water.

**SAN JOSÉ IGNACIO POINT, or PUNTA PIEDRAS,** so named on account of the lagoon of this name in the vicinity, will be recognized by the lighthouse. It may also be known from the offing by two large estancias, one, that of the Pescadores, 2 miles to the N.W., the other 6 miles to the N.E. The point is formed by a frontage of rocks  $\frac{2}{3}$  of a mile in extent east and west, divided by a small sandy beach. Two rocky reefs of 7 to 8 cables extend parallel to the coast from the east and west points of the cape, forming within small creeks where boats may land. At one mile south of the cape there is a ledge of rocks with depths of from  $5\frac{1}{2}$  to 8 fms.

**Light.**—On San José Ignacio point is a lighthouse, distant 27 miles S.W. of Cape Santa Maria. It is a fixed white light, elevated 103 ft. above the sea, and visible 15 miles.

**SAN JOSÉ IGNACIO LAGOON** falls into the sea 3 miles to the westward of Piedras or San José point; this lagoon is about 8 miles long in a northerly direction by an average breadth of 3 miles, and is said to be deep. The sandy beach recommences to the westward of Piedras point, and is only interrupted by some rocks,  $11\frac{1}{2}$  miles to the W.S.W. of the point, near the mouth of the Maldonado rivulet; these rocks form a slight projection named point Maldonado. Between this latter point and that of Piedras the coast forms a clean regular bay about  $1\frac{1}{2}$  miles deep; but from Point Maldonado for 8 miles westward the coast is straight and has some rocks scattered about.

## THE NORTH SHORE,

FROM

EAST POINT MALDONADO, TO THE WESTWARD.

**Punta del Este, or East Point,** which should be considered the real point of entrance of the La Plata, forms the eastern part of Maldonado bay. It is a small dark headland at the end of some sandy downs, and rises about 50 ft. above the level of the sea, with a lighthouse on its summit. Isolated banks extend off about 2 miles to the south westward. From the offing, in fine weather, the summits of the mountains Pan de Azúcar and Sierra de les Animas may be seen in the N.W. 8 or 10 miles before seeing Punta del Este.

**Light.**—On the highest part of Punta del Este (East point), at a  $\frac{1}{4}$  of a mile from its extremity, is a tower 90 ft. high, from which is exhibited, at a height of 152 ft. above the sea, an intermittent white light; from the distance of 5 miles to 15 miles, it is visible during a period of 90 seconds, and eclipsed during 25 seconds; within the radius of 5 miles, the eclipses will not be total. At the distance of 9 miles from Lobos island, and at the height of 23 ft. above the sea, the light is shut out by the summit of the island on a N.W.  $\frac{1}{2}$  W. bearing.

The above was formerly a fixed light, but was altered in 1883 to prevent its being mistaken for San José Ignacio Point light.

**Lobos Isle,** 4 miles to the S.E. of East point, is flat, rugged, 65 ft. above the sea and may be seen from a distance of 12 to 15 miles. It is usually visible a little sooner than East Point; its coast is rocky, and can only be approached by a sandy creek on the north side of the isle, near the place where are the huts of the seal hunters. It is not safe for large vessels to approach the north end of Lobos nearer than 3 cables, as the bottom is uneven and there are several rocky heads with only 3 fms. water. The west side of Lobos is steep-to, and there are 6 fms. water at less than 2 cables from the beach; but on the east side is a detached reef which extends E.  $\frac{1}{4}$  S. nearly a mile from the shore. The crown of the reef is formed by two large rocks always uncovered; between the reef and the isle there is a depth of from 3 to 7 fms. water.

Between Lobos and the main there is a channel 4 miles wide, with a depth of 10 to 15 fms. mud, with sand and mud; this channel, however, had better be avoided in light winds with a swell, as the currents are stronger than in the offing. Lobos, as its name denotes, abounds in seals; they live chiefly on the rocks on the east and north side; in the interior of the isle there is an abundance of rabbits.

**Pilots** for the River Plate cruise off Lobos.

**ASPECT.**—Before continuing the description of the inner shores of the La Plata it will be necessary to describe the hills and mountains in the interior that are visible from the offing in clear weather, as they may prove useful in making the land. In approaching on the parallel of  $33^{\circ} 45' S.$ , at 10 miles off shore may be seen in the west the Sierra del Carbonero, a range of hills  $4\frac{1}{2}$  miles long in a N.E. and S.W. direction, the centre being the highest; it lies inland  $9\frac{1}{2}$  miles from the shore, and is on the frontier line between Brazil and Uruguay. On one of the slopes of the hills the fort of San Miguel is very conspicuous.

**CERRO DE LOS DIFUNTOS.**—After running 25 miles parallel to the coast the Cerro de los Difuntos will be seen; it is composed of several summits of about the same height, and is situated 6 miles from the shore on the west side of a lagoon. Seen in the north-west this cerro presents a gap or ravine.

**CERRO CHICO OR AGUDO DE NAVARRO.**—On advancing to the S.W. at the same distance from the coast, the naked conical hill of Cerro de Navarro, rising from the

centre of a group of smaller hills, will be seen; it lies 5 miles W. by S.  $\frac{1}{2}$  S. from Cerro de los Difuntos, and at 9 miles from the shore. The great rounded sand-hill of Buena Vista close to the beach, already described, will here be visible in the S.W.

**CERRO CHAFALOTE.**—This mountain range is much higher than those just described, and is 19 miles westward of the cape. It is easily recognized by its isolation in the midst of the plain, by its greater size, and by its outline, which seen from the eastward presents three summits of which the centre is the highest; it is steep and broken up by deep ravines. This group of landmarks renders Cape Castillo a preferable landfall to Cape Santa Maria, which is a low point, and not well marked by the surrounding high grounds.

**SILLA CHICA** is a small saddle-shaped hill at 13 miles inland, and, as its name denotes, takes the form of a saddle; although not high it is remarkable from the offing from its isolation and form, especially when seen bearing north.

**SILLA GRANDE**, a similarly shaped hill, lying 5 miles westward of the former, is rather more elevated, it is steep on the north side, and its form is more remarkable when seen bearing about north.

**MORRO SAN IGNACIO** is a lofty summit, which rises over a series of undulating hills, named *Asperzas de Maldonado*; it lies 19 miles northward of San José Ignacio or Piedras point. Los Tres Cerros lie 8 miles more to the south westward; it is a hill with three summits, the westernmost being the highest, and it is easily distinguished from the offing.

**SIERRA DE LA BALLENA** is another range of rocky blackish hills, extending in a nearly north direction from the Punta de la Ballena, the western extreme of Maldonado bay. A large patch of white sand on the south slope of one of the hills,  $2\frac{1}{2}$  miles from the point, is seen a long way from seaward.

**PAN DE AZUCAR.**—To the northward of Punta Negra, or Black point, is a mass of mountains, of which the culminating points the Pan de Azucar and the Sierra de las Animas, are the highest summits of all the coast; they may be seen in fine weather at a distance of about 40 miles, and are consequently of great utility when a vessel makes the land in the parallel of, or to the S.E. of Lobos islet. Pan de Azucar, as its name indicates, is a nearly regular cone, and rises 1,230 ft. above the sea at 3 miles from the beach; it is of granite, black, arid and isolated from all the surrounding heights.

**SIERRA DE LAS ANIMAS** lies 5 miles N.W. of the Pan de Azucar, and rises still higher (1,610 ft.), but its summit is flattened, and has a slight depression in the form of a saddle, which is visible when seen bearing W.N.W.

**MALDONADO BAY**,\*  $5\frac{1}{2}$  miles wide by nearly 2 miles deep, is formed between East point and Ballena point. It is exposed to south-west winds, which cause much sea, but a portion of the bay is sheltered by the small island of Gorriti. On the beach north of Gorriti is an iron pier, and on the beach east of the island is a wooden pier; but neither of these piers afford landing from boats unless a temporary ladder is secured to them. Inside East point is a small sandy cove, the only place at which supplies can be shipped when the surf is on the beach after S.W. winds.

The shores of the bay are clean with the exception of Arecife or Granite point, 2 miles westward of the iron pier, which is rocky. Thence to a spot east of the north end of Gorriti, the shore is backed by sandy hill and ridges, 20 to 90 ft. high. Between the south end of the sand hills and the long flat hill 50 ft. high, which forms the promontory of East point (Punta del Este) is a low sandy isthmus. The sand hill which is situate just to the north of the isthmus is well defined, and useful as a mark for the anchorage.

\* Revised Directions for Maldonado Bay, by Capt. W. J. L. Wharton, R.N., H.M. surveying vessel "Sylvia" (*Hydro. Notice, January, 1883.*)

The small town of Maldonado, which gives it name to the bay, stands  $\frac{1}{2}$  a mile from the beach a little beyond the brow of a hill, about 100 ft. high, so that its locality is only indicated from seaward by a few trees, the tops of the church and of the higher houses, and by a small tower 60 ft. high, which is of a dull red colour, and stands on a summit of the ridge. A low, square, white house is also visible to the W.N.W. of the tower. The population of Maldonado has much diminished during late years; at present scarcely a fourth part of the number of houses are inhabited. San Carlos, a town of about the same size, is 7 miles farther inland.

**GORRITI ISLAND**, which gives shelter to the anchorage, is nearly a mile in length north and south, and about 3 cables broad. It is low, of sand and rock, and has a small bay and beach on its west side. Some small batteries, and a storehouse for the produce of the seal fishery, existed here in the beginning of the century, but are now in ruins. A rocky ledge extends a cable off its N.W. end; and extending 3 cables from its N.E. end there is a sandy spit, with a depth of  $1\frac{1}{2}$  fms. on its extremity, and must be carefully avoided.

**SHOALS.**—At nearly  $\frac{1}{2}$  a mile W. by S. from East point is the outer edge of a reef of rocks about 2 cables in diameter, with a rock awash at low river, and on which the sea always breaks. The New, or Parker, rock, is a shoal about  $1\frac{1}{2}$  cables in extent, with 4 fms. water on it. It lies W. by S.  $\frac{1}{2}$  S. distant 1 mile from East point, and south 8 cables from the south point of Gorriti island. The south extreme of East point, bearing N.E. by E.  $\frac{1}{2}$  E., leads southward of New rock; and Maldonado tower, over the S.W. side of Gorriti, bearing N.  $\frac{1}{2}$  E., leads to the westward. The bottom near New rock is rocky and uneven, and the depth varies from 7 to 12 fms.

**SYLVIA BANK.**—This bank with a depth of 5 fms., least water found, is about 3 cables in extent within the depth of 10 fms. Its shoalest part lies with East point bearing N.E. distant 2 miles.

**MOSTYN ROCK** lies about a  $\frac{1}{4}$  of a mile east of the ruins, which are situated on the S.E. side of Gorriti; the rock is 2 cables in extent, has 9 ft. least water; though not in the direct track of vessels entering, it might pick up a vessel at night, and too near the island.

**THE MONARCH** is a small rocky patch with  $2\frac{3}{4}$  fms. water on it; there are  $4\frac{1}{2}$  and 5 fms. close to, and round the rock within the distance of a cable. This shoal lies 6 cables W.N.W. of the N.W. point of Gorriti, leaving between a channel 3 cables in breadth with 7 fms. water. The leading mark through this channel is the old cemetery which stands half way between Maldonado tower and the beach, bearing N. by E. The cemetery has two domes, but as they are not kept white, they are not conspicuous. If the western one can be discerned and brought in line with the iron pier, bearing N. by E.  $\frac{1}{4}$  E., it will lead between Monarch rock and Gorriti island; but care must be taken not to use the eastern dome, as in that case the vessel would pass close to the rock.

To the westward of the Monarch there are no dangers, but a vessel should not shoal less than 6 fms. Maldonado tower over the iron pier, N.E. by N. leads 2 cables westward of it; and Pan de Azucar over a small low saddle immediately within Ballena point W.N.W. leads on it; but kept open the apparent breadth of Pan de Azucar either way clears it north and south. The hut near the iron pier in line with the square white house west of Maldonado tower, and bearing N.N.E., leads directly on Monarch rock.

**Tides.**—There are no tides in Maldonado bay; strong southerly and S.E. winds raise the water 6 ft., and the opposite winds depress it. Westerly winds cause a strong current to set round Gorriti to the east and south.

**Anchorage.**—Vessels may anchor in safety in  $4\frac{1}{2}$  to 5 fms. water, sand over very stiff mud, with the N.W. end of Gorriti island from S. by W. to S.W., and Ballena

point about W. by N. There is also anchorage sheltered from all winds but those from the S.W. (which are the most dangerous here) eastward of Gorriti, in 5 or 6 fms., muddy bottom, but care should be taken to avoid Mostyn rock already mentioned.

The ledge off the N.W. end of Gorriti will shelter a vessel from south winds, which occasionally blow very strong. If a vessel intends making any stay it is necessary to moor, as the anchor soon becomes foul; moor open hawse to the S.W., the holding ground is very good, the anchor requiring a great purchase to lift it.

**Pilots.**—A pilot resides at East point, and is a general pilot to Buenos Ayres, &c. Pilot cutters are also frequently off this bay, having both Buenos Ayrean and Monte Videan pilots on board.

**Supplies.**—Water may be obtained from a small running stream, about 150 yards eastward of the iron pier. Moor the boats close to the beach, and lead hoses off from the watering engines. The lower part of the water when it reaches the beach is brackish, but between the banks it is excellent; by sinking a tub to put the hose in, and having about 200 ft. of canvas hose and about 120 of leather to lead through the water, 20 tons may be obtained in a day.

There is generally a little surf on the beach, and after a S.W. wind for two or three days there is no landing on it, but in summer, water may, on an average, be had five days in a week. There is also a lake of good fresh water at 2 miles westward of the pier within 50 yards of the sea, where a vessel could anchor in fine weather for the purpose, but no vessel should remain there longer than is actually necessary, as the bottom is sand, and the swell comes in heavily with S.W. winds. Fresh beef and vegetables may be had at very moderate prices. Live stock is reasonable, and cheaper than at Monte Video. Plenty of fish may be caught in the bay.

**Directions.**—A vessel bound into Maldonado bay may pass on either side of Lobos isle, avoiding the reef extending from its east side. East point will be known by the lighthouse. If southward of Lobos isle, the town and tower of Maldonado will be seen, and probably Pan de Azucar, and Sierra de las Animas N.W. of it. Having passed the isle, East point should not be brought to bear eastward of N.E. by E.  $\frac{1}{2}$  E., and when Maldonado tower is open of the S.W. side of Gorriti island, bearing N.  $\frac{1}{2}$  E. haul up for either channel, keeping Pan de Azucar open of Ballena point.

When Maldonado tower is in line with the iron pier bearing N.E. by N., a vessel may haul in for the passage westward of Monarch shoal, until Pan de Azucar shows northward of the saddle on Ballena point, or the point bears W. by N.  $\frac{1}{2}$  N.; then steer for the anchorage: or the western dome of the old cemetery in line with the iron pier N. by E.  $\frac{1}{2}$  E. will lead between Monarch rock and Gorriti island in 7 fms. water. With the wind at S.E. by E. a vessel may fetch the anchorage by passing east of the Monarch, but a tack must be made if westward of it. Do not approach the iron pier nearer than  $\frac{1}{2}$  of a mile.

In rounding Gorriti island at night from the eastward, a stranger is liable to mistake the S.W. end of the island for the N.W. as the sandy bay between them is very low and not easily discerned in the moonlight or darkness.

Ballena point is bold, and may be passed at a prudent distance. In working into the bay from the westward, a vessel may stand into 6 fms. water, at the distance of a long  $\frac{1}{2}$  mile from the shore; and in approaching the Monarch, keep Pan de Azucar northward of the saddle on Ballena point.

**South east Channel.**—Between the N.E. end of Gorriti and the main the ground is uneven, but there is a channel about a cable in breadth carrying 4 fms. water, which in fine weather may be used by small vessels having local knowledge, as no direct marks can be given. In fresh southerly winds the sea breaks right

across. Pilot cutters and small coasters sometimes pass between East point and the reef west of it, but the current here runs strong, and renders the vessels almost unmanageable in a moderate breeze.

Strangers in boats should be careful not to get set amongst the breakers of the reef, as they are treacherous in the finest weather.

**POTRERO BAY**, west of Ballena point, and between it and Raza or Level point, is 9 miles in extent, and takes its name from an adjacent lagoon, which here has its outlet. The bay is clear, and affords anchorage with off-shore winds in from 5 to 6 fms. water, gravel bottom, at 2 miles from the beach. The white sandy beach in the bay forms a good mark for this part of the coast.

**PUNTA NEGRA**, or Black Point, which presents an east and west headland or frontage  $2\frac{1}{2}$  miles in extent, is formed by three rocky points, separated by two small sandy bays. The eastern point is named Raza (Level), the centre Negra (Black), and the western Iman (Magnet); they are all steep, and are overlooked by the high grounds which are connected with Pan de Azucar. The depth about a mile off this headland range from 7 to 10 fms. Westward of Iman point, the shore trends N.N.W., and at 3 miles is English point; the small bay which lies between is called Puerto Ingles. At 5 miles beyond is Animas point; it is low, and a reef of rocks extends some distance off it.

**PUNTA DE AFILA** lies 7 miles westward, with a clean sandy beach between. Two hills near the point, higher than the rest are conspicuous from the offing; on the northern was formerly a look-out station, whence the arrival of vessels was signalized to Monte Video. The slope of the southern hill forms the Point de las Piedras, which is low, salient towards the S.S.W., and bordered by steep rocks. The surf is heavy on this coast.

**AFILA ROCKS**, or Isla Chiba, is a reef of stones nearly awash; it lies  $1\frac{1}{2}$  miles south of Punta de Afila; it is surrounded by breakers, and covered at high tides.

**SOLIS ROCK**,  $3\frac{1}{4}$  miles to the eastward, lies 3 miles off shore, nearly midway between Animas point and Afila rocks; it is rocky, 4 cables long east and west, and 2 cables north and south; it is awash, covered at high tides, and the seas breaks on it constantly. There is a depth of 3 fms., sand and mud, between Solis rocks and the shore. From the crown of the rock, Pan de Azucar bears E. by N.  $\frac{1}{4}$  N., Sierra de las Animas N.E.

**PUNTA DE PIEDRAS NEGRAS**, the next salient point, lies about W.  $\frac{3}{4}$  S.,  $9\frac{1}{2}$  miles from Punta de Afila; the sandy beach between is broken by a rocky point named Pedro Lopez, and the rivulet Solis Chico falls into the sea about 2 miles westward of it. A rocky shoal encircles Piedras Negras point, and extends about  $\frac{2}{3}$  of a mile off shore. Piedras Negras point, as well as Pedro Lopez, are both double points, with a small beach between. A rocky shoal, less than that of Afila, lies S.E. at a short distance from Piedras Negras, with a 3 fathom channel between fit for boats.

**LA PLAYA DE SANTA ROSA**, an extensive gravel beach, lies between Piedras Negras and Carretas or Buceo point, a distance of 19 miles; it is clean and steep to, with 3 fms. near the shore. The sea is very heavy along this coast in all winds between south and east, and the strong currents would drive a ship bodily ashore. Several vessels have been lost here, and their crews have perished, not from rocks, but from the heavy surf that breaks on the steep shore.

Close to the westward of the point Piedras Negras, is a small bay called Santa Rosa, about  $1\frac{1}{4}$  miles across where is a depth of from 3 to 4 fms., mud; a small stream of fresh water falls into it, and the beach is of hard sand, and steep. At 6 miles further to the west, Pando rivulet falls into the sea; the town is on the right bank of the stream, and 6 miles inland.

**Carretas or Buceo Point** is low, rocky, and backed by a large hill, which has obtained for it also the name of Punta Gorda. This serves as a mark to recognise

the point. A small islet named Luz, about 5 ft. high, surrounded by rocky and uneven ground a quarter of a mile distant on all sides, lies S.E. distant 4 cables from Carretas point.

**SARA BANK.** a rocky shoal of 9 ft. over its shoalest part and 4 fms. at a short distance, is about 4 cables long, and lies one mile S.E. by S. from Mark rock, and  $4\frac{1}{2}$  miles W. by N. from Flores Island lighthouse.

**Carretas or Pipas Rocks,** a cluster rising to the height of 10 ft. above water, lie with their western extremity  $1\frac{3}{4}$  miles E.  $\frac{1}{2}$  S. from Carretas point, and extends thence 4 cables in an easterly direction. The eastern rock (Mark rock) is distant  $5\frac{1}{2}$  miles W. by N.  $\frac{3}{4}$  N. from Flores Island lighthouse, and is visible about 3 miles, showing dark against the white beach. Rocks awash extend about 2 cables east and north of Mark rock, and broken ground of from 1 to 2 fms. extends  $3\frac{1}{2}$  cables northward of Carretas rocks.

**BUMP SHOAL.** of 4 ft., lies 4 cables E. by S.  $\frac{1}{2}$  S. from Mark rock, with a depth of 4 fms., mud between. This shoal rarely breaks and is therefore more dangerous.

**FOREST KING REEF,** with 6 ft. water over it, is 5 cables long, in a N.W. and S.E. direction, and  $1\frac{1}{2}$  cables broad. From the southern extremity of the reef Mark rock (Carretas reef) bears N.E.  $\frac{1}{2}$  E., Luz islet N.W., and Flores Island lighthouse E.  $\frac{1}{2}$  S. 6 miles. The reef is steep to,  $3\frac{3}{4}$  fms. mud being found within a cable of the rocks.

**LUZ ISLET.**—A long narrow cluster of rocks having rocky and uneven ground, a  $\frac{1}{4}$  of a mile distant on all sides, extends from Carretas point in a south-easterly direction  $\frac{1}{2}$  a mile; the high rock called Luz islet, bears S.E. from Carretas point distant 4 cables, and is generally about 5 ft. above water; during a very high river the rock may be awash.

**Directions.**—In working out of the river, Flores Island light should not be brought to bear southward of east until two remarkable single trees, about 3 miles to the north-eastward of the entrance of Toledo river, are in line bearing N.  $\frac{3}{4}$  W.; this mark leads eastward of the shoals off Carretas point. The northern tree stands on the top of a low conspicuous range of hills. The southern tree much resembles the other, and is situated below the line of the hill tops, but shows clearly by reason of its dark foliage.

**FLORES ISLE,** at  $7\frac{1}{2}$  miles E. by S.  $\frac{1}{4}$  S. of Carretas point, is a good landfall, and one always made; it lies 51 miles about W.  $\frac{1}{2}$  S. from Lobos. The island or islets are a mile in extent, in a N.E. and S.W. direction. The N.E. portion, 42 ft. high and about 2 cables long, is connected at low water with the S.W. portion, distant 2 cables, by a ledge of rocks. On the S.W. extremity stands the lighthouse.

The island is in telegraphic communication with Monte Video, and is used as a quarantine station for vessels frequenting that port. The lazaretto is on the west side of the island, where also there is a pier, and a mooring buoy in 3 fms., half a cable off the pier. Shoal ground extends one mile northward of the N.E. extremity of the island; also  $\frac{1}{2}$  a mile westward of the lighthouse.

**CUMBERLAND SHOAL.**—At a full  $\frac{1}{2}$  mile S.W. by W.  $\frac{1}{2}$  W. of the islet is an apparently isolated rock, having only 17 ft. over it, on which H.M.S. "Cumberland" struck on the 15th March, 1858, and remained 7 hours, receiving much damage. There is a depth of 5 fms. between the rock and the shore, and depths of  $3\frac{1}{2}$  and 4 fms. extend 1 cable northward, and 3 cables southward of the shoal. This danger should be carefully avoided.

**Light.**—On the most elevated point of Flores islet to the S.W., which rises 50 ft. above the sea, is a white lighthouse, which shows a revolving white light every minute, at a height of 104 ft. above the mean sea level, and should be seen 12 miles in clear weather.

**PUNO SHOAL.**—From the N.E. point of the island, a ledge of rocks extends about  $\frac{1}{2}$  a mile; northward of which, and isolated, is Puno shoal, nearly  $\frac{1}{2}$  a mile in extent north and south. From its shoalest spot of  $1\frac{3}{4}$  fms., the N.E. point of the islands bears south, distant  $\frac{3}{4}$  of a mile.

There is anchorage in  $4\frac{1}{2}$  fms., mud, about 3 cables north of the landing pier; also all round the islands.

**BASSURAS BAY,** formed between Carretas and Brava points, is 5 miles in extent and 1 mile deep. Near the middle of the bay is the small islet of Meldroza, between which and the main is an anchorage for coasters.

**BUEN-VIAGE REEF** is nearly circular, about  $\frac{1}{2}$  a mile in diameter. From its east end Brava point bears W. by S.  $\frac{1}{2}$  S.,  $1\frac{3}{4}$  miles. The shoal is marked by 3 buoys, namely, a bell buoy on the eastern extremity in 4 fms.; a buoy on the north-eastern extremity in 4 fms.; and a bell buoy on the western extremity in  $3\frac{1}{2}$  fms.

**Caution.**—The navigator is recommended to approach this part of the coast with great caution, as the river has not been regularly surveyed.

**Punta Brava,** 2 miles to the eastward of Monte Video, is low and terminated by a reef extending  $\frac{1}{2}$  a mile to the southward; at its extremity is a detached rock awash; 1 cable from this rock there is a depth of 4 fms., mud. Ships should round point Brava at 1 mile off at least, avoiding a bank of  $2\frac{1}{2}$  fms. (supposed to have been formed by a wreck) reported to lie  $2\frac{3}{4}$  miles S.S.W. of the point.

**Light.**—A lighthouse coloured white is erected on Punta Brava. The light is a fixed white light, visible 10 miles.

Having passed the point, a vessel should keep in not less than  $4\frac{1}{2}$  fms. water southward of the parallel of the extremity of the reef extending from it; and in working to the westward, and unable to reach Monte Video bay before dark, a vessel can anchor south-eastward of the Cerro light at about  $1\frac{1}{2}$  miles from the shore, so as to be in readiness to take up a proper berth when convenient. The bottom near the shore eastward of Monte Video is bad holding ground.

**PUNTA SARANDI** is 3 miles W.N.W. of Punta Brava, and forms the western extremity of the peninsula of Monte Video. The coast between is rocky and forms a bay  $\frac{3}{4}$  of a mile deep; in the middle of this bay is a small sandy cove, named Playa Ramires. The west points of the cove, named Perez, and Gabriel, inside of it, have rocks extending a short distance off.

**MONTE VIDEO BAY** is in form almost circular, its diameter being  $1\frac{1}{2}$  miles, and having an opening over one-quarter of the compass towards the S.W. It is comprised between San José point on the east and point Labos on the west, 2 miles apart, and sheltered from winds between west round northerly to S.E. The eastern shore of the bay is the sea wall of the central railway, northward it is composed of sandy beaches and rocky points; the western shore, at the foot of the Cerro, is rocky. The bottom all over is of soft mud, with a few patches of rock; the depth varies from 15 to 10 ft.; the bay therefore only admits vessels of comparatively small draught of water.

The harbour, or inner anchorage, is a small space of less than  $\frac{1}{2}$  a mile square, close off the N.W. face of the town, with a depth of 14 to 15 ft.

The anchorage here is indifferent, as there is much sea during strong southerly winds. Vessels are recommended to moor, in all cases. The breakwater, which extends about 160 yards in a N.W.  $\frac{1}{2}$  W. direction from San José point, being under water, except at low river, affords no shelter to the landing place during a pampero, and but little protection at any time. A buoy marks the extremity of it. A pole buoy in 10 ft. marks the N.W. extremity of the shoal water, northward of Sarandi, with San José point bearing E. by N.  $\frac{3}{4}$  N. distant 2 cables.

There are some islets and patches of rock within the bay. Ratones (or Rat) islet to the N.W. was formerly fortified, but now is in ruins: it is surrounded by rocks and shoal water to the extent of a cable's length. At  $3\frac{1}{2}$  cables S.S.E.  $\frac{1}{2}$  E. from Ratones is a reef awash, at very low water, named **Sarina**, and marked by 2 buoys, viz., a white conical buoy on the east side, and a black conical buoy on the N.W. side.

Triton shoal, of 7 ft., lies a good cable to the eastward of Sarina.

**TAGUS ROCK**, with a depth of 15 ft., lies with El Cerro lighthouse bearing N.N.W., and the cathedral N.E. by E.  $\frac{1}{2}$  E. A pole buoy marks the rock.

Another patch, about a cable in extent, lies 3 cables to the north of Ratones, and a rock, having 6 ft. water over it, lies 3 cables to the eastward of Ratones island. On the east side of the bay, at  $\frac{1}{2}$  a mile north of the mole, is a group of rocks named **Familla**, marked by the boiler of a wrecked steamer which shows above high water on the middle of the rocks.

**El Cerro** or the **Mount**, is the distinguishing feature of the port. It rises on the western side of the bay in the form of a regular, isolated, bare cone to a height of 465 ft., at less than  $\frac{3}{4}$  of a mile from the beach. It is crowned by a fort, on which there is a lighthouse. The Cerro is useful to the mariner on all occasions, whether on his voyage up or down the river, as a conspicuous and easily recognised landmark, and by careful observations it will very materially assist in ascertaining the direction and force of the currents, which are so variable and uncertain.

Lobos point, the south extreme of El Cerro, has rocks off it to the distance of 4 cables, known as the White rocks. There is a depth of 15 ft. only, at  $\frac{1}{2}$  a mile southward from the point.

**SAN FELIPE de MONTE VIDEO**, the capital of Uruguay, stands on a gently rising ground on the east side of the bay, at its entrance, occupying a small peninsula, extending east and west  $1\frac{1}{4}$  miles by  $\frac{1}{2}$  a mile average breadth. The principal building is the cathedral, an imposing structure, with its dome and 2 towers, which may be seen at a long distance in the offing. The houses are mostly of one floor and flat-roofed; the streets cross each other at right angles, and are paved. The custom-house is on the north face of the town, near which some small moles or piers project into the bay. The defences of the town consist on the east or land side in a strong wall, which crosses the neck of the peninsula from the harbour to the sea, and on the west side in the small fort of San José at the entrance.

Consuls of all nations reside here, and there is an English church on the south side of the town near the shore. The trade of Monte Video is considerable; the exports consisting of wool, hides and tallow; and the imports of cotton and wollen fabrics, hardware, wine, &c. The population of the city and the immediate neighbourhood in 1879 was 110,167.

Monte Video is in telegraphic communication with all parts of Brazil; and by submarine cable with Europe.

**Docks.**—In Monte Video bay are 2 graving docks, viz., Cibil dock in the S.W. part of the bay, near Lobos point; and Mana dock in the eastern part of the bay.

The dimensions of Cibil dock are:—Total length 450 ft., width at entrance 56 ft., depth on sill at ordinary high-water 16 to 18 ft., depth at extraordinary high-water 18 ft. The dock can be divided into 2 docks by means of gates; the inner dock, thus formed, 260 ft. long, the outer dock 190 ft. The outer dock is closed by a caisson, and the entrance is sheltered from dangerous winds.

There is nearly 2 ft. less water in the harbour outside than on the dock sill; although therefore vessels drawing nearly 18 ft. might enter the dock with a high river, they might have to wait many days before they could leave. This dock is in constant use, and the channel leading to it is buoyed.

The dimensions of the Mana dock are:—Length 271 ft., width at entrance 52 ft. The water is occasionally as high as 18 ft. on the sill, and as low as 11 ft. The dock is cut out of the solid rock, and the entrance is closed by a caisson. As the entrance is much exposed the dock cannot be recommended.

**SUPPLIES.**—Water and other supplies may be got easily at Monte Video. Water is brought by pipes from the river San Lucia, distant 33 miles, to a reservoir, 6 miles distant from the town, and from thence to the capital. Water is brought off to the vessels when required. Supplies of coal can be obtained.

**Lights.**—A fixed and flashing light showing a flash every 3 minutes which lasts for 15 seconds is exhibited from a light-tower within the fort on the summit of the Cerro, at an elevation of 486 ft. above the sea, and should be visible in clear weather at a distance of from 20 to 25 miles. This light, on account, perhaps, of its great height, is not to be depended upon.

A white light is also shown at 147 ft. above the sea by the dial-plate of the clock in the S.E. tower of the cathedral, having been lighted by gas. This light is visible from 6 to 10 miles, and enables vessels to anchor in the outer road at night, by cross bearings of the 2 lights.

The **Anchorage** for vessels of moderate draught in the road at Monte Video is about  $1\frac{1}{2}$  miles S.S.W. of San José point in 20 or 21 ft. water, mud, with the Cerro bearing about N.W.  $\frac{1}{2}$  N., and the cathedral N.E. or N.E. by N., and Brava lighthouse east. Vessels may anchor farther in as convenient, and those of light draught in the inner anchorage, or northward of the town, in from 9 to 12 ft., mud. In the inner anchorage the holding ground is much better near the Cerro than the east side of the bay. On the east side vessels frequently drag their anchors during bad weather. A line of buoys, marking the limit of the man-of-war anchorage, is placed between the breakwater and Ratones islet. The anchorage near Sarandi point is not safe, on account of the heavy ground swell in that locality, and in case of a pampero the vessel would be on a lee shore.

Vessels that can depend on their anchors and cables may anchor safely in the road of Monte Video in the same depth of water as they draw, provided the river is at a mean height, for, whenever the wind sets in from the southward, the water rises sufficiently, and the bottom being so very soft, 3 ft. more than the vessel's draught is amply sufficient to ride out the heaviest gale without injury.

If vessels moor it should be with open hawse to the S.W., being the quarter from which the pampero blows strongest. One great evil is the generally crowded state of the small harbour, rendering it difficult to get under way without fouling some other vessels; and even then it is necessary to be towed up towards the Cerro before making sail, but by which a steady breeze is gained.

In approaching from the eastward, and unable to reach Monte Video bay before dark, a vessel can anchor S.E. of the Cerro light in  $3\frac{1}{2}$  or 4 fms. of water, and be in readiness to take up a proper berth when convenient. The bottom near the shore eastward of Monte Video is bad holding ground.

**Tides.**—It is high water, full and change, at 2 h. 30 m. (approx); astronomical tides range about 18 inches. The level of the water rises from the effects of winds, ordinarily 4 to 6 ft., occasionally 8 ft.; rising with east, south-east, and south-west winds, and falling with those from the opposite quarters. The water is sometimes considerably higher at the town than on the opposite side of the bay, and *vice versa*; there is also a less rise of river noticeable at Monte Video than farther out in the river's mouth.

An inshore stream runs round Monte Video bay often in the opposite direction to the main stream of the river, and the water forced into the bay by the first part of a strong south-westerly wind is heaped up and rushes out 3 or 4 hours after the wind has commenced to blow, as a counter current round the point San José,

causing vessels to ride across the wind to roll much, and frequently to part their cables and go on shore. The bottom, however, is so soft that they get off again without damage to the hull.

Great care is necessary in standing out from the eastern side of the bay after a pampero has been blowing, as a strong N.W. current is often experienced directly Sarandi point is cleared.

The coast from Lobos point trends to the west, forming three rocky points, the westernmost of which, named Yeguas, is low, in the form of an islet and joined to the main by a tongue of sand, with a reef on the east side, but steep-to on the south. Assuming a N.W. direction for 7 miles the coast forms 6 small sandy bays separated by rocky points, 3 of which are named respectively Tomador, Pedregal and Castro points.

**Espinillo Point** is the southern limit of the embouchure of the river Santa Lucia, and 10 miles westward of Monte Video. There are some remarkable white patches on the rise of the point. Its extreme point is low and rocky, and shoal water with large boulders extends  $\frac{3}{4}$  of a mile to westward with from 3 to  $3\frac{1}{2}$  fms. close to. Vessels should not approach Espinillo point within a mile as the currents are uncertain. H.M.S. "Dart," in 1872, grazed a shoal of 12 ft. depth, lying about  $2\frac{1}{4}$  miles W. by S. from Espinillo point.

The **Panela**, a dangerous reef, about 3 cables in extent and about 3 ft. of water over it, lies about south from Espinillo point, distant 5 miles; and W. by S.  $\frac{3}{4}$  S. from the cerro of Monte Video. With the river in its mean state the shoalest water on the Panela is 3 ft., but with a northerly wind producing a low river, the rocks have been seen 3 or 4 ft. above the water.

**Light-vessel.**—A light-vessel is moored at about 1 cable N.N.W.  $\frac{1}{2}$  W. from the shoalest part of Panela reef, and exhibits a fixed white light, 17 ft. above the sea, visible 5 or 6 miles. The light-vessel is frequently out of position after bad weather.

**Directions.**—The lead gives no warning of approach to the Panela; all round there is a depth of  $3\frac{1}{2}$  and 4 fms., mud. A vessel in the vicinity of the reef by day in clear weather, and the light-vessel not in place, should keep the Cerro lighthouse northward of an E.N.E. bearing until the westernmost white patch on Espinillo point bears eastward of N. by E.  $\frac{1}{2}$  E. To pass between the Panela and the Santa Lucia bank, keep the cathedral entirely masked, or the Cerro lighthouse to bear a little eastward of E. by N.

**Santa Lucia River** has its outlet between Espinillo point to the south, and Tigre point to the north. Its entrance is divided into 2 passages by the small islet of Tigre, and is encumbered by banks; coasters only can enter. At the entrance of Santa Lucia river there is a rock awash, marked by a buoy.

Santa Lucia bank is a sandy flat thrown out by the river; it is ill-defined, but its southern extremity, of 3 fms., appears to extend  $7\frac{1}{2}$  miles from the shore, and about the same distance from Espinillo point. The holding ground is good off Santa Lucia river.

**THE COAST** to the westward of the river Santa Lucia is a sandy cliff or Barranca, from 70 to 100 ft. in height, extending 22 miles in a westerly direction, as far as Santa Maria or San Gregorio, a dark bluff point about 100 ft. in height, with 2 or 3 houses on its summit. This cliff is known as the Rincon de Alcibas. From Santa Maria point the coast to the westward is much lower, and composed of sandy downs from 20 to 30 ft. high for 4 miles, as far as Sandy point, which is low.

Between these two points a small curved sandy spit, having depths of from 8 to 12 ft., extends 3 miles off shore; and at 7 miles south-eastward of Santa Maria, about 4 miles off the river San Gregorio, is said to be a shoal spot of 12 ft.

Vessels often complete water from alongside in this vicinity; it is generally as good as that obtained farther up. Fish may be obtained by hauling the seine in the bay between Santa Maria and Sandy points; and numerous deer, partridges, and wild duck may be shot in the vicinity.

North westward of Sandy point, a sandy beach continues, with downs at the back from 30 to 90 ft. high, as far as the outlet of the rivers Pereyra and Pabon; it offers few remarkable features, except some groups of trees which are seen from the offing, one near the outlet of the Pabon, the other half-way towards Sandy point. The entrance to the river San Miguel, 2 miles N.W. of Sandy point, is conspicuous at the distance of 6 or 8 miles; the dark brushwood at the entrance being strongly contrasted with the continuous sand hills stretching towards it from Sandy point.

Abreast of Rio Pabon is the limit of the 3-fathoms navigation in this quarter. The spit of the Ortiz bank here leaves the shore in a S.E. direction, and forms a *cul de sac*, named Pabon bay, where there is a rather exposed anchorage for vessels in  $3\frac{1}{2}$  fms., mud. There is, however, an inshore channel, between the great mass of the Ortiz bank and the land, for coasters, gunboats, and all vessels that do not draw more than 12 ft. water, for 37 miles to Colonia. At the river Cufre, 6 miles beyond the Pereyra, the sand hills become more elevated, rising to 150 ft.; and the coast changes from a N.W. to a west direction, and so continues to Colonia.

From the river Cufre westward there are three points. The first point, Rosario, formed by the embouchure of the river of the same name, is low, and not easily distinguished. Saucé point is easily made out, as it is the most wooded on this part of the coast, and has some high sand hills  $1\frac{1}{2}$  miles to the north. Some small rocks, partly uncovered, lie off the point to the S.E. about  $\frac{1}{2}$  a mile distant. Coasters may anchor under the lee of this point sheltered in winds from S.E. to north. Artilleria point, at 5 miles west of Saucé point, forms with it a rather deep bay of the same name, into the head of which the Saucé river, a small stream, empties itself. The sand hills here rise to 150 ft. above the sea. Artilleria point is bordered by rocks, which extend 4 cables to the southward.

Another rocky point called Punta Angostura succeeds, then the outlet of the Rio Chuelo, and 2 miles to the westward the Lagunos de Patos, off which the water deepens to 4 fms., deepening to 6 fms. towards Colonia.

**Las Pipas rocks**,  $6\frac{1}{2}$  miles W. by S.  $\frac{1}{2}$  S. of Artilleria point, and 2 ft. above water, lie  $1\frac{1}{2}$  miles off shore, and the reef extends  $1\frac{1}{2}$  miles in an east and west direction, with a depth of  $2\frac{1}{2}$  fms. all round. At  $1\frac{1}{2}$  miles N.E. of Las Pipas, and at 1 mile from the shore, is a reef, which dries; and  $1\frac{1}{2}$  miles S.W.  $\frac{3}{4}$  W. of the Pipas lies a rock, with 7 ft. water over it.

**COLONIA** is built on a slightly elevated point of a peninsula; the town is dilapidated in appearance, but has a considerable trade in hides and wool. The town is in telegraphic communication with Monte Video and Buenos Ayres by means of a submarine cable; also communication by a small steamer, weekly.

To the westward of the town are some islets and reefs sheltering the roadstead, which is well protected, except from winds between S.W. and S.E. With a southerly gale, which is the only one to fear, the tide invariably runs to the southward, sometimes at the rate of 3 or 4 miles an hour, and thus eases the vessel's cables. The reefs which shelter the road make the entrance difficult, and render it necessary to take a local pilot.

The bar, at the entrance to the road, is composed of hard sand and rock, with a least depth of 18 ft.; the bottom on either side is of soft mud.

**Light.**—The lighthouse at Colonia is near the S.W. angle of the plaza, and is of a dull brick colour. It shows a white revolving light, which attains its greatest brilliancy every three minutes, and is elevated 110 ft. above the sea; the light is visible at a distance of 10 miles, and sometimes 15 miles in clear weather.

**Islets of Colonia.**—**SAN GABRIEL ISLET**,  $1\frac{1}{2}$  miles to the west of Colonia, is low, slightly wooded, and  $\frac{1}{2}$  a mile long by  $2\frac{1}{2}$  cables broad. A reef extends 2 cables westward of the S.W. point of San Gabriel island, and patches of 18 ft. lie between 3 and 5 cables southward of that point; the outer patch of 18 ft., rock, has depths of from 29 to 33 ft. within a short distance, and lies with Farallon lighthouse bearing W.  $\frac{3}{4}$  S., distant  $1\frac{1}{10}$  miles. These patches lie in the fairway to Colonia road. The Ruby knoll, with a depth of 11 ft., and 17 ft. close around, lies with the east point of San Gabriel island N.  $20^\circ$  W., distant  $2\frac{1}{2}$  cables. At a  $\frac{1}{4}$  of a mile to the eastward is the Laja, a rocky bank, which breaks in a strong breeze.

**FARALLON** is a rocky islet 12 ft. above the sea, and covered with trees and bushes; it lies S.W. by W.  $1\frac{1}{2}$  miles from San Gabriel, and is surrounded by a reef, patches of which extend 7 cables to the northward and north-eastward, with 6 and 16 ft. water on them, from the S.E. side the reef extends nearly 4 cables, with a depth of 17 ft. at 1 mile distant. The west end of Lopez west islet shut in with the west end of San Gabriel island, leads eastward of the reef. A rock having a depth of 15 ft., marked by a black buoy, lies  $1\frac{1}{2}$  miles W. by S.  $\frac{1}{4}$  S. from Farallon island; and another of 17 ft. at 1 mile in the same direction.

**Light.**—A lighthouse 98 ft. high is erected on Farallon island. The light is a fixed white light, visible 12 miles.

**Pilot Station.**—A pontoon, for service as a pilot station, is moored off Colonia, with Farallon island bearing N.N.E., distant 6 miles. A red light is exhibited from the mast of the pontoon at night, and a blue flag with white square during the day.

**LOPEZ ISLETS** lie east and west about 2 miles N.W. of Colonia; they are bare rocks 8 and 10 ft. high, each in the midst of a long sandy flat or spit, which extends to the N.W. beyond the Hornos islands. There is a channel between the two islets and flats about 2 cables wide, with about 16 ft. water. To the northward of Lopez east islet a deep bight runs eastward into the sandy flat having a depth of 20 to 24 ft., which is called Lopez road. At  $1\frac{1}{2}$  cables north of the islet H.M.S. "Comus," in 1847, was hove down to repair damages, this being the most sheltered spot on this part of the coast.

**BEAUMANOIR REEF**, with a least depth of 12 ft., lies S.W. by W.  $\frac{1}{2}$  W. from west Lopez islet, and N.N.W. distant  $1\frac{1}{2}$  miles from Farallon lighthouse, was so named after a French brig that touched upon the rock in 1855, in working up to the Hornos anchorage. From the rock an isolated tree on the coast, in one with the west point of the middle Hornos islet, bearing N.  $\frac{1}{2}$  E.

**FISHER'S BANK**, the N.W. spit of the Ortiz bank called also the Pescadores, forms the shelter to Colonia road on the south. It has patches of from 10 to 12 ft. towards its N.W. extremity, which must be guarded against in passing. This bank is reported to be extending to the westward.

**Directions for Colonia Road.**—In steering for Colonia from the S.W. from the main channel of La Plata, the first island that comes in sight is Farallon and its lighthouse, then the low flat island of San Gabriel, which is covered with stunted brushwood. Farallon lighthouse, with vessels of 18 ft. draught, should not be brought to the westward of north, until within 2 miles of it, when the course should be altered to the north-eastward to just shut in west Lopez islet with the west end of San Gabriel islet; this mark leads eastward of Farallon reef. When past the reef, or with Farallon lighthouse bearing W. by N. the whole of west Lopez islet should be opened west of San Gabriel, to clear the patches southward of the latter island; and when the one-storied house on the beach at Colonia is midway between the cathedral and windmill, it may be steered for, passing about 2 cables south of Gabriel island, and crossing the bar with a least depth of 18 ft. at low river. When the whole of Lopez west island is open east of San Gabriel island, steer east, until the windmill comes in line with the lighthouse at Colonia, keep this mark on until the east extreme of middle Hornos island is in line with the west extreme of Lopez east island, which leads into the best berth in the roads.

**Anchorage.**—The best anchorage in Colonia roads, is with Farallon island in line with the south edge of San Gabriel island in  $4\frac{1}{2}$  fms. stiff mud, and on the leading mark; if necessary, moor with open hawse to the S.S.W. Vessels of 18 ft. draught may anchor in  $3\frac{1}{2}$  fms., at  $\frac{1}{2}$  a mile off shore. There is a good anchorage on the north side of Gabriel islet, but vessels of large draught should moor. Coasting vessels in this vicinity when overtaken by bad weather seek shelter here.

**Hornos Islands** lie 2 miles N.W. by N. of Lopez islets; they consist of three small low islets lying in an east and west direction, with a channel named the Bergantines of 15 to 19 ft. between the two eastern. The central and western islets are situated on a bank, which extends in a W. by S. direction, 6 cables from the islets; the depths on it are from 10 to 16 ft., rock and hard mud. Near the western extremity of the bank is a rock having a depth of 12 ft., on which the Italian corvette "Etna" struck in 1871. Colonia church open south of west Lopez island leads westward of the rock. The Hornos islands afford excellent shelter from S.W. winds round by south to E.S.E. The strongest winds are from the westward, but then there is less sea and they are not felt so much as those from S.E. to E.S.E. The best anchorage is 3 cables N.N.W. of the western islet, in 18 ft. mud; vessels of war on this station frequently resort to this anchorage to exercise their guns at a target.

**THE COAST.**—The eastern shore from Manuel point, opposite the Hornos islands, trends in a N.W. direction for about 22 miles to Martin Chico point; the coast is slightly elevated, rising into hills from 100 to 120 ft. high. The chief features are the ombu tree of San Pedro, and the river of the same name north of it, also the ombu and river of San Juan, and 6 miles inland the Cerros of San Juan.

**THE CERROS DE SAN JUAN** are three summits of the same hill, which forms the culminating point of this coast; they lie 17 miles N.N.W. of Colonia, and at 6 miles from the coast. The northern hill is 445 ft. high, the middle 350 ft., and the southern 370 ft. They serve as a landmark to navigation over this part of the river, and in clear weather they can be seen from the tops of the houses of Buenos Ayres, a distance of 33 miles. This is generally considered a sign of bad or wet weather.

**MARTIN GARCIA ISLAND** stands boldly up in the channel  $25\frac{1}{2}$  miles N.W. by W. from Colonia; it is a mass of granite almost circular, with the form of a flattened cone, 82 ft. high; it is about 2 miles in circuit, with its shores rocky except on the N.W. part where there is a small beach and a landing place. Its position between two narrow channels which lead to the great rivers Parana and Uruguay, renders it a strategic post of some importance, as in going up or down, a vessel must pass within  $\frac{1}{2}$  a mile of the islet on the south side, and within less than one mile by the Canal de Infierno. There is a battery and a granite pier on the S.W. point, and a small garrison; also some workers in the quarries, as the stone is good for building and paving.

**Beacons and Light.**—Two beacons are placed on Martin Garcia for the purpose of guiding vessels through the channel; one called Farrol mast, near the centre of the island, the other a white beacon near its S.E. end. These when in line, lead between Santa Anna and middle banks. A white fixed light 141 ft. above the sea, and visible 14 miles, is shown from a lighthouse on Martin Garcia island.

**CHANNELS.**—There are two passes or channels to ascend the river above Martin Garcia, one to the S.W., the other to the N.E. of the isle. The former is called the Martin Garcia channel; the latter is named the Canal del Infierno from the difficulty formerly of navigating it. These channels are marked by buoys, but their positions must not be depended on.

Vessels of about  $14\frac{1}{2}$  ft. navigate these channels, and occasionally, vessels drawing 16 ft. use the Canal de Infierno.



**Martin Garcia Channel** is about 17 miles long,  $\frac{1}{2}$  a mile wide, and has from 14 to 40 ft. depth. It is formed on the west side by the extensive bank called Playa Honda or the Palmas flat, which blocks up two-thirds of the area of the river, and on the east by the St. Anna and some other detached banks, which extend to the south-eastward from Martin Garcia, and between which it would be difficult to navigate without a beacon always in sight, not only to point out the route, but also to show the variable set of the current. This channel is only fit for vessels of 12 or 13 ft. draught.

**Buoys.**—The buoys in Martin Garcia channel and approaches thereto are reported to be (May, 1883) as follows, but as they are moved when alterations in the channel require it, they are not to be depended on:—

1. A black buoy, conical, marking the fairway entrance, which must be left on the starboard hand when entering the river, lies with ombu tree of San Pedro bearing east, and Cerros de San Juan north peak N. by E.  $\frac{1}{2}$  E.
2. A black buoy marking the southern edge of a shoal patch named the Bar; from the buoy, ombu tree bears S.  $82^{\circ}$  E., and Cerros de San Juan N.  $32^{\circ}$  E.
3. A red buoy with staff and flag, marking the northern edge of the Bar patch, lies N.N.W.  $\frac{1}{2}$  a mile from the southern bar buoy.
4. A black buoy marking the S.E. extreme of Santa Anna bank, with ombu tree bearing S.  $76^{\circ}$  E., and Cerros de San Juan N.  $42^{\circ}$  E.
5. A black buoy marking the south side of the Martin Garcia channel, with Farol mast bearing N.  $58^{\circ}$  W., distant 5 miles.
6. A red buoy with staff and flag, on the south side of the channel, with Farol mast bearing N.  $57^{\circ}$  W., distant  $4\frac{5}{10}$  miles.
- 7, 8, 9. Three black buoys marking the north-western edge of Santa Anna bank, leading to the Canal de Infierno, are to be left on the starboard hand.
10. A red buoy with staff and flag marks the south-east extreme of the shoal water extending from Martin Garcia island.
11. A small black buoy N.  $34^{\circ}$  W., distant 9 cables from No. 10, leading to the Canal de Infierno, to be left on the port hand.

The middle bank was marked by two red buoys, one on the S.E. end lying S.E. by E.  $3\frac{3}{4}$  miles from the white beacon on Martin Garcia island, and one on the west side of the bank near the centre,  $\frac{2}{3}$  of a mile from the S.E. buoy. The middle bank was also marked by two beacons, one near the centre on the east side, and one on the N.W. end. The bank extending to the westward of Martin Garcia, was marked by a post near its west edge, and by a square black buoy near its N.W. end.

**Directions to the Boca de Guazu.**—Vessels bound through Martin Garcia channels to the Parana or Uruguay rivers, may pass about  $\frac{1}{2}$  a mile west of Farallon islet then steer N.N.W. until Colonia church is in line with the western Hornos island,  $\frac{1}{2}$  from its western end, bearing S.E. by E.  $\frac{1}{4}$  E., then proceed on this line which will lead up to the fairway buoy, distant  $7\frac{1}{4}$  miles from Hornos islands leaving it on the starboard hand. Continue the same course until the north top of a white remarkable sand hill comes in line with the north summit of the Cerro de San Juan, bearing N.E.  $\frac{1}{2}$  E., then steer for Chico point until Farol mast and the white beacon (both on Martin Garcia) are in line N.W. by W.  $\frac{1}{2}$  W., then steer with these beacons in line, which will lead to the northward of the middle bank and southward of the flats extending from Martin Garcia island. Abreast the fairway buoy it is difficult to see Hornos islands or Colonia, the lead and the beacons (sometimes washed away) must be the principal guides. If no beacons are seen anchor.

The channel between the middle bank and the tail of the flat extending S.E. from Martin Garcia marked by a red buoy with flag, is used by vessels of about 14 $\frac{1}{2}$  ft. draught of water. When there is a depth of 16 ft. in the middle bank

channel, there will be 13 ft. water on the flats, which commence about 15 miles below Martin Garcia; and when the rocks situated on the west side of Martin Garcia island are awash, vessels coming down the river may be certain of 13 feet water all through the passage. Having passed through the Middle Bank channel, steer to pass about 2 cables westward from the south point of Martin Garcia. The edges of the banks are generally shown by a ripple.

Having passed Martin Garcia, steer about W. by N.  $\frac{1}{2}$  N., observing that the beacons in line, on Martin Garcia, lead southward of the shoal extending from that island, and haul up the main channel with the tree at Punta Gorda, in line with Juncal island until abreast Las dos Hermanos islands and bank, and when the Boca de Guazu is well open, or the village of Las Vacas (Carmela) bears about E. by N.  $\frac{1}{2}$  N., the course may be altered either for the Boca de Guazu (Parana) or the Uruguay.

**CANAL DEL INFIERNO**, which passes to the N.E. of Martin Garcia, is reported to have better water than the channel south of the island, and is used by vessels drawing as much as 16 ft., but the current is stronger, and may be 3 miles an hour. Approaching Martin Garcia with Farol beacon in line with white beacon, bearing N.W. by W.  $\frac{1}{2}$  W., the red buoy with flag, on the S.E. extremity of Martin Garcia flats, must be left on the port hand, and the buoys marking the S.W. extremity of Santa Anna bank, on the starboard hand; the course through being about N.N.W.  $\frac{1}{2}$  W. With Farol beacon bearing west,  $2\frac{1}{2}$  miles, the course may be altered to N.W., and when Carretas rock, southward of Martin Chico point, is in line with the south cerro of San Juan bearing east, steer with that mark astern, until Farol beacon bears S.W.; thence a course N.W. by W.  $\frac{1}{2}$  W., until the south cerro of San Juan is in line with, or a little shut in on Martin Chico point bearing east; this mark astern leads through the channel, until the leading mark tree on Punta Gorda is on with Juncal island, when steer up the channel with this mark until the entrance to the river Parana is open, or the town of Las Vacas bears about E. by N.  $\frac{1}{2}$  N., as before directed.

It is needless to say that neither of these channels should be attempted in foggy weather, or by night. Here, as elsewhere in the La Plata, the height of the water depends on the force and direction of the wind; it rises 5 and 6 ft. with S.E. and south winds, and falls with those from the opposite quarter.\*

## THE SOUTH SHORE,

FROM

### CAPE SAN ANTONIO, TO THE WESTWARD.

The South bank of the Rio de la Plata is low, uniform, and uncultivated; the only objects visible from the offing are groups of trees which are scattered along the coast, making the navigation near it difficult. The coast is the termination of the pampas of Buenos Ayres, immense monotonous plains, resembling the deserts of Africa, which extend to the chain of the Cordilleras, 420 miles to the westward. There is no other vegetation than the rare ombu trees, and no water but that of the marshes formed by the rain.

The only inhabitants are a miserable tribe of Indians, who come a great distance from the south-west to pillage the estancias or farm houses situated on the frontiers

\* The mariner when bound up, or loading in any of the rivers, should take into consideration the vessel's draft and the probable rise and fall of the river, or he may be detained for months. In 1870, H.M.S. "Cracker," drawing  $8\frac{1}{2}$  ft., was detained at Corcordia in the Uruguay three months (June, July and August) waiting for the river to rise. In some of the shallow passes there were only 6 ft. water.

[RIVER PLATE.]



of the province of Buenos Ayres. The complete absence of running water, and the saltiness of the marshes produced by the great quantity of salt which is everywhere found on the soil, renders this country uninhabitable.

**CAPE SAN ANTONIO.**—Rasa or Flat point, the northern extremity of the ill-defined cape San Antonio, is a low sandy spit; breakers extend nearly  $1\frac{1}{2}$  miles northward of it, towards Cabo bank. Near the point, is a chain of sandy downs, trending to the southward, increasing in height to Medano point, where they are from 65 to 80 feet above the sea. The coast is of light colour, with occasional tufts of stunted brushwood, and in clear weather this part of it may be seen from a distance of 8 or 10 miles.

Vessels of moderate draught may approach the cape to a distance of 3 or 4 miles.

**TUYU BANK**, called also Arenas Gordas, extends nearly 10 miles from the shore, north-westward of cape San Antonio, and the sea breaks on it at 1 mile from the shore, when the wind is from seaward. The ground near, and even on the bank, is extremely soft, the depth decreases gradually, and with the lead going there is no danger.

**CABO BANK** is the shoal portion of Tuyu bank, and is 5 miles long in an east and west direction; its shoalest part, of about 1 fm., generally breaks. It lies N.N.W.  $\frac{1}{2}$  W., about 5 miles from Raza point.

**SAN BORONBON BAY**, formed between cape San Antonio and Piedras point,  $5\frac{1}{4}$  miles to the N.N.W., is about 20 miles deep. From the cape the low flat shore nearly level with the sea, turns to the westward, and north-westward to Juncal island. The coast between is rendered visible at a short distance by the stunted and scattered brushwood growing on the sand. Close to the westward of the cape, is the little river Tuyu, communicating with several lakes; coasters of very light draught can enter the river.

The first remarkable group of trees, on Juncal island, is about two-thirds of a mile from the shore, and 32 miles N.W. of cape San Antonio; about 7 miles to the northward is the Rodeo group. In this neighbourhood, the sandhills begin to rise, though they do not exceed a height of 20 ft. Coasters of light draught will find convenient anchorage off Rodeo, at 2 miles from the shore, in 10 ft., soft mud.

**Currents and Tides.**—The currents set into or out of the Rio de la Plata, varying in their strength and duration as the winds vary, by which they are principally governed. Generally speaking the current sets to the northward, about N.N.W., at from 1 to 3 miles an hour, before and during southerly winds; and to the southward about S.S.E., at the same rate, before and during northerly winds.

When there has been an unusual flood in the inland countries, and the sea is at low ebb, or when the sea spring tide is unusually high and the river is the reverse, the current may set round cape San Antonio at least as strongly as it has been known to run past Lobos islet, on the northern side of the entrance to the Plata, at the rate of 5 or 6 miles an hour. These, however, are extreme cases, of rare occurrence.

It is high water, full and change, off the cape at about 10h.; and the rise is  $5\frac{1}{2}$  ft. In fine weather the tides are regular, but with strong winds from the S.E. quarter, the water rises about 3 ft. above the ordinary springs, and it falls with the winds from the N.W. quarter.

**Soundings.**—At the distance of 12 miles E.S.E. from cape San Antonio there are  $8\frac{1}{2}$  fms. water, over fine sand mixed with mud and broken shells; at 9 miles east of the cape, 7 fms., muddy sand; and at 5 miles E. by S.,  $3\frac{3}{4}$  fms., muddy sand. Along the coast southward of the cape, at the distance of 10 miles, there is in general from 8 to 10 fms. water, fine sand, but in approaching it the depth diminishes regularly and the sand becomes a little mixed with mud. In the offing at 35 miles east of the cape, there are 9 fms., sand and mud. Vessels of moderate draught may approach the cape to a distance of 3 or 4 miles.

**MOUNT ROSAS**, a sandy down a little higher than the surrounding land, covered with trees, about 12 miles northward of Juncal island, is about 30 ft. above the sea. The village of Pampas formerly stood on its summit, the ruins of which still remain.

**RIO SALADO.**—The Salado is a shallow bar river, unfit for any but small vessels. At times, when the Plata is high, there are 6, 8, or 10 ft. water on the bar, but at other times it dries, and the mud is so soft that one cannot walk from the boat, aground, to the firm land. There are a few houses near the Solado. The entrance of this river will be known by the red brick-kiln and mount Rosas southward of it. At 1 mile off its mouth, coasters will find anchorage similar to that off Rodea.

**Tides.**—It is high water, full and change, at the Rio Salado at 10h. 45m.; and the rise is 6 ft.

**RIO SAN BORONBON**, at 5 miles northward of the mouth of the Solano, is a small stream, and often dry. The coast between is from 14 to 20 ft. high.

**MOUNT JUAN GERONIMO.**—Between Rio San Boronbon and Piedras point north of it, is a chain of small sandy downs, on which some trees are seen. The most remarkable is  $6\frac{1}{2}$  miles southward of the point, named mount Juan Geronimo; at 1 mile from Piedras point is another smaller range.

**PIEDRAS POINT** is the north extreme of San Boronbon bay, and the south point of entrance to the Rio de la Plata. The point is low, and projects very little; it is composed, not of rocks, as its name implies, but of tufa, a species of friable compact sandstone, and appearing to be of hardened mud. This stone, known in the country by the name of tosca, is formed in various places on the coast as far as Buenos Ayres, and forms a girdle of dangerous banks of 5 to 6 miles mean breadth.

On Piedras point there is a group of trees known as Tala clump.

**SALVADOR GRANDE POINT** lies N.W. by N. 5 miles from Piedras point, and at about 7 miles farther on in the same direction is Indio point.

**PIEDRAS BANK.**—Piedras point, and that of Indio about 12 miles to the N.W. of it, is bordered by a bank of tufa and coarse gravel, and within a depth of 3 fms. is from 6 to 8 miles in breadth; thence the bank extends along the coast to the N.W. at the distance of 7 or 8 miles, gradually narrowing towards the bay of Barragan, where it terminates.

North-eastward of Piedras point, the bank extends for a distance of 20 miles, with a depth at low water of about 3 fms., and forming a bar to the river. There is a depth only of 16 ft. at low river, 11 miles from the point. Great caution must be used in approaching the coast. As the bank is approached, the cerro de Salvador Grande, on which are some trees, and Tala clump or Piedras point can be seen.

In estimating with the eye the distance from the coast, great errors are likely to be made; more so when in the La Plata, from the frequent effects of the mirage, and extraordinary refraction, which lower and raise considerably the objects in view near the horizon.

**Indio Point** is low and projects but slightly; it may be known by a long grove of trees planted in the vicinity of Tufted hill, and now overtops it. The trees are visible from a vessel's decks about 13 miles distant, and makes like an island, being seen some time before any other object on the point. In the immediate vicinity of the point the country is a flat grass plain; a small stream flows into the river from the southward, and may be ascended by boats at half-tide, unless the water in the river be very low. The crew of the light-vessel frequently land here for supplies, which are procured from the neighbouring farms.

Having passed the point, a continuous line of brushwood of uniform height will be observed for a distance of 18 miles, until Magdalena village is approached, when

the scattered ombus and slightly rising ground near it are more easily distinguished. It is difficult to make out the different points, as they only slightly project, and the coast cannot be approached on account of the banks which border it. By night it is necessary to navigate with the greatest care when near Indio point, as the currents are strong and the ebb tide sets on to the coast bank.

**Tides.**—It is high water, full and change, at Indio point, at 11h. 45m.; rise 4 ft.

**Light-vessel.**—Between Indio point and the Ortiz bank, about 2 miles southward of Cuirassier bank, is a light-vessel in  $3\frac{1}{2}$  fms. water. The light is a fixed white light, visible 10 miles. This light-vessel often drifts from her position. When pilots are on board, a blue flag with a white letter, P, is hoisted.

**MAGDALENA.**—When to the N.W. of Indio point, the most prominent ombus seen are in the precincts of Magdalena, and farther on the little village and church (having a large round white dome) of that name, but it is obscured on many bearings, by the trees, and is at all times difficult to make out.

**EMBUDA AND ATALAYA POINTS.**—In front of Magdalena is a slightly projecting point with trees on it, named Embuda. A red brick saledero, or slaughter-house, having a look-out place on it, is situated near the point, and a small creek connecting with the river at half-tide, to which native vessels of 4 to 5 feet draught resort to load with tallow and hides, passes close to the house. Atalaya point, at 11 miles to the N.W. of Embuda, is low and sandy, and difficult to recognise, the clumps of trees, ombus, and clusters of underwood, with which the coast is dotted, being similar in aspect. This point should be approached with caution, as the coast bank extends some distance from it.

**SANTIAGO POINT.**—At about 10 miles further to the N.W. is Santiago point, at the entrance to Barragan bay. The point is low and covered with bushes.

**ENSENADA DE BARRAGAN.**—This inlet is open to the W.N.W., and is only available for small craft, which should employ a pilot.

**CHANNEL BAR.**—A spit dries off Santiago, the eastern point, in a W.N.W. direction for the distance of  $\frac{1}{2}$  a mile. The channel south of the spit is about  $\frac{1}{2}$  a cable in breadth, and the depth on the bar at low water is stated to be from 6 to 8 feet. The channel is marked by 3 black buoys, the 2 outer to be left on the port hand, and the third on the starboard hand. The inlet was formerly deeper and more frequented, but from the accumulation of mud the water is shoaling daily; its shores on either side are swampy, thickly wooded, and intersected by numerous creeks. In the middle of last century large vessels unable to go to Buenos Ayres entered this inlet. At that time there was a depth of about 16 ft. on the bar at low water, and 6 to 10 ft. where the ground is now dry. Works are now in progress for the improvement of the harbour.

A canal is in course of construction, to connect La Plata with Ensenada de Barragan, also a channel from the harbour to the sea, in a N. by E. direction, 2 miles east of Santiago point.

Ensenada is connected by railway with La Plata, Punta Lara pier, and Buenos Ayres. The south side of the harbour has been embanked, and a wharf made near the railway station.

**LA PLATA,** the new fortified capital of the province of Buenos Ayres, created by law, and the foundation stone laid in 1882, is situated about 30 miles S.E. of the city of Buenos Ayres, and about 5 miles from Ensenada.

**SANTIAGO BANK,** with a least depth of 7 feet, lies westward of the approach to Ensenada; its outer edge is  $3\frac{1}{2}$  miles N.E. of Punta Lara pier.

**HARBOUR WORKS.**—From the village of Santiago, situated on the shore at about  $1\frac{1}{2}$  miles eastward of Santiago point, 2 piers 330 yards apart, and  $2\frac{1}{2}$  miles in length in a N. 25° E. (true) direction, are rapidly approaching completion; their

extremities curve towards each other, leaving an entrance about 220 yards in width. When completed, a channel will be dredged to a depth of 23 feet, which depth will be continued up the canal to La Plata, as far as the docks, also in progress. These docks are distant  $4\frac{3}{4}$  miles from the pier heads, and the city of La Plata lies S. 37° W. (true)  $5\frac{1}{2}$  miles from Santiago village, or about 3 miles above the docks.

**SANTIAGO.**—The village of Santiago, on the shore, is built of wood, and inhabited chiefly by the workmen employed in constructing the piers and canal.

**Lights.**—A fixed white light is shown from each extremity of the west and east piers at the entrance to the harbour of La Plata, visible for a few miles; these will, in due course, be superseded by more efficient lights.

The City of Plata is lighted by electricity. Two of these lights are at a considerable elevation, and may be seen from a distance of 22 miles, and the glare of them for some distance farther.

**Directions.**—Vessels from the eastward, having cleared Chico bank, may (allowing for current) steer to sight Santiago piers a little on the port bow. There is anchorage about 2 cables off the extremes of the piers in from 20 to 28 feet, depending on the height of the river, in muddy bottom. Vessels approaching from the N.W. should give Santiago bank a good berth.

Small vessels entering the bay from the eastward, pass Santiago point at the distance of  $\frac{3}{4}$  of a mile, and when a solitary hut a  $\frac{1}{4}$  of a mile westward of a remarkable clump of trees, bears south distant  $\frac{3}{4}$  of a mile; or with the entrance fully open, steer E.S.E., making allowance for the current which sets  $2\frac{1}{2}$  miles an hour with the ebb, this will lead into the inner anchorage, where vessels may lie in 2 fms. mud, and smooth water in all weather. Coming from the westward pass Lara Point at the distance of  $\frac{1}{2}$  a mile; then steer S.E.  $\frac{3}{4}$  E. along shore at the same distance until the hut bears south  $\frac{3}{4}$  of a mile and proceed as before.

**Tides.**—It is high water, full and change, at Barragan Bay at 7h.; and the rise is from 5 to 9 ft.

Ensenada harbour was opened as a port of entry on July 9th, 1874.

**PUNTA LARA PIER.**—A railway pier 2,845 feet in length, with machinery for loading and discharging cargoes, has been constructed 3 miles to the westward of Ensenada harbour, or about midway between that place and Punta Lara; at the outer end of the pier there is a depth of 16 ft. at low water, soft muddy bottom, but strong south-westerly winds decrease the depth to 14 ft. Vessels drawing 16 ft. water can unload alongside the pier, as there is a depth of 5 ft. of soft mud, but it is advisable to haul off with northerly winds, as vessels have sustained damage. It was proposed to construct a breakwater for the protection of the pier head.

**ANCHORAGE.**—Punta Lara road, situated between Punta Lara and Punta Lara pier, with depths from 16 to 18 ft., is recommended as a good winter anchorage for vessels of moderate draught, being protected from winds to the southward of east and west, which are the most dangerous on this coast: northerly winds appear to have little or no effect on the anchorage, as the sea is broken by the outlying banks.

Vessels drawing 13 ft. can enter Punta Lara road at low water. The channel is buoyed by the railway company, who have also laid down several screw moorings off the pier.

**TIDES.**—It is high water, full and change, at Punta Lara pier at noon; springs rise from 5 to 9 ft.

**DIRECTIONS.**—Vessels intending to go alongside the pier should, on arriving at the old anchorage off Punta Lara, apply to the authorities for a pilot. No charges

will be made except for the transport of merchandise by rail. The services of a steam tug are available.

Communication can be had by railway twice a day, between Ensenada harbour, Punta Lara pier and Buenos Ayres.

**LARA AND QUILMES POINTS.**—Nine miles to the westward of Punta Lara, is Quilmes point, in approaching which the rising edifices of Buenos Ayres and the vessels at anchor in the outer road will be seen. Between Ensenada de Barragan and Buenos Ayres the low grassy shore is partly inundated with a very high river. Lara Bank, of 2 fms., lies 4 miles off shore, and the same distance N.N.W.  $\frac{1}{2}$  W. of Punta Lara; it must be guarded against in approaching Buenos Ayres.

**LAS PALMAS FLAT.**—This flat is a great bank formed by the sand brought down by the Uruguay and the Parana, which spread over the whole of the upper part of the La Plata. The depths over its outer part are from  $2\frac{1}{4}$  to  $2\frac{3}{4}$  fms., over its inner part from  $1\frac{1}{4}$  to  $1\frac{3}{4}$  fms., and shoaling still more near the mouths of the great rivers. Vessels leaving the outer road of Buenos Ayres for Colonia or the Martin Garcia channel, should take into consideration the vessel's draught and state of the river, and steer to the eastward, if necessary, to round the flats in the deeper water. Farallon light N.E., or northward of that bearing leads clear, in about 3 fms. of water.

**BUENOS AYRES**, the capital of the province of the same name, was founded in 1535, and stands on the right bank at the head of the estuary of the Rio de la Plata, on a vast plain which is here about 35 or 40 ft. above the sea, and which extends westward to the Andes. The level uniformity of its outline is only broken by the spires of various churches. The streets are regular and straight, intersecting each other at distances of about 150 yards, and forming squares. The houses have never more than 2 storeys, and commonly only one. In 1882, the population of the province of Buenos Ayres was estimated at 612,000; and of the city 295,000.

The cathedral has a handsome dome and a portico with twelve corinthian pillars. There are several churches, including an English one, and a Presbyterian chapel. From San Miguel tower, 68 ft. high, a little westward of the cathedral, the true bearing of the north cerro de San Juan on the Banda Oriental coast is N.  $39^{\circ} 41' 35''$  E.

There are three wharves or piers abreast of the city, the southern, which is the custom house pier, is nearly abreast of the cathedral; the second, about 2 cables to the northward, abreast the church of La Merced, is a landing mole for passengers; Catalina mole, 4 cables northward of the landing mole, is about 1,800 ft. in length, and protected by a breakwater parallel to it, at the distance of about 1 cable. There is a beacon on the outer extremity of this breakwater.

Buenos Ayres has a considerable trade. Its imports are manufactured goods, cottons, earthenware, gunpowder, hardwares and cutlery, iron, leather, linens, oil, linseed, woollens, &c.; and the exports are bones, copper unwrought, grease, horse-hair, hides, horns, skins of various kinds, tallow, tobacco, wool, &c. All kinds of supplies, including coal, are obtainable at Buenos Ayres.

**Lights.**—A fixed white light is shown from the custom house tower, and a hulk or guard ship, is moored with Merced church bearing S.  $85^{\circ}$  W. distant  $8\frac{1}{2}$  miles. Position, lat.  $34^{\circ} 37'$  S., long  $58^{\circ} 12\frac{1}{2}'$  W. This vessel shows a fixed white light about 20 ft. high, visible 7 miles.

**OUTER ROAD.**—There are two anchorages in front of Buenos Ayres, formed by the city bank and that of the Camaron, an extension or tongue of the great Palmas flat. Both are anchorages exposed to the winds from S.E. to E.N.E., which often bring in a heavy ground swell; vessels frequently drag, foul each other, and sometimes go on shore. It is necessary to have good ground tackling, to be cautious not to ground on the anchors, and to give a berth to the buoys of vessels in the road to prevent grazing on their anchors. The bottom is a fine dark

sand; within the 12 ft. line of soundings it is generally hard, and to 15 ft. hard and soft, beyond 15 ft. it is mostly soft muddy sand.

There are many dangerous sunken vessels in the roads; until they are removed it is unsafe for vessels to move during the night. The great or outer road northward of the city bank, at about  $3\frac{1}{2}$  miles from the shore, is from 3 to 4 miles in length in a N.W. and S.E. direction, and from  $\frac{1}{2}$  to  $\frac{3}{4}$  of a mile in breadth, with depths of 18 to 22 ft. over soft mud, the shoaler water being towards the east and west extremes. The approach to this anchorage is over a bar or flat with only 15 ft. water on it at the mean level of the river and at times not more than 12 ft., which obliges vessels of moderate draught to anchor at about 8 miles from the town in 21 ft. water, with the Residencia in the southern part of the city bearing S.W. by W. This position is known as the bar anchorage.

The domes of the churches and the vessels at anchor in the outer road are seen at a distance of 10 or 11 miles. The bottom on the city bank or that southward of the outer road being hard, it is necessary to keep a little to the northward. Having passed the bar, the soundings slowly increase, and the bottom becomes softer; when in 17 ft. water, soft mud, steer to the westward, and anchor in about 20 ft., with the guard ship bearing S.E. by E.  $\frac{1}{2}$  E., distant  $2\frac{1}{4}$  miles; the Residencia S. by W.  $\frac{3}{4}$  W.; the custom house S.S.W.  $\frac{1}{2}$  W., and the church of the Recoleta, N.W. of the town, S.W.  $\frac{3}{4}$  W. A good berth will also be found near the sunken vessels, where the water is deepest and the position convenient for boats. It is not usual to moor in the outer roads, but to veer a long scope of cable, and be ready to drop a second anchor with south-easterly winds.

**INNER ROAD.**—The inner or little road off the N.E. angle of the city is a space of about  $1\frac{1}{2}$  miles in length, in a N.N.W. and S.S.E. direction, and about 3 cables in breadth, having 12 and 13 ft. water. It is formed between the city bank and the coast; the latter is bordered with a bank of rotten stone. Northward of the inner road is the anchorage of El Pozo, having about a foot more water. Vessels in the Pozo and inner road always moor N.E. and S.W. and great attention should be given to prevent grounding on the anchors, for frequently there are only 8 or 10 ft. water, and vessels are often aground and unable to go to sea for 15 or 20 days. As the fall of the river depends mostly upon westerly winds, vessels should have a good scope of cable on the east anchor. A large number of vessels are always here.

In proceeding from the outer road to this anchorage, steer N.W. by W. until the church of Recoleta bears S. by W.  $\frac{1}{4}$  W., then steer on this line across the west part of the city bank over soft bottom, in from 10 to 13 ft. water at the mean level of the river, until  $1\frac{1}{2}$  miles from the shore, when about a S.S.E.  $\frac{1}{2}$  E. course will lead to the anchorage. The depths of water over this part of the bank are about the same as elsewhere, but this track is chosen by the heavier vessels on account of the soft nature of the bottom; it is 4 miles longer than the Catalina.

**THE CATALINA CHANNEL**, south-eastward of the above, is a depression in the city bank, but the bottom is harder; it is much used by vessels under 10 ft. draught. A red buoy, with black band, is placed at the outer extremity of the channel, and on the south side of it, in 10 ft. water, with the custom house bearing S.S.W. and Recoleta church S.W.  $\frac{1}{4}$  W. As the banks are constantly shifting, it is necessary when going into the inner road to employ a pilot, and particularly for the purpose of choosing a clear berth and avoiding the many lost anchors in the roads.

**QUARANTINE.**—Vessels of less than 19 ft. draught will not be considered as having entered the port, nor be visited by the health officer unless westward of the line of Quilmes church bearing S.W. by S. Vessels of greater draught should hoist a flag at the yard arm, when the health officer will come off to them.

Landing in the roads of Buenos Ayres, during summer, when strong S.E. winds

prevail during the greater part of the day, the sea is so rough that communication with the shore is impeded; but during the winter, when the winds are generally from the S.W. or N.W., the sea is smooth, and communication easy.

**Winds.**—During summer, between August and March, the winds are from the eastward. About noon, if the barometer be in a mean state, there is generally a calm or little wind, which freshens from the south-eastward towards sunset, when it blows fresh, veers to the northward during the night, and becomes calm again about noon. In April, May, June, and July, the weather is variable. The barometer always rises with a south-east wind, which brings clear dry weather; falls for a pampero or south-west wind, but falls lowest with the wind from north to west, which brings cloudy rainy weather. It may be fine weather at sunset, and two hours after blowing a gale, but the barometer is sure to indicate it.

**Tides.**—It is high water, full and change, at Buenos Ayres at about 6h. and the spring rise is about 4 ft.; the time of high water is regular but the height is affected by the wind. The flood runs 5h., and the ebb 7h. at from 1 to 2 miles an hour. The winds from the south-east cause the water to rise, and those from the north-west depress it; and in some places cause a difference of 12 ft. A case has occurred when the wind from the north-west has so depressed the water, that a person was able to walk dry to the vessels anchored in the inner road.

**RIO RIACHUELO.**—At about a mile and a half southward of the city is the river Riachuelo, the commercial port of Buenos Ayres. 2 piers each about 450 yards in length, project in a N.E. by E.  $\frac{1}{2}$  E. direction, and form the entrance to the "Boca," as the dredged out portion of the Riachuelo is locally termed.

From a point 3 miles from the shore, marked by buoys, a channel with a least depth of 16 ft. at low water, has been dredged in a line S. 61° W. to the entrance piers. This channel is marked by pile beacons and buoys, red on the starboard hand, and black on the port hand, when entering.

In November, 1883, a depth of 18 ft. at high water could be relied on.

From the inner end of these piers, the bed of the Riachuelo has been deepened for nearly two miles, the north bank lined with wooden wharves, and the width of the stream increased. The upper part in the vicinity of the railway and tramway bridges, is named Baraccas.

It is proposed to form a capacious wet dock where the Residencia bank now exists, the sea wall of which will extend from the present north pier to the custom house mole.

**A DOCK,** 483 ft. in length, 55 ft. in width, and 21 ft. in depth, and which has taken a vessel drawing 14 ft., is situated at San Fernando, about 15 miles above Buenos Ayres, eastward of the mouth of the Tigre river. The channel to this private dock has about 13 ft. at high water.

**Lights.**—From the outer extremity of each of the two stone piers at Riachuelo, there is exhibited a fixed red and white light.

Both lights show white in the dredged channel, but when out of the line of the channel the nearer light will appear red and the further light white. A fixed light will be shown on the outer beacon (on starboard hand) when completed.

**THE COAST.**—From Retiro point, at the north-east angle of Buenos Ayres, the shore forming the bay of Olivos trends north-westward for 9 miles to the point of that name, a bluff 62 feet above the sea. At 2 miles westward of Buenos Ayres is Palermo, the palace of Rosas, now abandoned. The village of Belgrano stands on some high level ground,  $1\frac{1}{2}$  miles inland. Some streams empty themselves into the bay.

**AMARGA POINT.**—A fixed white light is shown from Amarga or Olivos point, about 9 miles northward of Buenos Ayres; it is visible from a distance of 5 miles. At 6 miles N.W. by W. from Olivos point, is the mouth of the little river Tigre, where commences the large delta of the Parana.

**RIVER TIGRE.**—Vessels of less than 8 ft. draught can navigate to the Tigre, where there is an excellent port and dock, and where vessels may beach for repairs. In strong winds from the south-east many vessels leave the roads of Buenos Ayres to seek shelter there, but it is necessary to have a good pilot, as all this western part of the La Plata is obstructed by the great flat and bank of Las Palmas, on which near the coast the depths are irregular, the channel winding, and subject to frequent changes. There are in places 13 or 14 ft. water, but the deepest is off the shore forming Olivos point, where there is a depth of from 12 to 17 ft.

Above the Tigre the shore runs to the northward, and completely changes its appearance; it is broken by a great number of little rivers, outlets from the Parana, forming sunken islets covered with wood. Of these rivers there are three more frequented than the others; the Arroyo del Capitan, the Parana de las Palmas, and the Boca del Mini. At 25 miles N.N.E. of the Tigre is the mouth of the Parana Guazu or Great Parana. The latter, is the only one vessels of any size can enter, the others, although deep, are generally too narrow and winding to admit of easy navigation.

#### APPROACHES TO THE RIVER PLATE.

During a recent examination of the approaches to the River Plate or Rio de la Plata, by the United States ship "Essex," Commander W. S. Schley, it was found that a very marked depression of the ocean bed exists between La Plata bank and the coast of Uruguay, and notably a channel or mud-well, the bottom of which is mud, of the consistency of sticky clay, and varying in colour in different parts from that of lead to a bluish black.

This channel commences south of Maldonada light, distant about 1 mile from the coast, and is at this point 11 miles wide. It maintains this width, excepting at one or two points near cape Santa Maria, outward to cape Castillo, where its distance from the coast increases to about 25 miles. Its general direction is about N.E. by E.

**Character of Soundings.**—Having crossed the mud-well, and steering towards the coast, the following changes in the character of the bottom will be observed: First, mud and sandy grit, next mud and shell, and finally sand and shell; the sand becoming quite coarse, changes colour, and is mixed with gravel or pebble and coloured shells as the coast is neared, while the soundings decrease somewhat regularly in depth to 14 and 12 fms. about 4 miles from shore. In thick weather, or when all points on the coast are not plainly visible from that distance, the water should not be shoaled to less than 15 fms. Going seaward, and having crossed the mud-well, the character of the bottom is as follows: First, mud and sandy grit, then mud and shell, next fine grey or white sand mixed with broken shells, and beyond the La Plata bank, fine white and grey sand.

Vessels bound for La Plata river, after having passed the latitude of cape Castillo will find the mud-well an excellent check on the reckoning when approaching the coast.

**Pilots.**—The cruising ground of the pilots is usually off cape Santa Maria, about 10 or 15 miles from the lighthouse. In bad weather they rarely keep their station, as their cutters are small. If caught outside in pamperos they run either under cape Santa Maria, or cape Castillo; and in strong easterly winds they run for Maldonado.

The pilot cutters carry a large blue flag at the masthead (International Signal Flag P.)

#### THE OUTER BANKS AND SHOALS.

**REPORTED SHOALS.**—H.M.S. "Caroline" when standing towards Lobos island from the southward, gradually shoaled the water from 14 to 7 fms. over hard sand, in the (approximate) position lat. 35° 13' S., long. 54° 53' W.; the heavy sea

[RIVER PLATE.]

prevailing at the time, together with the indistinctness of the land, prevented a detailed examination being made.

Prolonged search subsequently made by several of H.M. ships has failed to find the above shallow water reported by H.M.S. "Caroline," but in the course of their examinations three other knolls with less water on them than the surrounding depths, have been found:—

- 1.—A small patch of 6 fms., with 10 to 13 fms. around, reported by H.M.S. "Stork," lying with the following bearings:—Centre of Lobos island, N. 50° E., Punta del Este lighthouse, north. Position, lat. 35° 4' S., long. 54° 58' W.

It is to be remarked that the "Stork," returning to this spot to make a further examination, was unable to find her own knoll, which is not very surprising seeing that it is probably of small extent, and that there is some difficulty in accurately fixing the position of a ship in this locality, at some distance from the land, and with few objects.

- 2.—A depth of 6 fms., with 15 fms. close around, reported by H.M.S. "Ready," on the spot formerly marked on the chart as 9 fms., lying with Lobos island bearing N. 78° E., distant 7 miles. This shoal appeared to be circular in shape and about 2 cables in diameter. Position, lat. 35° 2' S., long. 55° 2' W.
- 3.—A patch of 6 fms., rock, was passed over by H.M.S. "Ruby," when proceeding from Maldonado to verify the "Ready's" soundings, mentioned in (2). Possibly less water may exist. It lies with Lobos island, bearing east, distant 5 miles. Position, lat. 35° 0 $\frac{1}{2}$ ' S., long. 54° 59 $\frac{1}{4}$ ' W.

As accumulated evidence points to the possibility of the existence of other small knolls at the entrance of the Rio de la Plata, the mariner should use every precaution in navigating this vicinity, and especially keep his lead going.

The Commander of the French vessel of war, "Dives," reports the existence of a shoal southward of Lobos island. This shoal (*Doze shoal*), on which depths of 4 $\frac{1}{2}$ , 5 $\frac{1}{2}$ , and 6 $\frac{1}{2}$  fms. were obtained, is reported to be situated with the S.E. point of Lobos island, bearing N. 29° W., distant about 2 miles. Approximate position, lat. 35° 3 $\frac{1}{2}$ ' S., long. 54° 52' W.

**LA PLATA BANK.**—At the entrance to the Rio de la Plata, between the meridians of Maldonado and cape Castillo, is a remarkable bank, with an average depth on it of from 10 to 20 fms., fine sand and broken shells. It extends N.E. and S.W., parallel to the coast, at a distance of from 40 to 50 miles. At 25 miles eastward of Lobos island it is a part of the bank extending from the shore, thence eastward, it is separated from the shore bank by the mud-well, which off cape Santa Maria is 5 miles in breadth, increasing to 20 miles off cape Castillo. This mud-well has depths of from 20 to 40 fms. Soundings of from 17 to 19 fms. are found nearly 50 miles S.E. of Punta del Palmer, evidently a continuation of La Plata bank.

It has long been known that there were detached sand-banks at the entrance to the Rio de la Plata, but the different positions assigned had caused some of them to be considered doubtful. At the present day numerous observations have shown the existence of several shoals, all lying in the same straight line, parallel to the coast, and proving to belong to the same bank. Its great length and narrow shape of La Plata bank explain clearly the different positions assigned to these shoals.

**ENGLISH BANK,** is a dangerous rocky shoal, partly covered with sand, and dry in several places at low water, on which the sea continually breaks over a space of from 3 to 4 miles; it lies nearly north and south about 12 miles, and about midway on the western side a tail, from  $\frac{1}{2}$  to 2 miles in width, trends off in a S.W. by S. direction about 15 miles, on which the depth is from 2, 2 $\frac{1}{2}$ , and 3 fms. From its north end Flores islet lighthouse bears N. by W., distant 11 miles, and Monte Video lighthouse N.W. by W.  $\frac{1}{2}$  W. 22 $\frac{1}{2}$  miles.

According to an examination made by Captain W. J. L. Wharton, H.M. surveying vessel "Sylvia," in the months of August and September, 1882, the soundings are found to be regular off the eastern side of English bank. There are depths of 6 and 7 fms. close to the north end of English bank, and the soundings are found to be regular off the eastern side of it; if common precaution be taken with the lead, the approach towards the bank will be indicated. To the northward of the bank the depth will not be less than 7 fms. until westward of its meridian. Should a vessel have occasion to anchor near it, the anchor should not remain long in the ground, as from the stiff nature of the bottom there will be great difficulty in lifting it.

The currents in the vicinity of the bank were observed to set in all directions, but generally more towards the east and west than towards the north and south; the greatest rate observed did not exceed 1 $\frac{1}{2}$  knots an hour.

**Light-vessel.**—Off the north end of the English bank is a vessel painted red, having 3 masts, and which exhibits a fixed white light visible 12 miles; but the vessel drags from time to time during heavy gales; and it would seem is generally left in the position to which she drifts. No confidence therefore can be placed in her as a guide to clear the bank; and as the jib and spanker are sometimes set to keep the vessel steady, it is then difficult for a stranger to recognise her as a light-vessel. She lies in 7 fms. water, muddy bottom. From the light-vessel Flores lighthouse bears N. by W.  $\frac{3}{4}$  W., distant 11 $\frac{1}{4}$  miles; Cerro de Monte Video lighthouse N.W. by W.  $\frac{1}{2}$  W., or about 1 $\frac{1}{4}$  miles E.  $\frac{1}{2}$  N. from the north part of the bank. Vessels should pass north and east of the light-vessel.

**ARCHIMEDES BANK,** discovered by an English frigate of that name, is westward of the English bank, and extends over a space of about 4 miles, having on its centre 2 $\frac{1}{2}$  fms. water, and on the other parts of the bank 3 fms. The bank is composed of sand; to the northward and westward of it the bottom is mud, or sand and mud. It should not be approached, unless in a vessel of very light draught, nearer than 5 fms. water. Between the Archimedes and the English bank there is a channel nearly 4 miles wide, with 5 $\frac{1}{4}$  and 5 $\frac{3}{4}$  fms. in it, sand and mud.

The commander of the French vessel of war "l'Etoile," has obtained a sounding of 18 ft. at low water, hard sand bottom, 5 miles westward of the western side of Archimedes bank. Position, lat. 35° 13' S., long. 56° 13' 45" W.

The French bank, with 1 $\frac{1}{2}$  fms. on it, occupies a place on the chart in lat. 35° 43' S., long. 55° 37' W.; but was unsuccessfully searched for by H.M.S. "Sylvia," in 1883.

**ROUEN BANK** lies to the southward of the English bank, its northern edge which lies 24 miles southward of the centre of English bank, is in lat. 35° 43' S., long. 55° 58' W., whence it extends in a southerly direction for 15 miles, varying from 5 miles in breadth at its northern end, to a mile at its southern part in 5 fms. The general depth on this bank is from 3 $\frac{1}{2}$  to 5 fms.

**CUIRASSIER BANK** is about 3 $\frac{1}{2}$  miles long in a N.W. and S.E. direction, about  $\frac{1}{2}$  a mile broad, and has 17 to 18 ft. water on it, the bottom being sand and mud, and in the shoaler places hard sand. Its centre lies N. by E.  $\frac{3}{4}$  E., distant 11 $\frac{3}{4}$  miles from the grove of trees on Indio point. Between Cuirassier and the Ortiz there is a channel 3 miles in breadth, having from 21 to 23 ft. water, mud, and a mixture of mud and sand. To the southward of Cuirassier, between it and the bank bordering the coast of Buenos Ayres, the depths are 19 to 22 ft., with the same bottom.

**Light-vessel.**—A light-vessel painted red with 2 masts is moored on a bearing N. E. by N., distant about 10 miles from the high grove of trees on Indio point. The vessel exhibits at the height of 33 ft. above the sea a fixed white light visible 10 miles. This vessel often drifts out of her right position; she is locally known as the Indio point light-vessel. When pilots are on board a blue flag with a white letter P, is hoisted.

ORTIZ BANK begins near Colonia, thence it borders the coast to the eastward so far as the outlet of the rivers Pabon and Pereyra, a distance of about 37 miles, and extends in a tongue to the south-eastward across the La Plata, the shoal parts from 9 to 10 ft., terminating 15 miles N.E. by N. from Indio point, and about 56 miles from Colonia. This portion, which was examined in 1871, appeared to have an average breadth of only 3 miles, and to extend parallel to the shore for 20 miles, thence in a S.W. direction to Piedras point, and joining the shore bank. This portion may be termed the bar of the La Plata, and is about 9 miles across, with a depth of about 18 feet at low water. In the centre of Ortiz bank the depths vary from 9 to 15 ft.; and along its north part, at 4 miles from the shore, the bottom is remarkably level, the depths being from 2 to 2½ fms.

The bottom is sand, or rocks covered with sand, which the seaman should take into consideration in crossing with a vessel of light draught, as well as the state of the river. The bank may be approached on all sides by the lead, the soundings gradually decrease, and the mud (found in the channel) becomes mixed with sand; the only fear is getting in one of the indentations of the bank more or less deep, and known by the pilots under the name of *saccos*. A vessel should not go nearer than 3 fms. water.

The Ortiz bank forms two channels, one along the north coast, which is long, narrow, and practicable for vessels of about 12 ft. draught. The other on the south, northward of the Chico bank, is deep and more frequented, being the main channel between Monte Video and Buenos Ayres.

CHICO BANK lies in the middle of the channel between the Ortiz bank and the coast of Buenos Ayres, and is a series of small banks of hard sand, about 15 miles long in a N.W. and S.E. direction, nearly joining the shore bank, the depths upon which vary from 1 to 3 fms., with narrow channels of 3 and 3½ fms. between; these banks are steep-to on the north-eastern side. From the 3 fm. northern extremity of the Chico bank, Magdalena church bears S. by E. ½ E. 17 miles. A shoal portion of from 7 to 9 ft. lies E.S.E. between 4 and 7 miles from the northern extremity and borders the channel.

Southward of the Chico bank there is a channel of about 3 miles in breadth, navigable for vessels under 15 ft. draught, but it is not recommended, as the currents run strong and the soundings in approaching the banks are not a sufficient guide. The main channel between the Chico and Ortiz banks has from 4 to 6 fms. water, muddy bottom, which is carried as far as Santiago point; from thence the soundings decrease gradually to about 2½ fms. at the bar of Buenos Ayres.

**Light-vessel.**—A light-vessel painted black with 2 masts is moored in 4½ fms. water 1 mile off the north-east end of the Chico bank, and 16½ miles N. ½ W. from Magdalena church; the vessel exhibits a fixed white light, visible 10 miles. The vessel's position is often doubtful after gales.\*

**Tides.**—In the vicinity of the Cuirassier and Chico light-vessels in ordinary weather the average rise and fall is 4 ft., the ebb setting to the S.E. at the rate of one-half to 3 miles an hour, and the flood to the N.W. at from one-half to 1½ miles an hour.

#### GENERAL DIRECTIONS FOR NAVIGATING THE RIO DE LA PLATA.

Making the land at the entrance of the Rio de la Plata does not present any great difficulty. The inconvenience is caused by the frequency and suddenness in the changes of the weather. The latitude is of the greatest importance, and no opportunity should be lost in obtaining it either by day or night, whenever the state of the weather will admit, and with the lead, the vessel may be navigated with safety.

\* Information has been received that Chico bank light-vessel is now moored northward of Chico bank, and is supposed to be nearly in mid-channel, so that she may be passed on either side. (November, 1889.)

In fine weather, and coming from the northward, with north-easterly winds, the lighthouse at cape Polonio (Castillo) and Sta. Maria will be sufficient to identify the coast.

In hazy weather, a good parallel for making the entrance is on the parallel of Lobos island, and when in the longitude of about 53° 10' W. the La Plata bank will be struck, in depths of from 12 to 20 fms.

The bank here is about 10 miles across, then the mud-well will be reached, in which the depth is over 20 fms.

Allowance must be made for the current according to the direction and force of the wind, bearing in mind that with the wind from S.E. it sets strong towards the coast. If set to the southward the depths will increase slowly, the bottom being fine sand; if, on the contrary, the vessel be set to the northward, the soundings will decrease rapidly, and the bottom is sand and broken shells. The nature of the bottom and the change of depth will assist in indicating the course followed, and as a vessel proceeds westward the chart is the best guide; but mud and sand will be found on the parallel of Lobos, and muddy bottom is sure indication of being in the fairway.

Several vessels are yearly wrecked on the English bank by not paying attention to the lead and particularly to the nature of the bottom. To the westward of Lobos islet, with a scant or beating wind, the north shore should be kept aboard, as it is bold; there are no out-lying dangers at the distance of 5 miles from it, and the weather is seldom so thick for any length of time that the land cannot be seen. The nature of the bottom is mud, and the decrease of soundings to the westward will indicate an approach to Flores lighthouse. With a fair wind, if a vessel be to the southward, out of the channel, the bottom will be grey or black sand, especially near the English bank, whilst in the channel the bottom is pure, soft blue mud.\*

With a steady N.E. breeze cape Castillo should be sighted, when the vessel, aided by a favourable current, can run along the land. If, however, the wind be from S. to S.E. or the weather be uncertain, by sighting the cape a vessel will be to leeward, with a strong current against her, and a heavy swell setting towards the coast. It would therefore be necessary, with S. or S.E. winds, to keep a little southward of the parallel of Lobos, and steer so as to sight that islet in a W. or N.W. direction.

In bad weather attention should be paid to the soundings over La Plata bank, and mud-well, and the river should not be entered before a vessel's position is well ascertained by sighting Lobos or the surrounding lands.

If caught in the entrance with a S.E. gale, and unable to reach a port, it will be prudent to anchor on muddy bottom, under the lee of any sand-bank. If eastward of Lobos isle, the vessel will be set rapidly towards cape Castillo, where shelter will be found on the north side of the cape, as mentioned at page 7, or she may stand off shore until the return of fine weather.

In entering the Rio de la Plata southward of the English bank the seaman should be certain of his latitude, and steer on the parallel of about 35° 37' northward of the Rouen bank, taking into consideration the state of the wind and sea; or run on the parallel of 36° south of the Rouen, avoiding the space between, in which French bank and others have been reported. Westward of Rouen bank a course must be shaped for the desired port according to position, as in the absence of marks the bottom and soundings are the only guide.

\* Some years ago the lighthouse on Lobos island was removed to East point, Maldonado, on account of the light interfering with seal hunting. Navigators are unanimous in condemning this change, as it has led to many wrecks. The anxiety to avoid this low island with its outlying reef causes the navigator to keep far off the north shore, which combined with the strong currents that often set across the river, and inattention to the soundings, carries them on the English bank.

Eastward of English and Rouen banks, the bottom is sand sometimes mixed with shells, whilst northward of English bank, in the channel, it is mud. Westward of these banks, and of the meridian of Monte Video, the bottom is mud with the exception of the tosca off Piedras point, and the Ortiz bank, which is sand.

As cape San Antonia, the south point of entrance, is low, and seen only at the distance of a few miles, a vessel from the southward, in the absence of observations, must depend entirely on the lead; and on proceeding for Buenos Ayres, the Cuirassier light-vessel near Indio point will probably be the first thing seen, at a distance of 6 or 8 miles.

**MONTE VIDEO to BUENOS AYRES.**—It is customary for vessels from Monte Video to Buenos Ayres to employ a pilot, and unless the mariner has some knowledge of the navigation of the river, it is almost indispensably necessary for those of more than 16 ft. draught; for although the channel is marked by Cuirassier and Chico light-vessels,\* at certain places it is narrow, and the edges of the bank are liable to change after gales or extraordinary tides. The pilots alone can be acquainted with these changes, but they should not be trusted too much, though their services are still at a high price; those only known to the place should be employed.† As the banks are generally steep-to, the least neglect in the steerage may cause a vessel to ground; great attention should therefore be given to the navigation even with a pilot on board.

Vessels of less than 9 ft. draught can almost always steer across the Ortiz bank in a direct line. In proceeding through either channel it must be borne in mind that when in the fairway the bottom will be soft mud, and the nearer the banks are approached the more the mud will be found mixed with sand, and the bottom harder, as near all the banks sand predominates. Should a vessel's position be doubtful in consequence of thick or bad weather, she should anchor. Eastward of the meridian of Flores a vessel should anchor only during fine weather, but westward of that meridian she may anchor without the least inconvenience where the bottom is mud. Near the banks in the Rio de la Plata, the upper stratum is a mixture of black mud and sand, whilst the second, which is reached by the anchors, is stiff clayey mud.

**NORTH CHANNEL** is seldom frequented by any but coasting vessels. Leaving Monte Video for this channel, and having passed Panela rock and the south extremity of St. Lucia bank at a prudent distance; steer about W.N.W. along the land, passing Santa Maria and Sandy points at the distance of 4 or 5 miles, and when the soundings increase from  $3\frac{1}{2}$  to  $4\frac{1}{2}$  fms., a vessel will be off the bank extending southward between the 2 points. When Sta. Maria point bears E.N.E., distant about 6 miles, a course N.W. along the shore may be taken, passing about 2 miles southward of Rio Pereyra; westward of this river the water decreases. Off the Cufre the depth is about 16 ft., which should be passed at the distance of  $1\frac{1}{2}$  or 2 miles.

On arriving off Sauce point, which is more woody than the others, a course about W. by S.  $\frac{1}{2}$  S. should be steered, so as to pass southward of the Pipas rocks, and the rock to the S.W.; having passed them, close the land by the lead to within  $\frac{1}{2}$  a mile, steering along it for Colonia roads. The soundings from about 4 miles west of Pipas rocks will increase to 4 fms., and at less than  $\frac{1}{2}$  a mile southward of Colonia to 7 fms. In rounding the point at the distance of  $\frac{1}{4}$  of a mile, 6 and 5 fms. water will be carried into Colonia roads. If bound to Buenos Ayres, steer so as to pass  $1\frac{1}{2}$  cables south of San Gabriel island, and with its centre bearing N. by W., a course may be shaped to pass north or south of Farallon island.

\* The mariner is warned that these vessels after a heavy pampero are often out of their proper positions, sometimes to the extent of 3 or 4 miles. The lights of vessels at anchor must not be mistaken for those of the light-vessels, although this is frequently said to occur.

† Some care is required in selecting pilots, for although licensed by the superintendent of the port of Buenos Ayres, it is to be feared there are many who are not competent to undertake the navigation of the river. Wrecks are frequent, but the pilots are seldom, or never, made to feel their responsibility.—Lieutenant L. S. Dawson, R.N., 1871.

**SOUTH CHANNEL.**—In leaving Monte Video for the south channel to Buenos Ayres, steer about S.W. by W. so as to pass about 4 miles to the S.E. of Cuirassier light-vessel; but as the currents which always prevail in this part of the river are uncertain, the course should be carefully preserved by the bearing of the Cerro as long as it is in sight, which in fine weather will be at a distance of 28 or 30 miles, by which time the direction of the current should be fairly ascertained. Although this part of the bed of the river is nearly flat, great attention must be paid to the lead and the actual course and speed frequently ascertained by means of the ground log.

At about 12 miles from Monte Video the depths will be about 4 fms., mud, decreasing to  $3\frac{1}{2}$  fms. as the Ortiz bank is approached, over the tail of which 17 ft., soft mud, will be obtained, deepening to 20 ft. on its western side, but if the vessel or light be not seen, do not haul to the north-westward until the water shoals to less than 3 fms. near Indio point. The state of the river should always be considered.

Should the soundings decrease to 16 or 17 ft., before the necessary distance from Monte Video is made good, a vessel will be near the southern shoal patch of the Ortiz bank, but should they increase to  $4\frac{1}{2}$  fms. or more, she will be some distance to the south-eastward, bearing in mind that, generally the bottom is more or less soft in the channels and more or less hard near the banks. The grove of trees on Indio point is visible 13 miles in clear weather; this, when first sighted, will give an approximate distance from it, and may assist the mariner, if the light-vessel is not seen. The mariner must not be deceived in his distance from the land, as it may be seen by mirage at a greater distance. In thick weather it will be prudent to anchor.

Having passed the Cuirassier light-vessel on either side, steer N.W. about 28 miles, making due allowance for the current, the direction of which will probably be seen in passing the light-vessel; the ebb sets strong to the S.E., and the flood to the north-westward. When the Chico light-vessel is seen, which it probably will be after having run 18 or 20 miles, steer so as to pass northward of her, then a W.  $\frac{1}{2}$  N. course made good will lead to the bar anchorage and guard-ship and over the flats to the outer road of Buenos Ayres. Should the Chico light-vessel not be seen, in consequence of thick weather, or being out of her proper position, skirt the edge of the Ortiz bank by the lead.

Between the Ortiz and Chico banks is the deepest part of the channel, the depths increasing near the latter bank. Towards the Ortiz bank the depths shoal very gradually; Chico bank is steep-to. It is scarcely known of a vessel grounding on this edge of the Ortiz bank, but several have grounded on that of the Chico. From the Chico light-vessel the soundings westward are regular as far as Santiago bank, when they gradually decrease to Buenos Ayres.

From the Cuirassier or Indio point light-vessel to Buenos Ayres, the navigation for a sailing vessel presents some difficulties, unless with a fair wind, and at all times requires great attention. Between the two points, in ascending or descending the river, the seaman should not attempt to beat against the current unless the vessel can attain a speed of 6 knots, if the current is beyond its normal state, of 1 or  $1\frac{1}{2}$  miles an hour; it will be more prudent to remain at anchor. In working to windward do not stand nearer than 3 fms. on either side.

When in the vicinity of the Chico bank, Ortiz bank should be kept aboard, as the former is steep-to, and must be approached with caution. When Magdalena church or the trees bear S.S.W. a vessel will be between the Ortiz and Chico banks; and with the church S.S.E. will be westward of Chico bank, and may stand farther to the southward.

A vessel will then have no difficulty in tacking on either side of the channel at a prudent distance from the edge of the banks, bearing in mind that Santiago bank is steep-to. If bound to Colonia or Hornos islands, steer by the lead along the



edge of the Ortiz bank, or with Farallon light in sight, it may be steered for bearing north. A pilot boat will probably be found about 6 miles southward of Farallon lighthouse.

Vessels leaving Buenos Ayres for the S. E. should steer for the light-vessel on the north end of the Chico bank, preserving the course by the bearing of the guardship as long as she is in sight; and the bearing of Barragan trees will indicate an approach to the bank. Should the Chico light-vessel not be seen, on account of fog or other cause, the edge of the Ortiz bank should be skirted by the lead, and when sure of being eastward of the Chico bank steer for the Indio or Cuirassier light vessel, making due allowance for the tide, and keeping the lead going.

## THE RIVERS

### URUGUAY, PARANA, AND PARAGUAY.

**THE RIVER URUGUAY** rises in Brazil, in the Sierra de Santa Catharina, and flows first west and then south, separating Brazil and Uruguay from La Plata, and falling into the Rio de la Plata, where its waters preserve their clearness for miles before they are lost in the muddy current of the Parana. Its whole length is nearly 900 miles, and it is navigable for vessels of about 12 ft. draught as far as Concordia and Salto (about 240 miles above Buenos Ayres), and for small steamers beyond it. The navigation is easier than that of the Parana; the currents are not so strong, and there are fewer banks. The most difficult parts are usually marked by buoys or stakes, but they are often washed away. The entrance of the Uruguay is 18 miles N.W.  $\frac{1}{2}$  N. of Martin Garcia; it is formed on the west by the mangroves of the delta of the Parana, and on the east by some high ground terminated by two principal headlands, Punta Gorda, a wooded bluff 55 ft. high, to the south, and Punta Chaparo on the north, 5 miles apart. The river here is narrowed to about a mile in breadth, and varies from 12 to 15 fms. in depth.

Above Punta Chaparo it widens out to 5 miles, and preserves nearly that breadth to cape Fray Bentos. Two villages are situated on this eastern coast, **Las Vacas**, near the outlet of a river of the same name, and opposite the mouth of the Parana Guazu; the other **Las Higuieritas** or **Nueva Palmira**, in the strait of the Uruguay, where is a pier and some coasting trade.

**Mercedes** is a port of discharge situate on the left bank of the river Negro south of Fray Bentos. The town is stated to be clean and healthy.

**Boca de Guazu.**—The great mouth of the Parana, known commonly by the name Guazu (great in Guarane) opens out into the Rio de la Plata at 12 miles N.W. of Martin Garcia, and 6 miles southward of the entrance to the Uruguay, flowing from the westward; all this western coast is formed by low marshy land covered with wood and impenetrable mangroves, and intersected by numerous channels which are so many branches by which this great river flows into that of the La Plata.

The aspect of the Uruguay is altogether different from that of the Parana. In the lower part of its course between Chaparo point and Fray Bentos, the river is 5 miles wide, and has the appearance of a lake. It is encumbered with flats, but there is a navigable channel running through which enables vessels that can pass Martin Garcia to reach Paysandu, 110 miles above Chaparo point. Above Fray Bentos the river narrows rapidly, to half-a-mile and less.

The right bank, Entre Rios, is generally low, wooded, and as monotonous as the low shores of the Parana, the land here and there ranging, perhaps, to 180 ft. at the highest; but the left bank, that of Banda Oriental, is composed of pleasant hills reaching occasionally from 200 to 500 ft. high, broken by numbers of rivulets,

with receiving houses from distance to distance connected with the estancias and villages, from which the produce of the country is exported. The principal towns of Entre Rios are on the borders of the river, whence the commerce of the province is carried to the Uruguay by the facilities of its affluents, the route to Buenos Ayres being much shorter than that by the Parana. This bank being low and drowned, the towns are from 6 to 9 miles in the interior, standing on the banks of the rivulets by which they communicate with the Uruguay.

The river is subject to periodical rises, occasioned by the great rain in springs in the Brazilian provinces, where it takes its source. It rises in September and October, sometimes very rapidly, and in places where the river is narrow it attains the height of about 30 ft., and above Salto 15 ft. A strong southerly wind will, when the river is low, cause the water to rise a few feet up to within 20 miles of Salto. The strength of the current depends upon the height of the river, and during a high river runs from  $2\frac{1}{2}$  to 4 miles an hour; at other times at  $\frac{1}{2}$  to  $1\frac{1}{2}$  miles an hour, and is then much influenced by the winds. The prevailing winds are from the northward; they generally follow the course of the river as in the Parana.

**FRAY BENTOS**—The place most frequented by foreign vessels is Fray Bentos, which serves as a port for **Guauguaychu**. In this part of the river, which is 6 miles in breadth, the channel is very near the eastern bank; it is necessary to cross to enter the little river of Guauguaychu, leading to the town of the same name on its right bank. This river is about 10 miles in length, with a bar at its entrance; vessels of light draft ascend when the water is a little above the average height, which is always the case when the wind is from the southward. The difficulty of reaching Guauguaychu renders the operation of loading and unloading very tedious. The produce is hides, tallow, bones, and jerked beef. Here all vessels lie that can pass Martin Garcia flats.

The next port is **Concepcion del Uruguay**, situated 12 miles below Paysandu, and about 45 miles above Fray Bentos. Vessels can approach to a cable distance from the quays. The little river of Concepcion admits vessels of light draught. Here is embarked the produce of the estancias in the district. A regular weekly communication is established between Buenos Ayres and the principal towns of the Uruguay so far as Salto.

**PAYSANDU**, a town of 12,000 inhabitants, about 57 miles above Fray Bentos ranks next to Monte Video in the Bande Orientale. It has a custom house and piers, and is in telegraphic communication with other important towns. During the greater part of the year it is accessible to vessels of 14 ft. draught.

**CONCORDIA** and **SALTO**, are situate about 75 miles above Concepcion; Salto Grande is 17 miles higher up the river. Beyond Salto the river is only navigable for very small craft, as the channel is nearly closed with rocks.

**Pilots** for the Uruguay are usually engaged at Monte Video or at Buenos Ayres, but sometimes they may be obtained at Concepcion, a place where a large number of foreign vessels trade to. The usual charge is four dollars a day.

**SUPPLIES** can be obtained at all the towns near the banks of the river. Coals are scarce, but wood, which answers well for steaming purposes, may be obtained.

**THE RIVER PARANA** rises in Brazil, N.W. of Rio de Janeiro. The upper streams of this river have various names; but at the confluence of the Rio Grande, the longest of them, with the Paranaiba, it takes the name of Parana, which it retains till it merges itself into the Rio de la Plata. The Parana flows southward, receiving several large affluents, and separates Paraguay from Brazil and La Plata. It then turns to the west, and flows in that direction for 50 miles, still forming the boundary between Paraguay and La Plata. It receives the Paraguay from the north, and at 13 miles to the S.W., at Corrientes, it again turns south and flows through La Plata into the river of that name.

[RIVER PLATE.]

The total length of the Parana is about 2,100 miles—namely 500 from the source of the Rio Grande to its confluence with the Paranahiba, 1,000 from thence to the union of the Paraguay and Parana, and about 600 from that point to the Rio de la Plata. In all the upper part of its course, as far as the province of the Missions, the river flows through a mountainous country, between scarped and tortuous shores, which renders it unnavigable; and its breadth does not exceed from 450 to 550 yards. But below the Salto d'Apipe, the highest point a vessel can reach, and during its course in the Argentine Confederation, the aspect and nature is quite opposite.

Below Corrientes the river acquires an average breadth of from 1 to 3 miles; sometimes in the great rise of its waters, the breadth extends many miles. Great changes then take place in the configuration of the river; new islets are formed and others carried away by the current, and there is often great difficulty in finding the route. In the upper part, the bed of the river is composed of rocks, but below Corrientes it is of shifting sand, and sometimes with a little clay.

The Parana and its affluents are subject to a periodical rise, which then permits vessels of 12 or 13 ft. draught to reach Corrientes, and those of 7 ft. draught the Brazilian province of Matto Grasso, in lat. 18° S., at about 2,000 miles from the sea. The rise or swelling of the river is produced by a double cause; the melting of the snow on the Cordilleras, whose water descending to the Parana by its affluents from the westward, and by the great rains which fall at nearly the same time in the Brazilian provinces, reaching the Parana by its affluents from the eastward.

When the water is low the river is navigable to Corrientes for vessels of about 7 ft. draught, and for vessels of smaller draught to the Salto d'Apipe, 135 miles farther on, in lat. 27° 30' S., where the last rapids occur. It has a low and high season, depending on the periodical rains; the former is said to last during the winter and spring of the southern hemisphere, from June to December, and the latter during the summer and autumn; but the difference in the height of the river in these seasons varies at different times, and in different parts.

In the lower part of the river the water rises occasionally when the wind blows strong from the S.E., which forces it back; but this rise lasts only while the wind is from that quarter, as it falls again when it veers to northward or westward. During a very low river the sand banks forming the port of Parana have uncovered 5 ft., and in a very high river the water has been known to rise to the level of the quays at Corrientes. In the navigable part of the Parana, from its mouth to the province of the Missions, the average strength of the current is from 2 to 2½ miles an hour, it is most rapid in the narrows, and where it runs along by the high cliffs, and on the contrary weakest when it flows between low inundated banks.

The Parana is lowest in the month of December. It rises in January, February, and March, attaining its greatest height in the latter month. In April, May, and June it is apparently steady. In July, August, and September it falls and rises irregularly. In October the great fall commences, from 1 to 4 inches per day, continuing to the latter part of December, when it begins to rise again at about the same rate.

SAN NICHOLAS is situate about 110 miles from the entrance of the Parana Guazu, and is increasing in importance. It may be approached by a vessel drawing 12 ft., by either channel. There is a pier alongside which vessels load and discharge; and good anchorage in 9 fms. close to the shore. Vessels intending to proceed higher up the river anchor outside the islets. Supplies are cheap and plentiful.

ROSARIO is a thriving town about 40 miles above San Nicholas, with a population of about 28,000. Vessels of 17 ft. draught can navigate to Rosario when the river is high, and in general all those that can pass Martin Garcia; sailing

vessels do not usually go beyond Rosario on account of the difficulties of navigation. There are piers with a depth of 17 ft. alongside, for discharging cargo, but the harbour, from the want of dredging machines, is reported to have been much reduced in depth in the last 10 years.

The anchorage at Rosario is in from 10 to 15 fms. water, at the distance of about a cable from the shore; vessels may haul alongside the wharf. The port is stated to be gradually filling up, as in the last 12 years an island or sand bank has sprung up a little above the town, and banks are reported as having formed where formerly there was plenty of water.

The current runs from 2 to 3 knots an hour.

PARANA.—This town is situate about 90 miles above Rosario. Vessels of 10 ft. draught can reach Parana throughout the year. The least water obtained between Parana and Corrientes in June 1881, was 13 ft. in the Chimbolan pass about 45 miles below Corrientes; but the river was considered high.

DIRECTIONS.—It would be difficult to give any specific directions for the navigation of the Parana, where in places the channels vary much every year. There are many islands formed where deep water was found years ago, and there are now deep and good passages where none formerly existed. The charts should therefore be considered merely as sketches of the river. It requires constant practice, care, and great attention in navigating this river. Hands should be kept by the anchor, and attention paid to the lead. It is navigable for a steam vessel of 12 ft. draught for a considerable distance at all times of the year. A vessel should anchor at night in a broad part of the river, where the current is not so strong, and the banks more shelving than in the narrow parts. When going against the stream, should the vessel pass the land at a rapid rate, she will be out of the channel, and in the eddy. Avoid rushes, ripples, and smooth patches; whenever the river takes a sudden turn, open the reach before entering, or keep on the concave side of the river; and in case of a doubtful passage the seaman will know best how to act.

Keep nearer the upper than the lower bank; for should a vessel get ashore on the upper bank, she can easily haul off; but if on the lower bank, a bower anchor must be laid out up the river; and the cable hove taut, when, after a few days, the bank will wash away, and the vessel will float in most cases without being strained the least. If a vessel take the ground in ascending the river, she is easily got off again, but if descending, if she once touches she remains fast. It is very common to hang an anchor astern in descending the river, to let go the moment the vessel touches the ground.

The only part of the river a vessel can navigate at night without great inconvenience is between the Boca de Guazu and Rosario, the shoals being few in number and the route easy to follow, but the descent at night is always dangerous, and should not be attempted unless in cases of urgent necessity. Sailing vessels cannot navigate at night.

Steam vessels of 12 or 13 ft. draught can, with high water, navigate as far as Paraguay, but those above that draught cannot proceed farther than the passes of San Juan, about 10 miles above La Paz. The pilots usually examine these passes by boat before proceeding through with a vessel, on account of the constant changes.

PARANA DE LAS PALMAS, is the southern branch of the Parana river, joining the main stream at San Pedro. Its entrance is about 18 miles N.W. of Buenos Ayres, across Palmas flats. The ports of discharge on this branch are SAN FERNANDO, CAMPANA, ZARATE, and BARADERO. We are informed that the depth of water below San Pedro in this branch is 8 ft.

H.M.S. "Cracker" descended this branch in May 1875, turning into the Capitan branch, and thence through the mouth of the Lujan river to the river

Plate. The vessel grounded several times on soft mud. In some places in the Tigre the channel was scarcely broader than the length of the ship, and extremely tortuous. The mouth of the Parana de las Palmas although comparatively deep, is avoided on account of the difficulty in keeping the channel over Palmas flat, which is not buoyed; whereas the route by the Capitan can be taken without buoys.

Large quantities of game may be shot on the shores of the Parana.

The **RIVER PARAGUAY**, the principal affluent of the Parana, issues from several lakes in the Sierra Diamante, in Brazil, at the height of 1,020 ft. above the sea, in about lat. 13° S., long. 55° 40' W., and flows southward in a right line for 850 miles, but taking into account its detours, it is little less than 1,400 to 1,500 miles; it traverses the great marsh of Xarays in all its length, and falls into the Parana a little above Corrientes 650 miles above Buenos Ayres, and separating La Plata from Brazil and Paraguay. Its whole length from its source to 14 miles N.E. of Corrientes is about 1,890 miles. The height of the river above the level of the sea at Asuncion is 253 ft., and at its sources in Matto Grosso 1,000 ft. The breadth in the lower part of its course near Asuncion varies between 220 and 550 yards.

The two banks of the Paraguay are in general of the same aspect, having the same small cliffs of the average height of about 6 to 13 ft., which are broken by a number of rivulets from the marshes. Of the two the left bank is higher; both slope downwards towards the interior, there being generally but a narrow strip of dry ground between the river and the lagoons or swamps. Most of the trees that grow on the edge of the river are of little use except as fuel, which is suitable for steaming purposes. Great numbers of carpinchos, \* different species of deer, game of many kinds, large numbers of caimans, birds of the marsh, &c., are seen. Alligators are numerous in the lagoons, and jaguars in the forest.

The Paraguay like the Parana has periodical rises, but the time is a little different. It commences to rise towards the end of February, and continues until June, when it falls. Its rise is very irregular, sometimes the high river taking place of the low one until within 90 miles of its mouth. When the Paraguay is very low, the Parana on the contrary is very high, the waters of the latter river then force back that of the Paraguay. The difference of level between low and high water is also very variable; it is on an average about 9½ ft., but it is sometimes nearly 14 ft., as in 1859, when an extraordinary rise overflowed the banks of the Paraguay, and occasioned great loss to the inhabitants.

During the average rise, vessels of 12 ft. draught can reach **Asuncion**; those of about 9 ft. draught can reach it the greater portion of the year; but during low water those only of less than 6 ft. can reach it. In favourable seasons, vessels of about 7 ft. draught are able to go as far as the San Laurent or Cuyaba, and those of less than 5 ft. draught, can reach the town of Cuyaba in latitude 17° S. The only difficulty is the narrowness of the river, the number of its détours, and the rapidity of the current. Asuncion was visited by H.M.S. "Rifleman" in February, and by H.M.S. "Dwarf" in June, with a draught of 9½ ft.; and the "Cracker" proceeded 140 miles beyond Asuncion, to within 8 miles of Villa de Concepcion drawing 7 ft.

At about 50 miles from the mouth of the river is the town of **Pilar** or **Nembucu**, where pilots may be obtained. This town is small, clean, and regularly built; it consists of about half-a-dozen streets at right angles to each other, and the houses are low, neatly thatched, and whitewashed, each standing on a small enclosure shaded by orange trees. Off the flag-staff at the captain of the port's house, is a

\* Carpinchos are about the size of our pigs, and their flesh is of fair taste, but they are reputed as being very unhealthy. The flesh of the young ones is said to be scarcely distinguishable from lamb.

shoal of rock and sand, with 6 ft. water on it, and 4½ fms. close to it. It is necessary to keep well over on the western shore close to the north point of the island, where there are 3½ fms. water.

From **Pilar** the channel is deep and winding, the scenery pretty with occasionally large patches of cleared and cultivated land as far as **Asuncion**. The best anchorage at **Asuncion** is close to the shore in 3 fms. water, with the flag-staff at the captain of the port's house S.E. ½ E., distant about 2½ cables. Here a vessel will be clear of those going in and out, and the ground is good for holding. Farther out the bottom is rocky, and an eddy causes vessels to swing round their anchors.

The town of **Asuncion** is situated on rising ground, and has a pleasing appearance. It is of some extent, irregularly built, and contains several very handsome buildings; the population is about 1,700, but scarcely any foreigners. The country for 20 miles around is hilly and well cultivated with coffee, maize, tobacco, sugar cane, &c. Woods of all kinds, many very durable and well adapted for ship building, are found in the forests. There is a railway to Paraguay, distant 45 miles.

A bi-monthly Paraguayan steam vessel has established rapid communication between Buenos Ayres, Rosario, Parana, Corrientes, and **Asuncion**; there is also a Brazilian steamer monthly to Coimbra in Matto Grosso; and others frequently running between the above intermediate ports. These steamers navigate the river day and night; they are of small draught and have excellent pilots.

The strength of the current depends upon the height of the river; above **Asuncion** with the water at an ordinary height it does not usually exceed 1½ miles an hour; below the embouchure of the river Vermejo the current runs from 2½ to 3 miles an hour. The navigation of the Paraguay is easier than that of the Parana, especially for steamers. There are but few shoals in the middle of the river, and as they are rocky and covered with sand, they do not shift as in the Parana. The depth is variable; it is greatest at **Humaita**, where there are from 22 to 27 fms. water, and least at the passes of **Laguna**, **Villeta**, **Lambaré**, &c., and where at times there are only about 5 or 6 ft. water.

Remarks on the general navigation of the Parana apply also to the Paraguay, and most other rivers. Large floating islands (canelottes) are brought down by the current, and often foul the cable, and may cause a vessel to drag her anchor, unless a careful look out is kept.

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TABLE OF RIVER DISTANCES.

Rivers.	Places.	Miles.
URUGUAY ...	Buenos Ayres to Rio Negro entrance... ..	92
	Do. Mercedes (Rio Negro) ... ..	127
	Do. Fray Bentos ... ..	114
	Do. Concepcion del Uruguay ... ..	164
	Do. Paysandu ... ..	176
	Do. Concordia, and Salto ... ..	240
	Do. Salto Grande... ..	257
PARANA ...	Do. mouth of Parana Guazu ... ..	52
	Do. San Pedro ... ..	135
	Do. Obligado ... ..	144
	Do. San Nicholas... ..	170
	Do. Rosario ... ..	210
	Do. Santa Fé and Parana towns ... ..	300
	Do. Hernandaria point ... ..	347
	Do. La Paz ... ..	383
	Do. San Juan channel ... ..	393
	Do. Goya ... ..	510
	Do. Bella Vista ... ..	560
	Do. Chimbolan pass ... ..	588
	Do. Corrientes ... ..	635
Do. Salto de l'Apipe ... ..	780	
Do. Salto de Guayro ... ..	1,070	
PARAGUAY...	Do. mouth of the Paraguay ... ..	650
	Do. Humaita ... ..	670
	Do. Villa Pilar ... ..	690
	Do. Villa Franca ... ..	730
	Do. Asuncion ... ..	827
	Do. Villa de Concepcion... ..	986

TABLE OF TIME OF HIGH WATER ON FULL AND CHANGE DAYS;

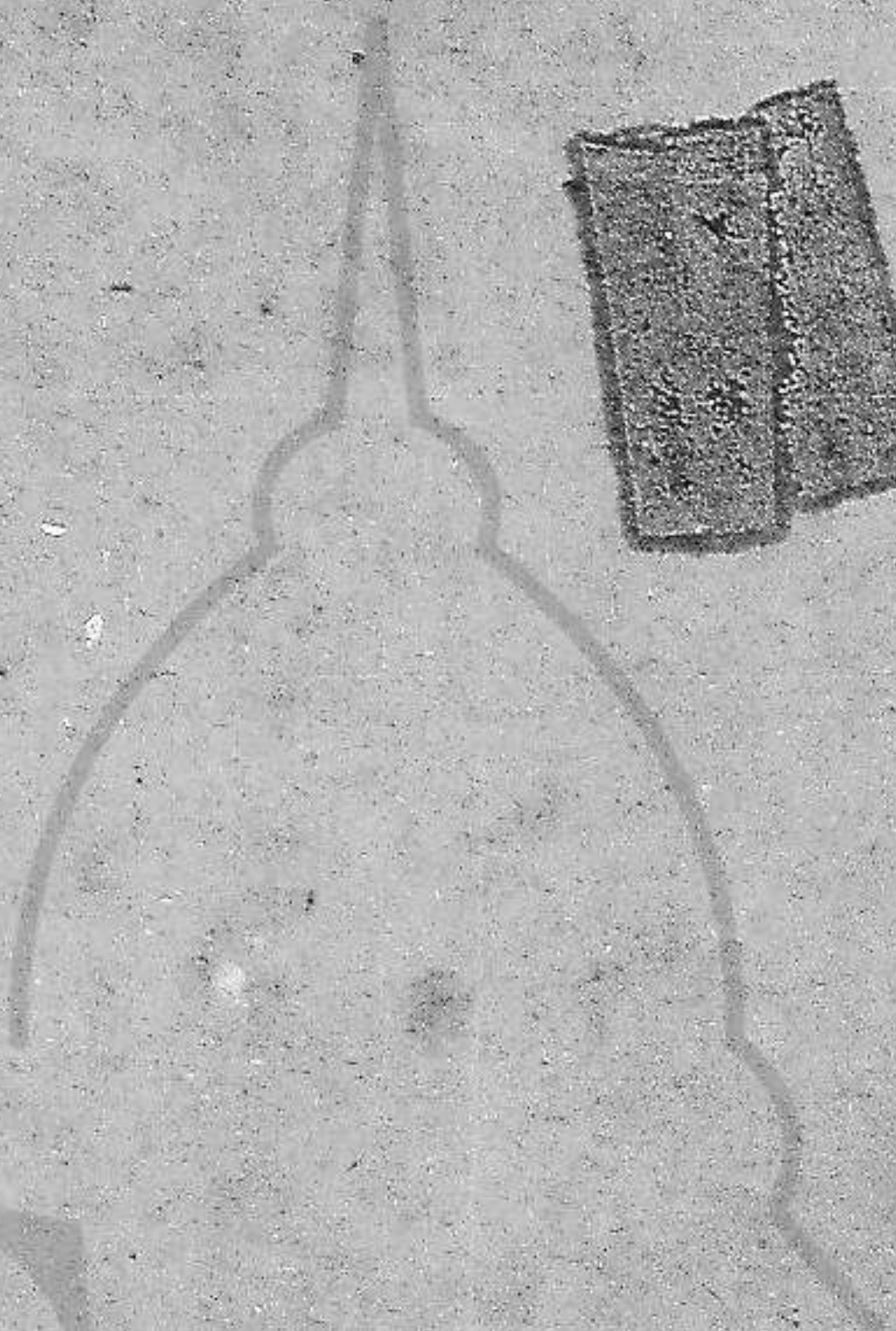
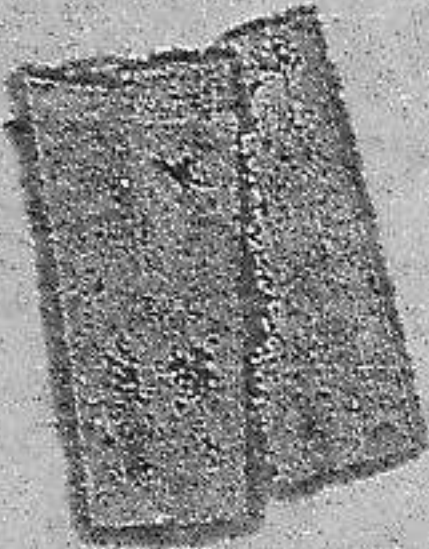
With the Rise of the Tide at Springs, &amp;c.

	High Water Full and Change.	Rise at Springs.
	h. m.	ft.
Cape Castillo ... ..	8 30	2 0
Maldonado ... ..	irregular.	
Monte Video ... ..	2 30	1½ to 5
Colonia ... ..	irregular.	5 or 6
Cape San Antonio ... ..	10 0	5½
San Boronbon Bay, River Salado ... ..	10 45	6 0
Piedras Point ... ..	11 15	6 0
Indio Point ... ..	11 45	4 0
Barragan Bay ... ..	7 0	5 to 9
Buenos Ayres ... ..	6 0	3 to 5

After heavy gales from S.E. to S.W., the water in the Rio de la Plata may rise 4 ft. above the soundings shown on the Chart; and continued winds from N.N.E. to N.N.W., may cause the water to fall 4 ft. less than the soundings shown.

LIGHTS IN THE RIVER PLATE,  
AND  
GEOGRAPHICAL POSITIONS.

		Latitude South.	Longitude West.
		° ' "	° ' "
CAPE POLONIO ...	Light fixed ...	34 25 0	53 47 0
CAPE SANTA MARIA ...	Revolving every minute ...	34 40 0	54 8 51
SAN JOSE IGNACIO ...	Light fixed ...	34 51 0	54 40 0
LOBOS ISLAND ...	Proposed ...	35 1 39	54 52 53
MALDONADO EAST POINT	Intermittent, visible 90 seconds, eclipsed during 25 seconds...	34 58 15	54 56 47
FLORES ISLAND ...	Revolving every minute ...	34 56 55	55 54 41
POINT BRAVA ...	Light fixed ...	34 55 7	56 9 0
MONTE VIDEO ...	Light flashing, on West Mount Light fixed in cathedral south tower ...	34 53 3	56 14 50
COLONIA ...	Revolving every 3 minutes ...	34 28 20	57 52 1
FARALLON ISLET ...	Light fixed ...	34 29 0	57 57 0
MARTIN GARCIA ISLAND	Light fixed ...	34 11 25	58 15 40
BUENOS AYRES...	Custom house light F. Guard Ship in the roads. Light fixed. Red and green lights on the landing mole.	34 36 28	58 22 20
LIGHT VESSELS—			
PANELA ...	Light fixed ...		} positions frequently shifted.
INDIO POINT ...	Light fixed ...		
ENGLISH BANK ...	Light fixed ...		
CHICO BANK ...	Light fixed ...		
CAPE ST. ANTONIO ...	North extremity ...	36 19 0	56 46 20
INDIO POINT ...	Tufted Hill ...	35 16 40	57 17 20
MAGDELENA ...	Church ...	35 5 0	57 32 30
RIACHUELO CHANNEL...	Two lights white and red appear white up the Dredged Channel.	34 37 5	58 21 0

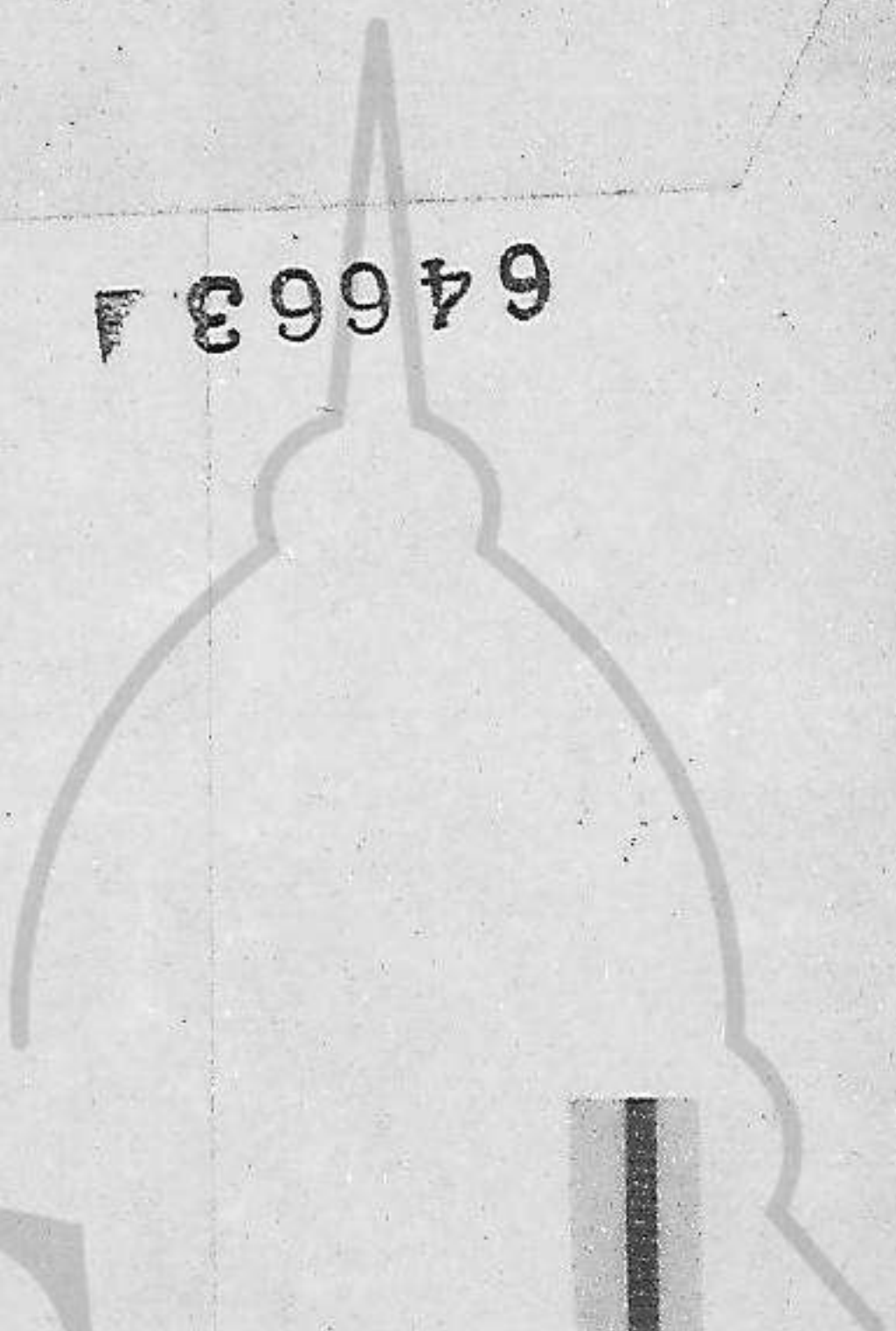


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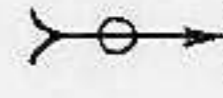


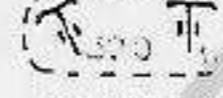


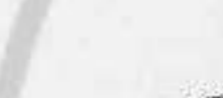
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LA NA

Croquis 9

REFERENCIAS:

-  Posición alemana.
-  » rusa.
-  Batería de obuses pesados 15 cm., alemana (Batería N.º 1).
-  Batería de obuses livianos, 10 cm.
-  » » cañones pesados 10 y 12 cm.
-  Agrupación de baterías rusas.
-  Instalación de flanco ruso N.º 1
-  Direcciones de tiro de las baterías alemanas contra las instalaciones rusas.
-  Direcciones de tiro de las baterías alemanas contra las instalaciones de flanco rusas.



Repartición del fuego de la agrupación B contra la artillería e instalaciones rusas de flanco

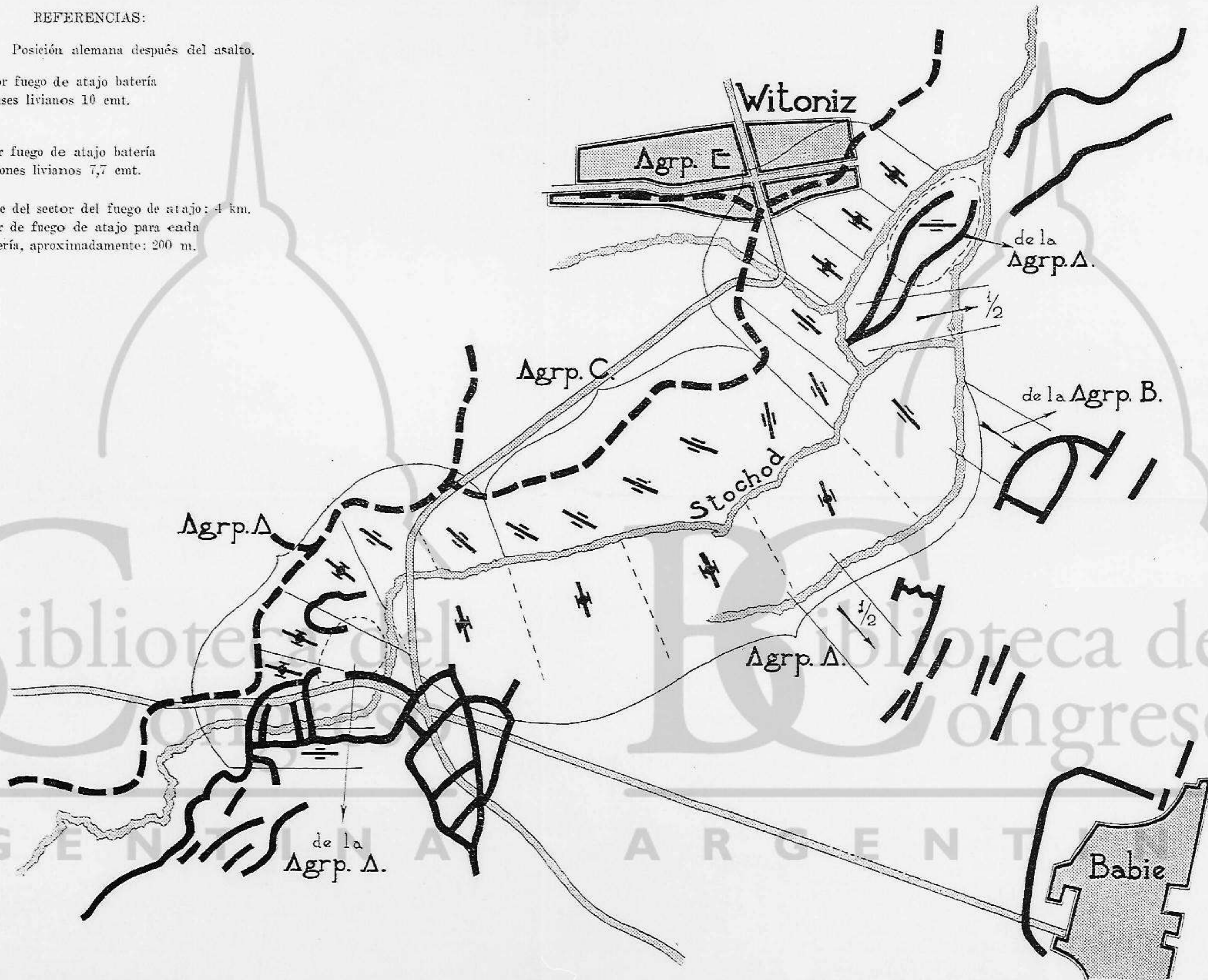
REFERENCIAS:

----- Posición alemana después del asalto.

||| Sector fuego de atajo batería obuses livianos 10 emt.

||| Sector fuego de atajo batería cañones livianos 7,7 emt.

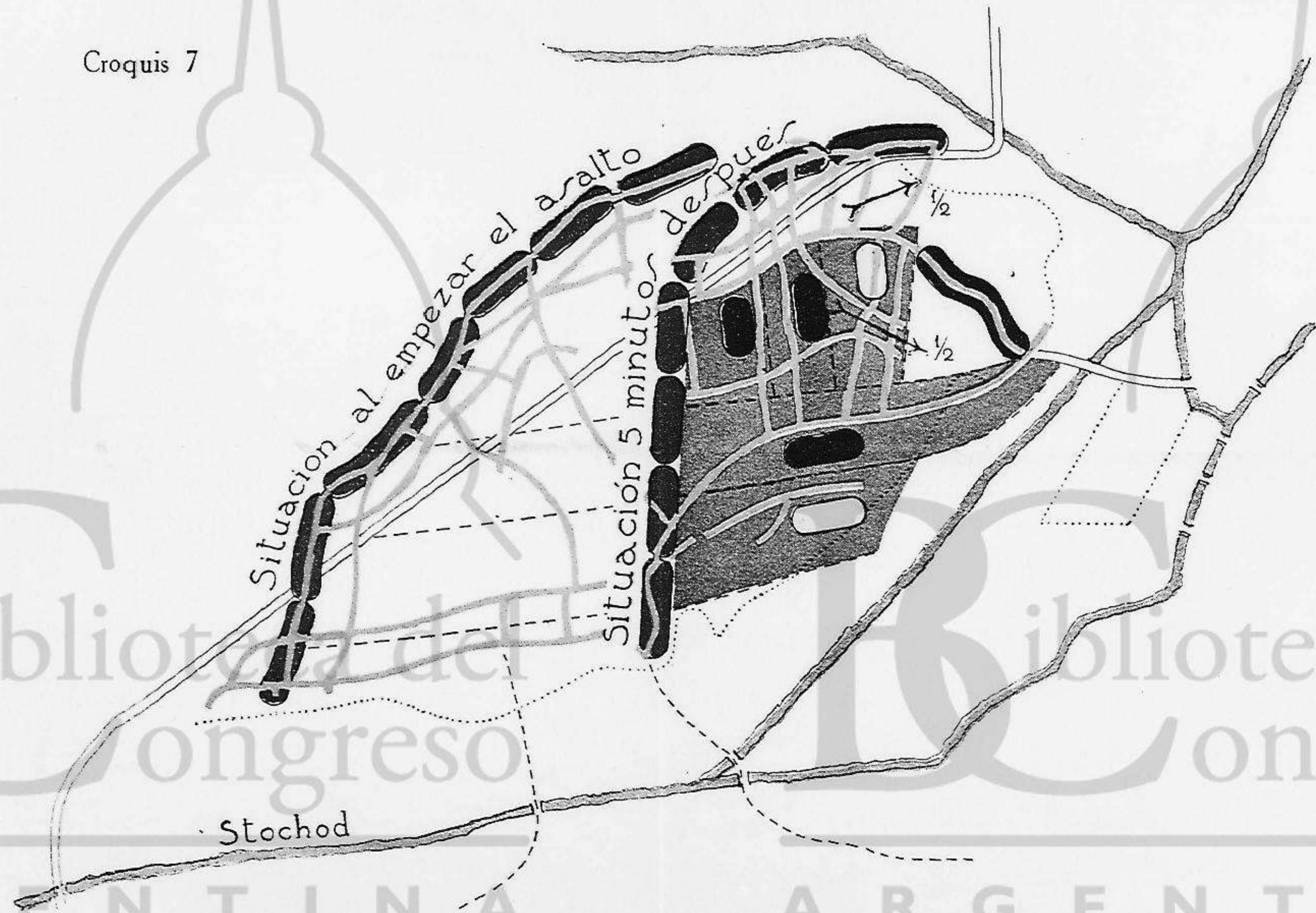
∨ Frente del sector del fuego de atajo: 4 km.  
Sector de fuego de atajo para cada batería, aproximadamente: 200 m.



Croquis 8. — Fuego de atajo después del asalto



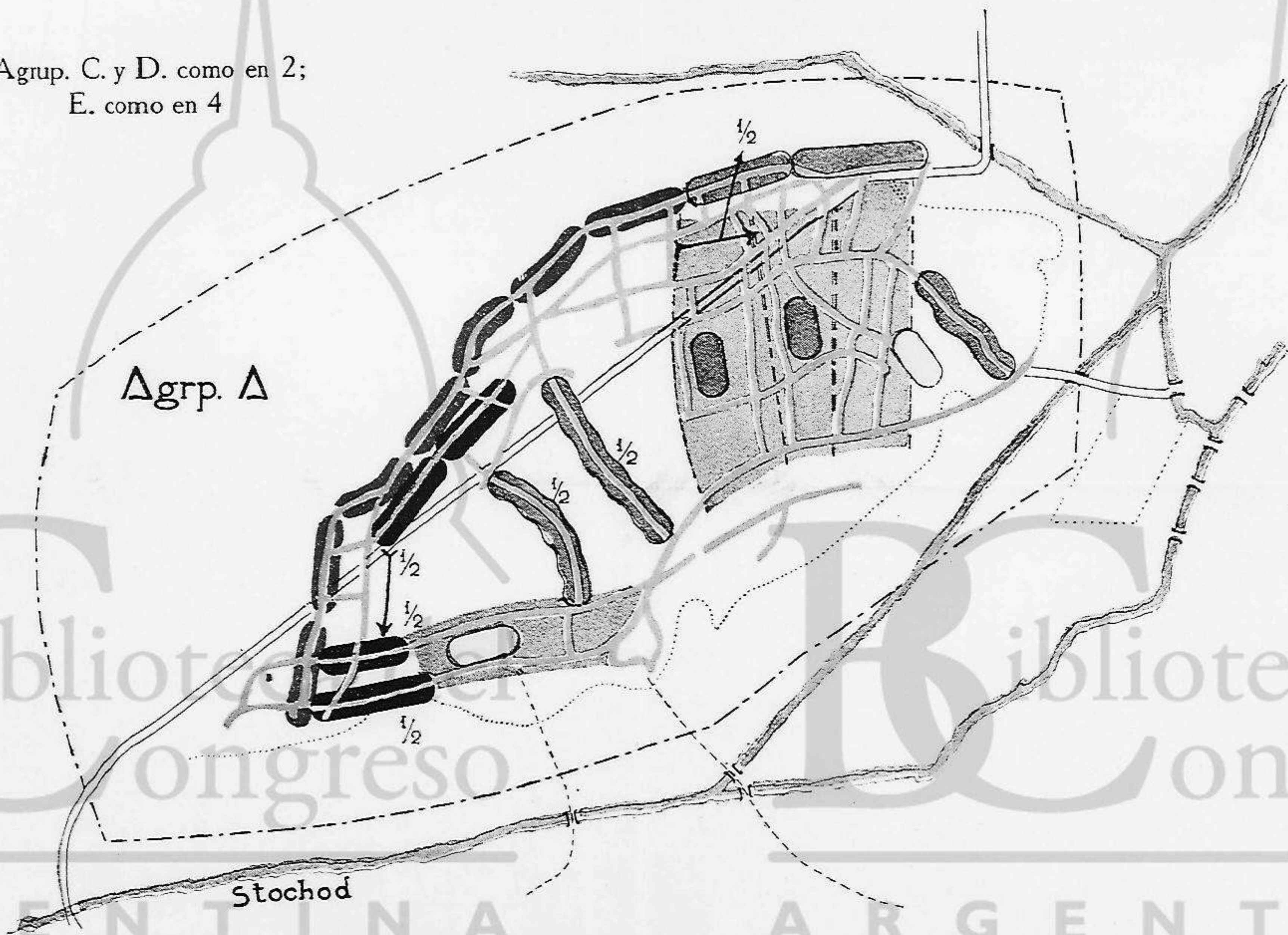
Croquis 7



Rodillo de fuego; su situación antes y después del 1.º alargamiento del tiro

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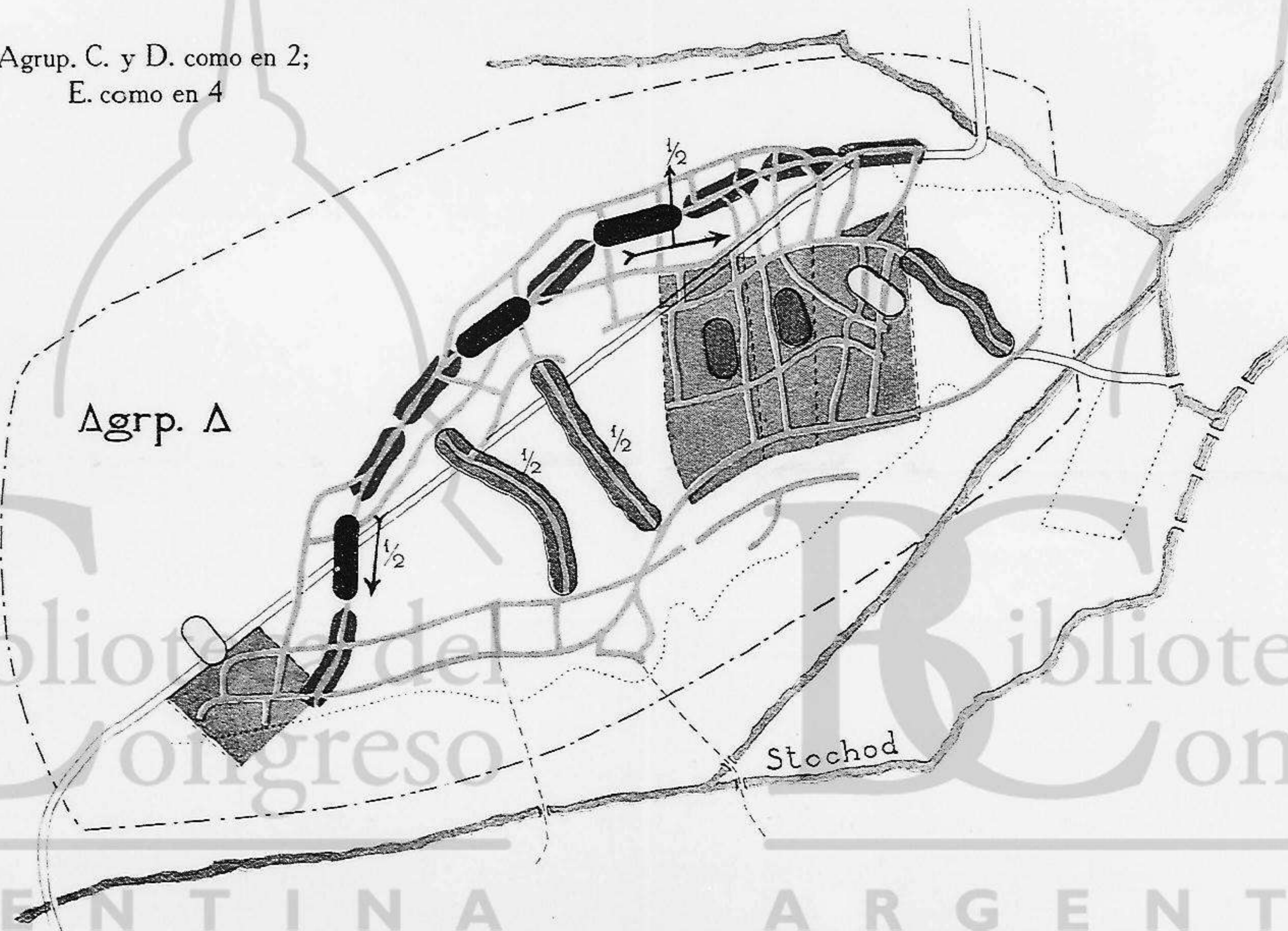
Agrup. C. y D. como en 2;  
E. como en 4



Croquis 6.— Tiro de eficacia. 5.º y 6.º período

Agrup. C. y D. como en 2;  
E. como en 4

Agrup.  $\Delta$

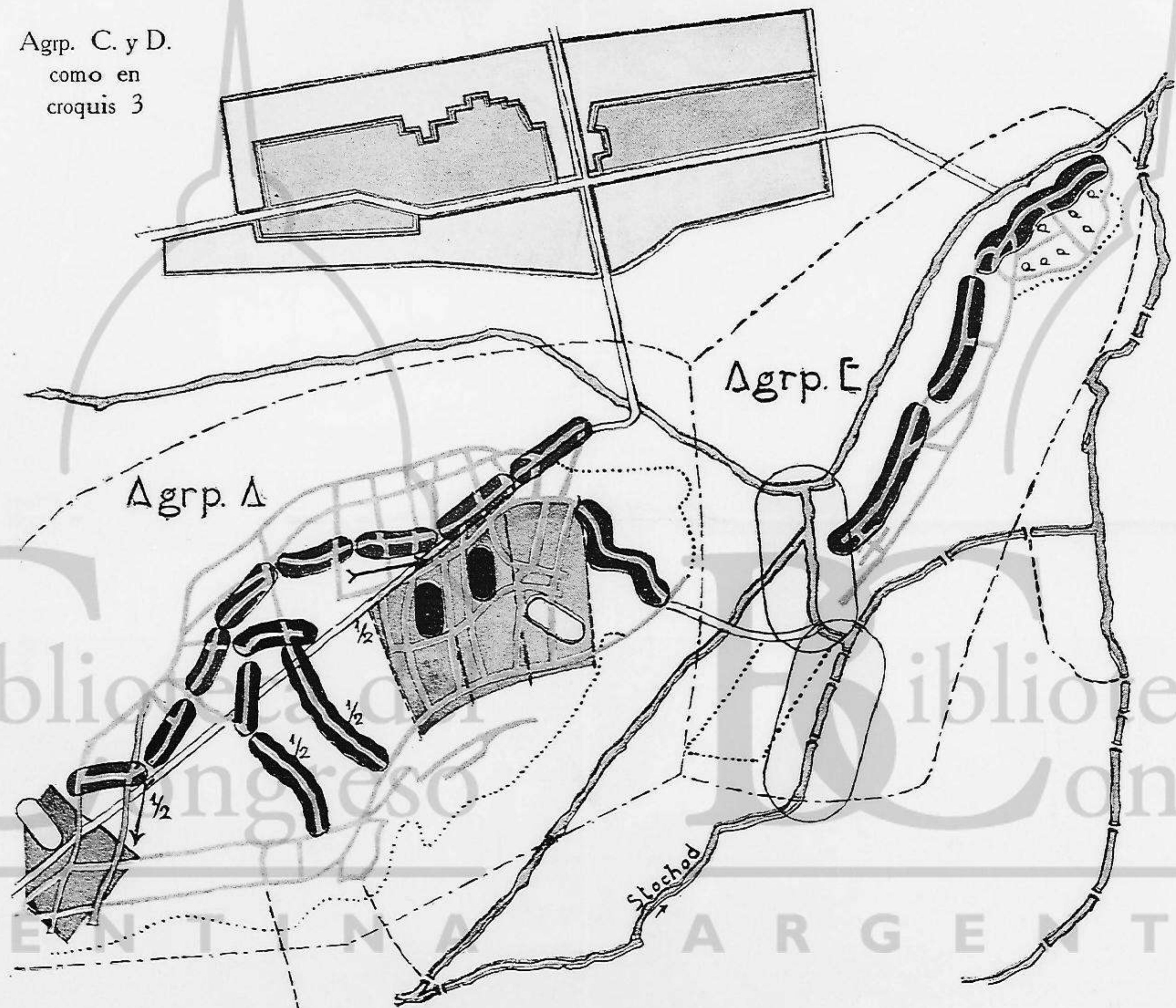


Croquis 5. — Tiro de eficacia. 4.º periodo

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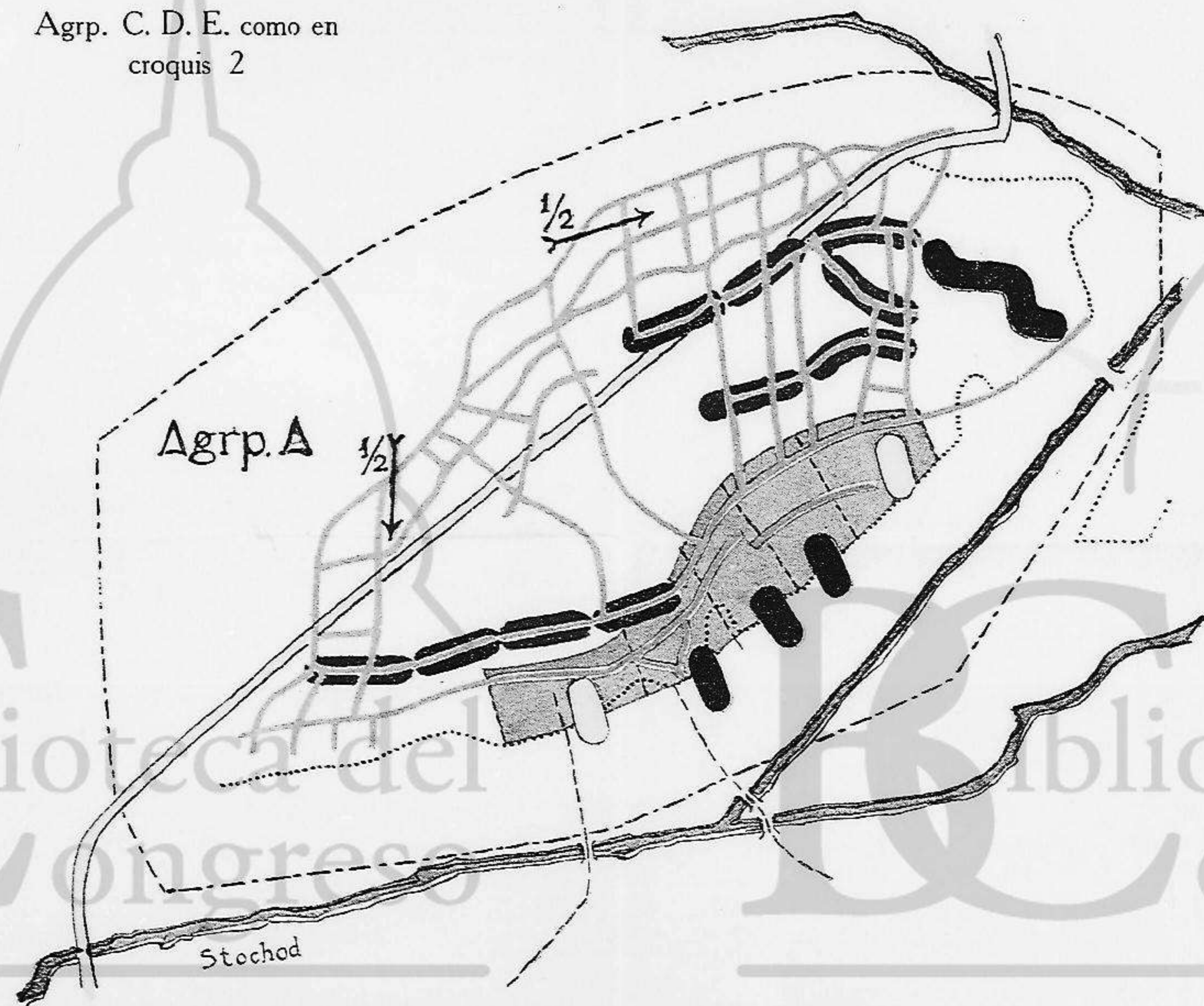
WITONIZ

Agrp. C. y D.  
como en  
croquis 3



Croquis 4. - Tiro de eficacia. 3.<sup>er</sup> periodo

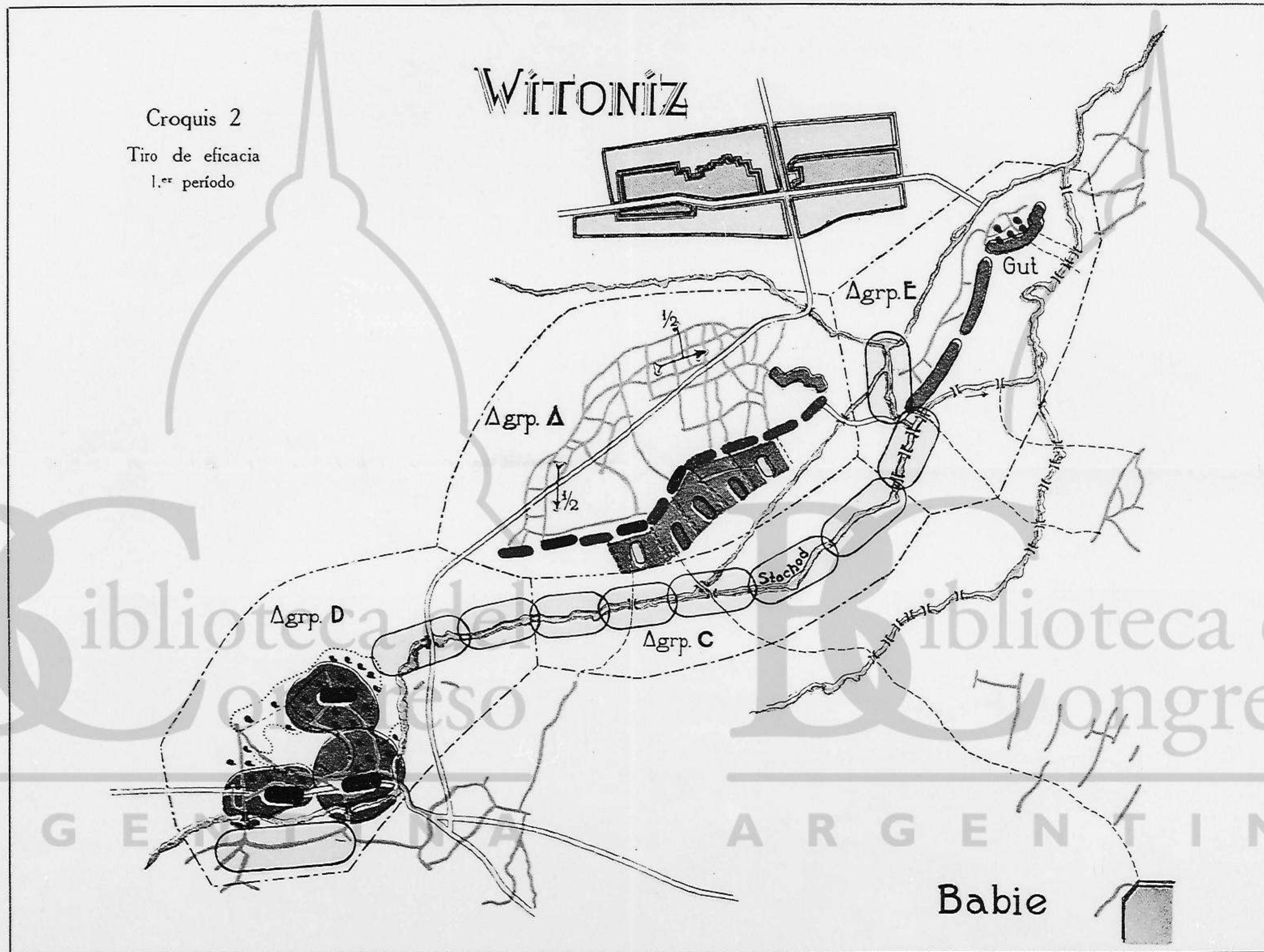
Agrp. C. D. E. como en  
croquis 2










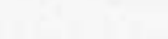
Croquis 3.—Tiro de eficacia. 2.º período

ARGENTINA ARGENTINA

Croquis 2  
Tiro de eficacia  
1.<sup>er</sup> período



REFERENCIAS:

-  Posición enemiga.
-  » alemana.
-  Agrupaciones de artillería.
-  Límites entre las agrupaciones de lanzabombas.
-  Frente de ataque: 4 km.
-  Frente que ocupa la artillería: 11 1/2 km.
-  Profundidad de la posición de artillería atacante (frente a la altura 192): 2700 m.
-  Límite anterior de la posición de la artillería con respecto a la posición de la infantería atacante: 1 1/2 a 2 km.

Nowy Dwor



Lowiszcze



Kol Ostrow

Dissonwald

Babie

Jasionowka

Gu Witoniz

Witoniz

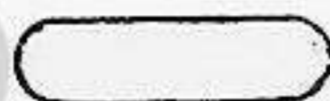
Solotwin




Croquis 1. - Asalto de la cabeza de puente Witoniz. 1.º de Noviembre de 1916

REFERENCIAS:

----- Límites de agrupaciones


 Batería de cañones de campaña

 " " " de 10 cm.

 " " obuses ligeros

 " " " pesados

 " " morteros

 Fuego de zonas

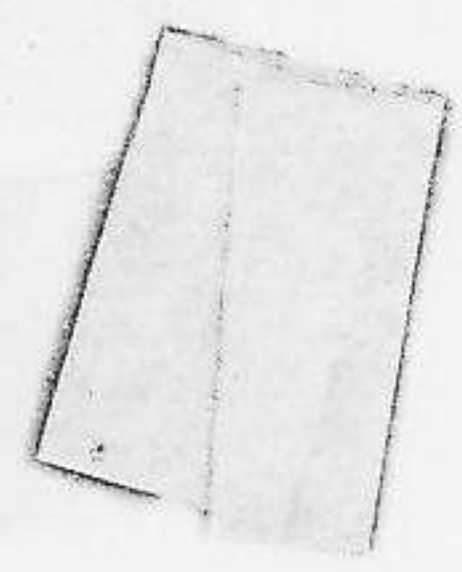
Croquis sin escala. — Ver descripción del terreno



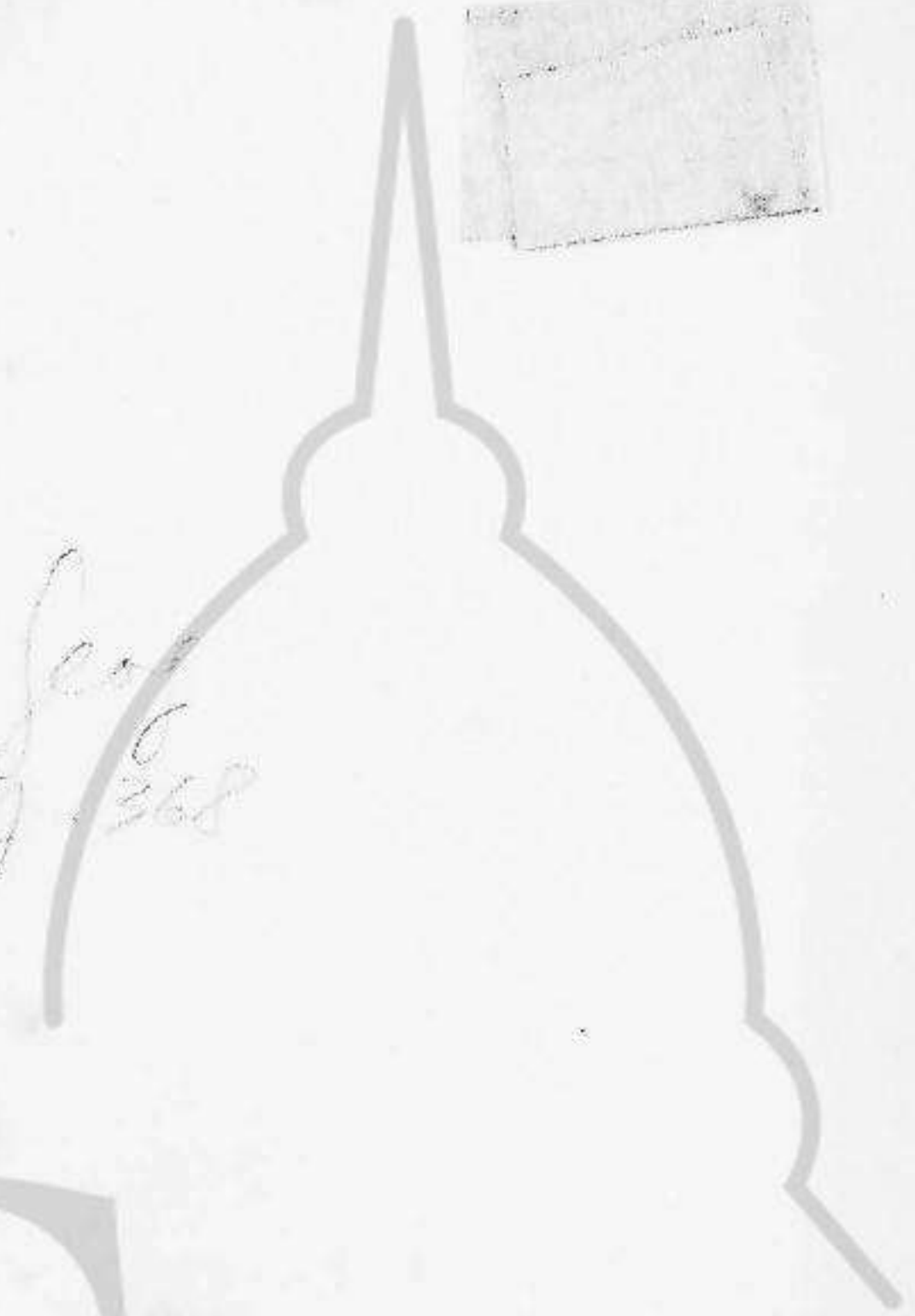


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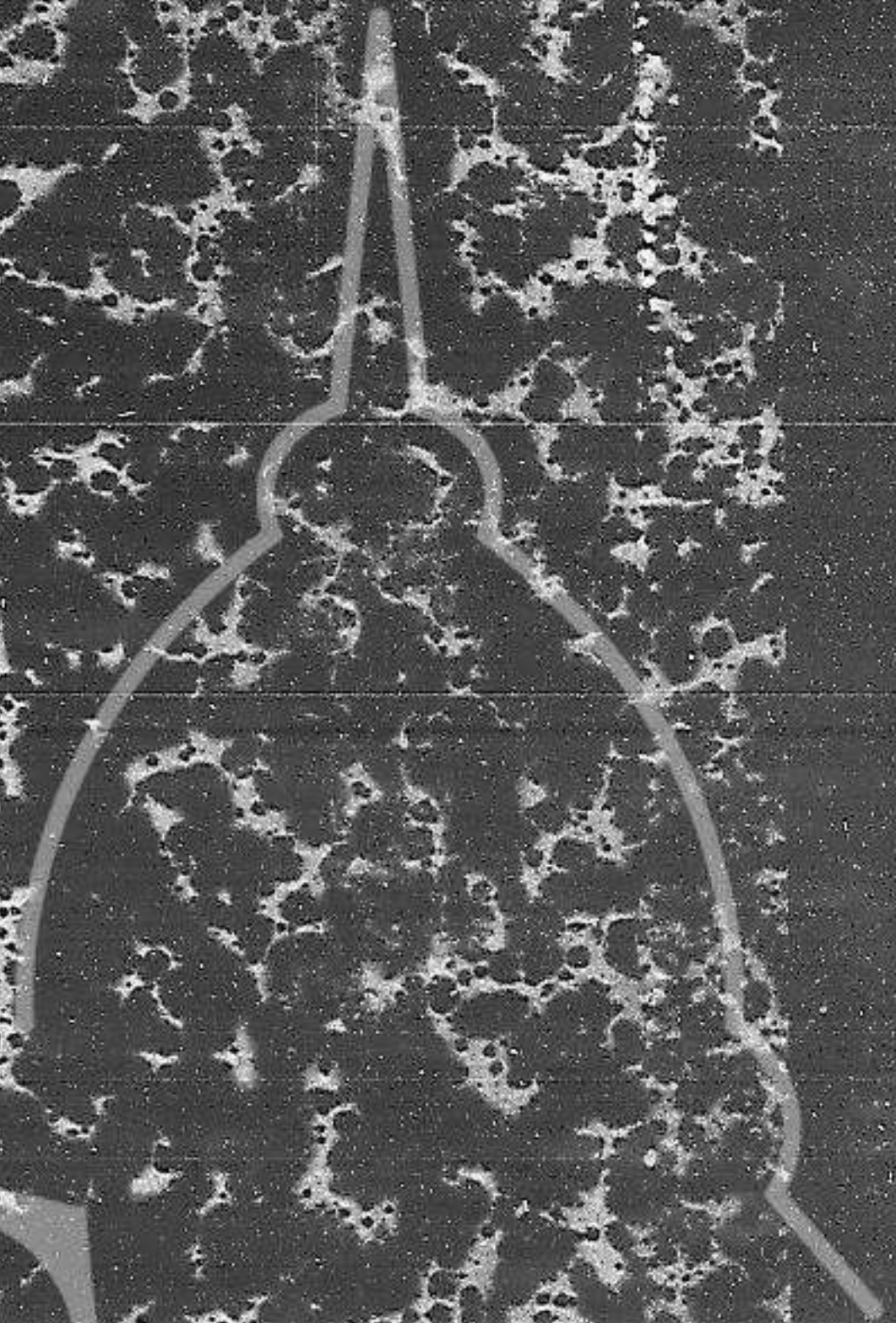
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